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AN INTERVIEW WITH MS. CAREY SMITH, PRESIDENT OF DEFENSE & SPACE AT HONEYWELL AEROSPACE

# DEFENCE TURKEY

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## STRATEGIC AIR DEFENSE SYSTEMS AND TURKEY'S ROAD MAP

## BELL HELICOPTER'S TILTROTOR TECHNOLOGY: THE FUTURE OF VERTICAL FLIGHT

## TASAM STRATEGY REPORT: THE FUTURE OF TURKISH DEFENSE INDUSTRY

## 3D PRINTING IN AEROSPACE – REVOLUTION OR EVOLUTION?

## A400M - 'GAME CHANGER IN TRANSPORT AND TACTICAL'

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## An Analysis on 'The Future of Turkish Defense Industry'

Ayşe Akalın Evers
Publisher & Editor in Chief

"The Future of Turkish Defense Industry", The Strategic Report prepared by the National Defense and Security Institute was released. The report focused on strategy to increase exports, the sustainability of Turkish Defense Industry, Plans and Strategies of the Defense and Security Industry Sector of the Western Countries and the Suggested Measures.

According to the report, in the last 15 years, the Turkish Defense Industry has taken the achievement to have operated in the international platforms and despite these positive developments, the resources allocated to the defense budget from gross national product started decreasing since 2010.

In the report, it was stated that a total of $ 7 billion was allocated to Turkey's defense expenses according to 2004-2013 data. In the coming 10 years, Turkey allocated merely 19 percent of this $ 17 billion budget to armament. The report underlined that the Turkish Defense Industry was still not at the desired level in indigenous and domestic design aspects and touched uponthe importance of decreasing foreign dependency especially in raw materials and the high cost of energy inputs.

On the international platforms, the report suggested another strategy for Turkey; to operate as amain contractor with less fierce competition conditions in countries such as Pakistan, Iraq, Georgia, Azerbaijan, Malaysia, Turkmenistan, Bahrain, United Arab Emirates, Egypt, Qatar, Nigeria, Afghanistan, Bangladesh, Rwanda, Colombia, Kazakhstan, Philippines and Slovenia.

It was stated that civil-military relations had an impact on the overall functioning of the defense industry sector. There fore, the report underlined the importance of the establishment of a strong architecture that would allow the structuring of the sector while decreasing the need for coordination.

In this part of the report, it was stated that as a result of the strong relations established with such countries, the Turkish Defense Industry would beheading towards the first row of the third league. Moreover, as stated in the concluding comments, Turkey's failure to create a global brand in the international arena besides the success of a few companies, due to its failure in forming an 'ecole' (school-model) was mentioned in addition to the limitations in the sector's market activities due to international regimes, the embargoes and sanctions implemented to third parties by the governments with whom Turkey allies with.

I believe that this analysis will be one of effective impact toward establishing new strategies to become a global brand and to increase achievements in new markets in the coming years.

In this issue we are pleased to share with you, interviews with Mr. Richard Harris, Vice President of International Military Business Sales at Bell Helicopter; Ms. Carey Smith, The President of Defense and Space at Honeywell Aerospace; analysis on Strategic Air Defense Systems and Turkey's Road Map; a report on The Future of the Turkish Defense Industry; recent developments and news; technical articles related with the products and capabilities geared towards the defense industry.

Enjoy this issue…■

# Strategic Air Defense Systems and Turkey's Road Map

by Cem Akalın-Editor

The "T-LORAMIDS" Turkish Long Range Air and Missile Defense Systems Tender that was expected to be concluded for a long time was cancelled with the Prime Ministry's declaration on 15th November 2015. Following the cancellation, the messages conveyed at the "Strategic Air Defense Systems and Turkey's Road Map" event organized by SETA (Foundation for Political, Economic and Social Research) on the 26th of October gained more importance.

SETA's Director of Security Research Assistant Prof. Murat Yeşiltaş was the moderator of the panel on "Strategic Air Defense Systems and Turkey's Road Map" organized by SETA and the Undersecretariat for Defense Industries. Undersecretary for Defense Industries Prof. İsmail Demir, Faculty Member of MEF University Prof. Dr. Mustafa Kibaroğlu, Faculty Member of İzmir University of Economy Dr. Sıtkı Egeli, Aselsan Deputy Director General Mr.Mustafa Kaval and Roketsan Deputy Director General Dr. Sartuk Karasoy attended the event as panelists. Turkey's strategies for the upcoming period were examined during the panel and the participants were informed on the significant clues regarding the cancelled T-LORAMIDS program.

The event was launched with the opening remark of SETA Director of Security Research Assistant Prof. Murat Yeşiltaş and Undersecretary for Defense Industries Prof. İsmail Demir took the floor as the first panelist. In his speech, Prof. Demir pointed out that missile defense systems were systems utilizing quite complicated systems in an integrated manner and mentioned that in case of a ballistic missile attack, following the identification of the threat, the threat should be classified through the supersensitive guided systems and then immediately destroyed. Prof. Demir added that in order to struggle against the stratified threats, the technological development capable of achieving the fight against greater threats should be accomplished immediately.

Prof. Demir stated that developing Turkey's Air Defense System fell under the responsibility of the Undersecretariat and added that Turkey was undergoing a tender process. Prof. Demir underlined important subjects regarding the upcoming period: "With the announcement of the winner of the T-LORAMIDS tender, several arguments in world opinion arose. Turkey's increasing its self-sufficiency in Air Defense Systems -as well as all other areas- is the point we attach importance. Our plans regarding this point are continuing. Considering this issue, our domestic defense industry companies are continuing their activities in the field of Low and Medium Altitude Air Defense Systems. We believe that these efforts will make significant contribution to our Indigenous Long Range Air and Missile Defense Systems". Given the ever-changing world conjuncture, Prof. Demir pointed out that the decision-makers desired to see their systems operating in the field as soon as possible, he emphasized that Turkey needed to remain prepared against surrounding threats at all times and immediately create its air defense shield.

In his speech, Head of MEF University's Department of Political Science and International Relations Prof. Dr. Mustafa Kibaroğlu underlined the requirement of the correct identification of the threat during the struggle against threats, regardless of its type. Prof. Kibaroğlu stated that the identification, categorization and eventually the destruction capacities regarding the military

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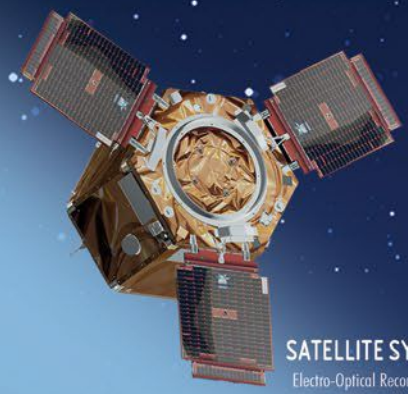

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SAMP/T Medium Range Air Defense and Missile System

and ballistic threats should be acquired immediately. Reminding the participants that Turkish Air Forces' existing air defense systems had the capacity to resist merely to threats of certain levels; Prof. Dr. Kibaroğlu added that Turkey had a limited defense capacity with the current resources and capabilities. Prof. Dr. Kibaroğlu also reminded that Turkey's interest in missile defense systems was not new and told that especially military circles were interested in this area in the 90s and added that during the 1st Gulf War in 1991, hit rate of the Patriot missiles was 13 percent. Stating that following the Gulf War in 90s, there was no progress in the ARROW project upon which Turkey, US and Israel negotiated and told that when the representatives of USA and Israel were inquired about the reason behind this, each party blamed each other. Prof. Dr. Kibaroğlu expressed that though Turkey was not yet at the desired point, it was now in a better place considering the defense area and stressed that the country needed to strengthen its Smart Power in order to avoid the surrounding threats. Prof. Dr. Kibaroğlu concluded his speech saying that the Western allies' insistence on Turkey not procuring its missile defense system from China was meaningless as these countries did not make use of the opportunities handed over them many times before.

In his remark, İzmir Economy University Faculty Member Dr. Sıtkı Egeli expressed that the air defense systems were far more different than the conventional weapon systems and they remained in an area where countries' defense strategies and "Grand Strategies" intersected each other. Touching upon the features of the ballistic missiles, Dr. Egeli warned the participants that the identification of such missiles were quite difficult before and after their launch and that as a result of their ability to move fast, the reaction duration of the targets were quite short. Reminding that most of the ballistic missile flights took place at the in space, Dr. Egeli noted that this feature made the conventional preparations meaningless. Dr. Egeli spoke of another feature of the ballistic missiles and said that their speed increased in parallel with the increase in their range and thus it became more impossible to resist against them. Dr. Egeli mentioned that against the ballistic missile attacks, in addition to the air defense systems, special sensors and satellite systems located in space to make the first warning were required and underlined that these systems were currently owned by USA, Russia and

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Israel. Stating that in case of the existence of the sufficient technology, it would be relatively easier to stop the ballistic missiles in space, Dr. Egeli stressed that the sooner a missile is stopped, the wider the protected area would be. On the other hand, Dr. Egeli said that the attacking party would always be a step ahead of the defense when the ballistic missiles are at hand and stated that defense would be harder and more expensive. Addressing the statements of the representatives of the USA, that spent $ 350 billion toward missile defense systems in the last thirty years, Dr. Egeli emphasized that this was not a battle to be won on the financial side. Dr. Egelistated that Turkey has been under the missile threat since the 1960s and that it became interested in the systems with ranges over 300 kilometers in 1990s. Dr. Egeli recalled that the ranges of the ballistic missiles manufactured by Iran exceeded 1.100 kilometers and stressed that following this development, the stage of preventing these missiles in space should be adopted step by step. Dr. Egeli additionally noted that Turkey became interested in the Russian ballistic missiles since 2008 as Russia started to utilize these missiles against Georgia. Lastly, Dr. Egeli said that Turkey's overall air defense was based on aircrafts, that ground stationed systems were weak and therefore the country suffered from an overall weakness.

In his presentation, Roketsan Deputy Director General Dr. Sartuk Karasoy summarized the technological developments in missile defense systems and mentioned that the ballistic missile defense systems' operations were getting more complex each day in parallel with the technological developments in that field. Dr. Karasoy underlined a technical feature of the ballistic missiles is that of the impossibility of interfering them during a major part of their flight after they are launched. Dr. Karasoy told that even though they expected that the SM-3 and THAAD systems would be available for Turkey's access within the NATO framework, due to the role determined for Turkey as part of NATO's overall defense concept, Turkey was unable to access these systems. He underlined that, therefore, Turkey should be developing a "Turkey centered system" to abolish its foreign dependency. Dr. Karasoy added that in addition to a ballistic missile defense system Turkey has to adopt "space" as a strategic target in order to acquire a ballistic missile defense capability in a wider sense.

Aselsan Deputy Director General Mr. Mustafa Kaval made a presentation on the air and missile defense systems and assessed Turkey's current status in these areas. Mr. Kaval stated that the air and missile defense systems should actually be defined as the system of systems for in these systems numerous systems were functioning in an integrated manner. Mr. Kaval noted that the communication infrastructure, sensor systems, weapon systems and the command control systems within the air and missile defense systems were extremely complex structures nested within each other. Mr. Kaval stressed that a severe system engineering approach was necessary for all levels in order to make progress in the studies and activities to this end and reminded the participants of the vital importance of the correct need assessment. Moreover, Mr. Kaval told that the acquisition of T-LORAMIDS system-program would not be fully solving Turkey's air defense requirements, and underlined that increasing the number of such systems, their expansion were required for locating Turkey under the full protection of the shields offered by these systems.

In the Q&A session of the panel, regarding the question about the current situation of Turkey within the scope of the missile defense system tender, Undersecretary for Defense Industries Prof. İsmail Demir expressed that the tender process was a dynamic one in the sense of proposals and negotiations and Turkey was about to reach a final decision taking Turkey's needs and interests into consideration and that they passed to the final stage of the tender.

## Where is Turkey Heading after the T-LORAMIDS?

Following these remarks, an important decision was reached on 15th November 2015 regarding the T-LORAMIDS program that has been occupying the agenda for quite a long while and the cancellation of the tender that was initiated eight years ago was announced to the public opinion. So, how was the procurement plan initiated? How was Turkey's Ballistic Missile Threat perception formed? In order to reach a better understanding and see the big picture, we need to reconsider the cold war era and observe the Middle East geography dominated by wars and conflicts. Turkey's introduction to the ballistic missiles threat that was increased especially in the 1980s, developed and expanded their utilization scale occurred in 1991 with the 1st Gulf operation. The SCUD, R-17 and EL-Hussain missiles in the inventory of the Iraqi Army were used against the coalition countries and Israel many times. Within this scope, Turkey remaining in the hot line began to perceive the Ballistic Missile threat this close for the first time. With the ballistic missile attacks displayed live and the scale of the threat formed and the escalating defense perception, made it compulsory for Turkey, which was one of the most important actors of the conflicted region, to take steps to this end. In that period, against the Ballistic Missile threats, Turkey only owned the "Nike – Hercules" missiles manufactured in 1959 that were designed in line with the cold war concept and doctrines of the 1960s and intended to intercept the Soviet aircraft fleets. These systems in the inventory that were designed according to the old and cold war doctrines were way behind the rapidly developing, evolving, ballistic missile threats that were rapidly increasing their range and velocity. Protection of major cities, military bases with great importance, critical facilities in particular, had to be provided through long range air and missile defense systems and this point became one of the privileged topics of Turkey. During the Gulf War, the American Patriot systems located in Turkey were once intended to be procured via the Foreign Military Sales, however the procurement plans were suspended due to the economic crisis that Turkey went through in 1994 and as a result of the ensuing political ambiguities it could not be implemented at all.

Ten years after, in 2006, within the scope of a plan formed by the Undersecretariat for Defense Industries authorized by the Ministry of National Defense, on 30 June 2006 with a decision adopted by the Defense Industry Executive Committee, the T-LORAMIDS (Turkish Long Range Air and Missile Defense Systems) Program was initiated. Following the preparation of the feasibility studies and the Request for Proposal (RFP), in 2010 RFP including the technical specifications were issued. In the tender, executed through the foreign direct procurement method, Lockheed Martin-Raytheon consortium proposed "Patriot PAC II/III", French – Italian consortium Eurosam offered "SAMP/T", Russian Rosoboronexport Company offered Antey 2500 and Chinese CPMEIC Company offered FD-2000 (the export version of HQ-9) to Turkey in their proposals. The final decision was announced through Defense Industry Executive Committee's (SSIK) decree of 26th September 2013. It was decided to initiate the contract negotiations with China Company CPMIEC and in case an agreement could not be reached with them then negotiations were supposed to made with French – Italian consortium Eurosam that was the second company in the tender. Meanwhile, in order to avoid the exclusion of Eurosam and the American party from the process, Turkey reached decisions on extending the validity of the proposals for their revision two times. Taking the operational requirements of the coming 20-30 years, Turkey was determined to procure the most developed and improved systems. Moreover, in the procurement of the aforementioned system, in line with its strategic plan Turkey identified certain significant criteria such as the infrastructure to be established within the country, the joint production areas, technology transfer, industrial participation, etc. As these criteria could not be met at the expected level and for the parties could not reach an understanding, this two-year-long adventure ended on 15th November 2015.

The severe messages conveyed by the Turkish party before the cancellation were already the indicators of direction of the tender headed. A year before the cancellation of announcement, prior to the NATO Summit of 2014, President Mr.Recep Tayyip Erdoğan declared that there were problems with the Chinese party regarding know-how and joint production issues, that the Italian – French consortium listed as the second winner of the tender revised and submitted its proposal and that they were conducting the negotiations in this context. These declarations, uttered by the highest rank of the state, underlined that Turkey was adamant about its sine qua non criteria regarding the maximum domestic participation ratio, industrialization and technology transfer and would not take a further step before they were fully met. Following the aforementioned message from the top authority of the state, at the ADEX 2014 event that took place in Azerbaijan in September 2014, the sector's senior executives made important remarks considering the Indigenous Long Range Air and Missile Defense System, the feasibility studies of which were carried out simultaneously with the T-LORAMIDS program. The sector's prominent actors, Aselsan and Roketsan officials stated that they were prepared to develop Indigenous Long Range Air and Missile Defense Systems with the help of the know-how they acquired from the Low and Medium Altitude Air Defense Missile Systems and by making the following remark that read, "Our negotiations on the technical scope are continuing and we reached a certain level in Low and Medium Altitude Air Defense Systems. We agreed that we had the capacity to accomplish these activities within the scope of 'high altitude' and believe that we would complete this program in a five-year-period".They conveyed the message both to Turkish public opinion and to the actors competing in the tender. Following the messages given in the last quarter of 2014, the electoral atmosphere in the country, and in addition to the changes in the world conjuncture, the program did not appear in the agenda until June 2015. The negotiations were conducted quietly and then in June 2015,it was claimed within the defense source that the negotiations were blocked on the technology transfer issue. Eventually, on 15th November 2015, the cancellation of the tender was announced to publicly.

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**So, what are Turkey's options now, following this decision? Has Turkey identified a Road Map?**

Due to their architecture, the High Altitude Air and Missile Defense Systems are composed of very complex systems and sub systems. Turkey has a threshold to get by on this issue, but fortunately there are some promising developments too. In the exclusive interview our magazine made with Aselsan's General Manager Dr. Faik Eken in November 2015, he noted that they had the infrastructure capable of manufacturing long range search and fire control radars that were considered to be the most critical components of the Long Range Air and Missile Defense Systems and said, "With our infrastructure level and with the know-how we acquired, we are capable of developing these radars. We are perfectly able to produce both the modules used in these radars and the Gallium Nitrate transistors used in the modules through our national resources. Regarding the radars, we formed the know-how capable of design and production without foreign dependence at all levels. The first application of this capacity was launched in the Low and Medium Altitude Air Defence Missile Systems "Hisar" and Self – Propelled Low Altitude Air Defense System "Korkut" projects. As Aselsan, we designed and manufactured the search and fire control radars within the scope of these projects. We are getting quite successful results in the ongoing field tests with these radars". Additionally, in his special statement to our magazine in September 2015, Defense Industry System Projects and Logistics Deputy Undersecretary Mr. Mustafa Şeker relayed important messages by saying, "We are hoping that Turkey will be fulfilling the radar requirements of the Long Range Air and Missile Defense Systems within the next four-years-period". These optimistic messages given by the prominent representatives of the sector may seem to pave the way in front of Turkey, yet the country has lost a great amount of time considering the urgent requirements and the increasing threat perception. And bridging this gap does not seem so easy in the short run. Unfortunately, Turkey does not have many options in this context. According to the best case scenario assessed, through the technology transfer and support accomplished in the critical technologies arena, Turkey would be putting forth a prototype system in 5 to 10 years' time. Meanwhile, the indigenous development studies of "Hisar A" and "Hisar O" Projects continue and currently the sub system development and test activities are being conducted, a certain level of maturity has been reached considering the design of the ground systems and missile sub systems but it is stated that for the qualification and serial production of these systems, another 3 or 4 years' period would be required. So, what kind of a Road Map does Turkey have ahead? Should Turkey continue its progress stage by stage with the extended version of the "Hisar A" and "Hisar-O" systems that were indigenously designed through local resources? Or would it be better to create its own high altitude air and missile defense system by making a technology transfer and shortening the period with a partner country?


"Hisar-O" Turkish Indigenous Medium Altitude Air Defense Missile System.

The response to all of these questions surely lies beneath Turkey's perception of threats. Are the targets, "Air Breathing Targets" such as the UAVs, Combat Aircrafts, Fighter Aircrafts, and Cruise Missiles? Or are they the ballistic missiles that contain 30% of the threat perception yet requiring a different category? Or should all of the aforementioned be considered?

Besides all of these options, during and after President Recep Tayyip Erdoğan's visit to France in December 2015, the Air Forces Command and representatives of the Undersecretariat for Defense Industries' participation in the SAMP/T system's fire test conducted in Italy indicate to us that there is still a third option on the table. 2016 will be a year that we will learn the answer to many of these questions. We wait in anticipation and we will follow the progression as this topic unfolds.

# Bell Helicopter Expects Tiltrotor's Unique Combination of Speed, Range and Payload to be the Future of Vertical Flight

Mr. Richard Harris, Vice President of International Military Business Sales Bell Helicopter shares the company's enthusiastic view about growth opportunities in Europe - Expanding discussions with both Turkish Military and Industry in 2016, Leading the Industry with combat-proven Tiltrotor Technology, Investing in the Future of military rotorcraft with the next generation V-280 Valor tiltrotor.

**Defence Turkey: In terms of production, investment, export and international projects, how could you evaluate the improvements in figures in 2015? How do you assess Bell Helicopter's position in 2016? What are 2016 targets?**

Bell Helicopter's military programs continue to deliver and perform. 2015 was one of our best years, and we expanded our international military sales by over 500%. In fact, Bell's resurgence into the military market has taken the industry by storm and we see huge growth potential in 2016 taking large market share from Boeing, Sikorski, Airbus, and others.

**Defence Turkey: Could you please enlighten us about your Military helicopters?**

Bell Helicopter produces and maintains the most robust and state-of-the-art combat helicopters in the world, which include the UH-1Y, AH-1Z and V-22.

The UH-1Y and AH-1Z are just now entering into the international market, setting new records for affordability, performance and combat effectiveness. As the mainstay of US Marine Corps combat rotorcraft, they offer the most effective and efficient means of accomplishing an array of missions, anywhere in the world. The two airframes boast an amazing 85% commonality of parts, significantly reducing the logistics footprint, training costs and burdens on the supply system. Most remarkably, these state-of-the-art helicopters boast a 30% reduction in Life Cycle Costs (LCC) over all current and legacy equivalent platforms.

The Yankee (Venom) and Zulu (Viper) are both operated by the Marine Corps, which has reinvented both utility and attack helicopters into ones that are more comprehensive in functionality and capability.

© Defence Turkey

Upgrades in ISR, targeting, precision fires, lift, and operational reach represent a giant leap in the capability to support the utility and attack mission spectrum

New, marinized airframes well-matched to state-of-the-art sensors, also, providing corrosion resistance in sea/coastal/humid environments

The V-22 tiltrotor is now referred to as the most in-demand aircraft in the United States Marine Corps. The Osprey has proven its worth with nearly 300,000 flight hours in humanitarian aid campaigns, rapid response emergency evacuations and long-range logistical support. The versatile Osprey has become the United States crisis response platform of choice. Supporting earthquake relief in Nepal in May 2015, the airports in Kathmandu were damaged in the earthquake. The V-22s were dispatched from Okinawa to get much needed food and medicine into the hard-to-reach and high-altitude locations across Nepal.

The V-22 has proven a highly effective platform for long-range combat search and rescue (CSAR) and in personnel recovery, given its speed and range. This was demonstrated in the rescue of the F-15 Pilot downed over Libya where a V-22 executed a safe recovery and return of the pilot to a ship faster than a helicopter could have even reached him.

**Defence Turkey: How would you assess your position in the defense industry market? What are your ongoing programs and achievements taken in recent years in global markets?**

Bell Helicopter has been setting the global standard in the rotorcraft business for the past 80 years. We invented the combat utility and attack helicopters, which all modern day versions are derived from. Bell's entry in the tiltrotor market with the V-22 was evolutionary, and set the standard for global military engagements as well as humanitarian relief operations.

Bell recently enjoyed their first international military sales in 20 years to Japan (V-22) and Pakistan (AH-1Z), marking a resurgence in Bell's military portfolio and prowess. On the horizon, the Bell V-280 is defining the Future Vertical Lift (FVL) requirements for the US Army and other services. We see tiltrotor as the future that will eventually make all conventional helicopters obsolete

**Defence Turkey: As it is well known that, The V-22 Osprey is the world's first production tiltrotor**

© Bell Helicopter

V-22 Osprey


**aircraft. Could you please enlighten us about the program in details? What is the role of Bell Helicopter as one of the prime contractors in this program?**

The Bell Boeing team is constantly working on ways to add to the Osprey's already versatile portfolio of capabilities. The companies are in the process of developing or demonstrating an offensive weapons capability for the V-22 that includes the ability to forward-fire rockets and missiles. In addition to this, the team is also working on further development of the capability for performing as a tanker, refueling fighters and other military aircraft while airborne. No requirement exists for these capabilities yet from the V-22 operators, but the ongoing enhancement efforts underscore the fact that the book is still being written on what the V-22 is capable of. We've also fielded an Inlet Barrier Filter which has substantially increased Engine On Wing Time (EOWT) and reduced maintenance hours and cost per flight hour.

The Marine Corps recently conducted an exercise on the USS Wasp involving the V-22s and the F-35Bs. THE USMC is testing how the F-35b performs with deck operations designed to simulate combat conditions, and part of this picture is to see how the V-22 can fit into a concept of operations that includes tiltrotor. Part of this exercise included the internal delivery of an F135 power module on a sled designed by Pratt Whitney. The ability to resupply the F-35 engine modules at sea is one of the key parts of the V-22 Carrier Onboard Delivery mission. This is just the start of what a new aviation-optimized amphibious force could accomplish when integrated with the versatility of the V-22 platform.

**Defence Turkey: What can you say about technical capabilities and technological competence about V22?**

With the nature of an increasingly interconnected global economy and geopolitical instability with transnational threats, all regions of the world see an increasing demand for technologies that support national security and help save lives. Tiltrotor is one such technology. Its unique combination of speed, range and payload make the V-22 tiltrotor the most in-demand aircraft for the U.S. Marine Corps. The USMC uses the V-22 around the world to not only protect U.S. and allied interests, but also to support life saving operations in Humanitarian Assistance and Disaster Relief.

In today's contested and Anti-Access Area Denial (A2D) environment, the necessity for technologies which maintain and even increase operational maneuver are even more important. Tiltrotor is one such transformational technology, which does exactly that. It is expected that as the proven performance, understanding and acceptance of tiltrotor technology continues to inevitably increase, so will its demand in the global market. Bell Helicopter expects tiltrotor's unique combination of speed, range and payload to be the future of vertical flight for global militaries as well as for commercial applications, which demand that unique combination of performance in complex missions such as Search and Rescue.

The V-22 is an expeditionary aircraft whose missions require it to deploy on U.S. Navy ships. As a result the Osprey is designed and manufactured to withstand the harsh environment

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aboard an ocean going vessel. Marine and Navy aircraft built by Bell Helicopter are designed to withstand most environmental conditions, not simply ocean environments. This is important for any operations, close to the ocean or not. Countries that have purchased other products have found that corrosion is a significant issue that must be addressed continually if the airframe they purchased was not specifically designed to operate in challenging environments. Those militaries that invest in corrosion prevention have seen a higher return with regard to aircraft availability than those that did not purchase an expeditionary or marinized aircraft.

**Defence Turkey: Could you please tell us about versions and different configurations of V22 for Navy, Air Forces and other civil and security Missions?**

Since entering into service in 2007, the Osprey has achieved outstanding mission success in deployments around the world. The V-22 is the safest aircraft operated by the United States Marine Corps (USMC), and offers operators a full spectrum of mission capability. This includes raids, Casualty Evacuation (CASEVAC), Tactical Recovery of Aircraft and Personnel (TRAP), Humanitarian Assistance/Disaster Relief (HA/DR), resupply, VIP transport, and theater security cooperation.

Air Force Special Operations Command (AFSOC) CV-22: Mission profiles include long-range special operations, evacuations and maritime special operations, and contingency operations. Bell Boeing has delivered a total of 44 CV-22 aircraft so far.

United States Marine Corps MV-22: Mission profiles include amphibious assault, sustained land operations, and self-deployment. Since the MV-22 was initially deployed in June 2007, it has been deployed in varying roles across the globe in support of contingency operations. Bell Boeing has delivered a total of 242 MV-22 aircraft so far.

The U.S. Navy's decision to procure 44 V-22s for the vital Carrier Onboard Delivery mission reinforces the critical requirement for tiltrotor aircraft that can transform naval logistics around the world.

**Defence Turkey: What are the ongoing programs for V22 and H-1 on local and international platforms?**

The Japan Self Defense Force announced its procurement of 5 V-22, with the current intent to procure 12 more for a total of 17 V-22, which is a leading indicator of the developing global understanding and demand for tiltrotor technology the unique increased capabilities it brings to the warfighter.

As part of a recent contract award from the U.S. Navy, Bell Helicopter will manufacture and deliver three AH-1Z "Viper" helicopters for the Pakistan Army. This contract calls for the AH-1Z helicopters along with additional equipment, training, and logistical support. The work will occur at the Bell Helicopter manufacturing facility in Ft. Worth, Texas, and at the company's aircraft assembly facility in Amarillo, Texas.

We have received positive feedback from many countries for the UH-1Y, AH-1Z and V-22. Foreign military sales are government to government transactions. The process can be very involved, and timelines can shift. Our aircraft continue to garner interest and we stand ready to work with our in-country partners to support our Governments for any international sales.

**Defence Turkey: You have strengthened your presence in Turkey by establishing a new office with Elibra. Could you please inform us about this new structure and cooperation with Elibra?**

Elibra Global is Bells trusted consultant and agent in Turkey. They have a wealth of knowledge and experience in the rotorcraft industry, and are serving the company well as a forward positioned advocate and agent for Bell products.

**Defence Turkey: Could you please inform us about your activities performed over the years in Turkey? What is your assessment on the future cooperation opportunities in Turkey?**

Bell Helicopter is enthusiastic about growth opportunities in Europe, and we see a large potential in the Turkish market. Recent sales:

- Bell Helicopter announced its facility in Prague, Czech Republic delivered two commercially registered Bell 429 aircraft to Turkey. The aircraft were delivered to Saran Aviation and were highly customized in a Helicopter Emergency Medical Services (HEMS) configuration. The customization also included a TCAS system, full cabin audio communication system, marker beacon, maritime communication radio, loud hailer, moving map and an upgraded GPS system. Based in Istanbul, Saran Aviation, a Saran Holding Group company, will fly the Bell 429s for helicopter emergency medical services. In conjunction with TAA Gökçen Aviation, Saran Aviation's air ambulance services enable immediate and effective emergency intervention in situations where ground transportation would be inefficient or protracted, resulting in greater risk to the patient to receive timely medical care.
- The Turkish National Police purchased 15 Bell 429s to be used as multi-mission airborne platforms flown across the full array of law enforcement missions from surveillance to air support of ground operations
- The Bell 429 was selected for its superior performance, low operating costs and ease of maintenance. In addition, Bell Helicopter's industry-leading customer support and service was a key factor in the selection
- The Bell 429 was selected after an extensive evaluation period during which

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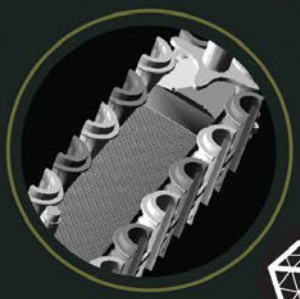

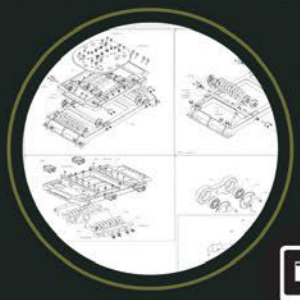

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Turkish National Police Bell 429

members of the Turkish National Police Undersecretariat for Defence Industries, SSM and Turkish Aeronautical Industries (TAI) visited several large helicopter OEM's in North America and Europe

- Five Bell 429 aircraft operated by the Turkish General Directorate of Forestry (TGDF) to protect forest resources and coordinate firefighting operation
- These aircraft will be performing challenging tasks, including firefighting operations, in demanding environments
- The TGDF will utilize the Bell 429s to survey and safeguard their woodland resources, comprising 27% of the surface area in Turkey

**Defence Turkey: What is your approach to set up new partnerships with Turkish Defence Industry companies? Do you have any activities in this respect?**

Bell is very interested in improving relationships with Turkish industry. Our pursuits in Turkey have been limited due to military interest in our products. We hope to expand our discussions with both the Turkish military and industry in 2016.

**Defence Turkey: Could you please enlighten us about your R&D activities on new platforms and new technologies?**

Bell Helicopter is developing a next-generation tiltrotor called the V-280 Valor. The design of the Bell V-280 Valor creates the capability to fly twice the range at double the speed of any existing helicopter. The V-280's tiltrotor technology leverages vertical takeoff and landing (VTOL) capability into a strategic and tactical advantage for battle planning. Bell Helicopter leads the industry with combat-proven tiltrotor technology, and has invested in the future of military rotorcraft with its next generation tiltrotor.

The V-280 program will build and fly an operational aircraft by 2017.

**Defence Turkey: Finally would you like to add some information for our readers?**

The geography of Turkey presents a complex set of environments in which to operate, from the Mediterranean and Aegean coasts in the south and east, to the sharply contrasting seasons of the inland Anatolian plateau and north to the shores of the Black sea. The sea and sand environments can both be unforgiving and unrelenting in their extremes – heat, cold, dust, mud, rain, salt spray, from sea level to the Armenian highlands. The H-1 class of helicopters and the V-22 are designed to operate aboard ships just as easily as land, thus they benefit from several key elements rarely (if ever) seen in helicopters designed to operate from fixed shore bases:

- The airframes, internal components, and fittings are coated with corrosion resistant paints and seals to reduce the effects of salt water on the metal. This provides the aircraft with greater protection from sand, as it limits the ability for sand to work its way into the fittings.
- The airframes are also designed to "shed" water so it is not captured anywhere in the airframe thus further preventing corrosion. This also provides a means to keep sand out of the aircraft as they can be washed / rinsed more easily as it is part of the design construct.
- Maintaining the aircraft was based around a small manpower footprint (total numbers) because the total number of personnel that would be available aboard the ship would be limited. This resulted in a simple concept that can be accomplished aboard ship or in an austere (shore based) but not fixed based environment (a landing zone in a field vice a runway and a hangar).

The key asset to the design concept of these aircraft is that they were designed to be used by a mobile force in combat – a force called upon to respond quickly, and one which will forward deploy aviation assets in close proximity to the ground units; it was a design requirement for these aircraft to be rugged and operate from any environment in which the Marine Corps would be engaged, both afloat and ashore.

Aircraft designed for a maritime environment are more adept at operating in a desert environment – either a fixed base or an austere location, making the Bell Helicopter military products the perfect solution for almost any condition or environment.


Ms. Şebnem Akalın, International Relations Director of Defence Turkey Magazine met with Mr. Richard Harris in IDEF 15'

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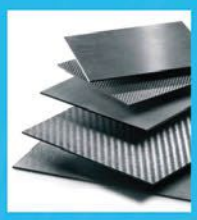
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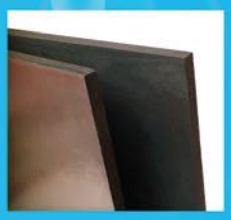
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# TASAM Strategy Report: The Future of the Turkish Defense Industry

The Strategic Report for Sustainable and Strong Export - 1 titled "The Future of Turkish Defense Industry" prepared by the National Defense and Security Institute was announced to the public at a workshop in which Former Minister of National Defense Mr. Vecdi Gönül, Former Minister of Foreign Affairs Mr. Yaşar Yakış, Undersecretariat for Defense Industries Prof. İsmail Demir, TASAM President Mr. Süleyman Şensoy, representatives of Security and Defense Industry, foreign diplomatic mission representatives and media members participated.

TASAM President Mr. Süleyman Şensoy made the workshop's opening remarks. Mr. Şensoy mentioned that they focused more on their studies and activities regarding the Security and Defense Industry within the scope of "Turkey's Strategic Vision 2023" since 2006 and informed the audience on the current status they reached since then. Mr. Şensoy said, "The activities regarding the sector we initiated in 2006 have institutionalized and formed the basis for new studies and new foundations. The Strategic Report titled 'The Future of Turkish Defense Industry' that we will discuss here today is one of them. The "Istanbul Security Conference" that will be taking place on 03-05 December 2015 in Istanbul will be a first in Turkey. The National Defense and Security Institute passed a certain stage considering the institutionalization process. We believe that this institutionalization will be falling into its place as a 'learning process' in the upcoming period".

Mr. Şensoy underlined that the Defense Industry was amongst the leading sectors of Turkey and added, "Turkey has made an important headway in the last era. Turkey is currently capable of covering sixty percent of its requirements through local resources. Then again, regarding the remaining forty percent, there are still more complicated areas containing high technology that we are dependent on from foreign countries. We need to cover more distance from what we have achieved so far. There is a crucial point that needs to be stressed here. In my opinion a scale change is required in our sector. A reform whether in the form of a "sector reform", "security reform" or a "defense reform" is essential. Without doubt, the management method for this reform is also quite important. I believe that building a process that operates from the bottom to the top within the structure to be formed here would be healthier".

Prof. İsmail Demir, Undersecretary for Defense Industries

Mr. Şensoy stated that this sector reform was of vital essence for the sector receiving the 1.2 % of the gross national product within the scope of the current budget appropriations and continued, "In my opinion, a country struggling to become a regional and balancing power in its region needs to develop a greater scale in this area. In the current period, security needs have to be put in the center of all aspects of our lives. For instance the NATO updated its new security concept as a 'strategic communication'. Surely,

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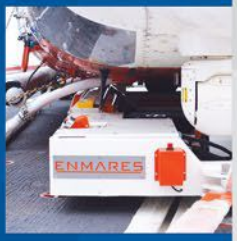




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the members of the Armed Forces are closely following these developments. I think we need a modular hard power concept allowing integration, containing rapid and high technology and that is compatible with the soft power rather than mere hard power".

In his remark during the opening ceremony, Undersecretariat for Defense Industries Prof. İsmail Demir initially expressed that the countries should avoid foreign dependency especially considering the critical technologies during fulfillment of their defense and security requirements and continued, "For reaching a more dynamic, productive and competitive sector, firstly we need to increase the efficiency and extend the capabilities. In the light of this principle, as the Undersecretariat for Defense Industries, we initiated the incentive mechanism. We provide soft loans to the domestic companies assigned as sub-contractors at the Defense Industry projects, for the investment finance for the machinery and equipment they require within the scope of the project throughout the duration of the project through the Defense Industry Support Fund. Meanwhile, our Undersecretariat is assuming important roles in the defense industry cluster activities as well. In addition to our activities in Istanbul Technopark, the Kazan Specialized Organized Industry Region that we established can be put forth as one of such activities". Prof. Demir stated that they were conducting all the aforementioned activities for reaching a more effective and competitive industry capable of producing solutions for all the requirements of the Turkish Armed Forces and added that in order to reach the identified goals, the overall industry policy, world conjuncture, education system, human resources structure and human resources training projects need to be considered as a whole.

*Ret. Brigadier General Dr. Oktay Bingöl: "Turkey have to reveal New Doctrines"*

In the panel related with the report that consisted of five chapters, namely, "Identifying the Proper Strategy for the Future to be shaped in Increasing the Export Potential and Sustainability of the Turkish Defense Industry", "Points Identified during the Studies Conducted Regarding the Status of the Turkish Defense Industry and the Report Preparation Process", "General Outlook on the Plans and Strategies of the Defense and Security Industry Sector of the Western Countries" and "Suggested Measures"; one of the creators of the Report, Ret. Brigadier General Dr. Oktay Bingöl informed the participants on the report's overall framework and the adopted methodology.

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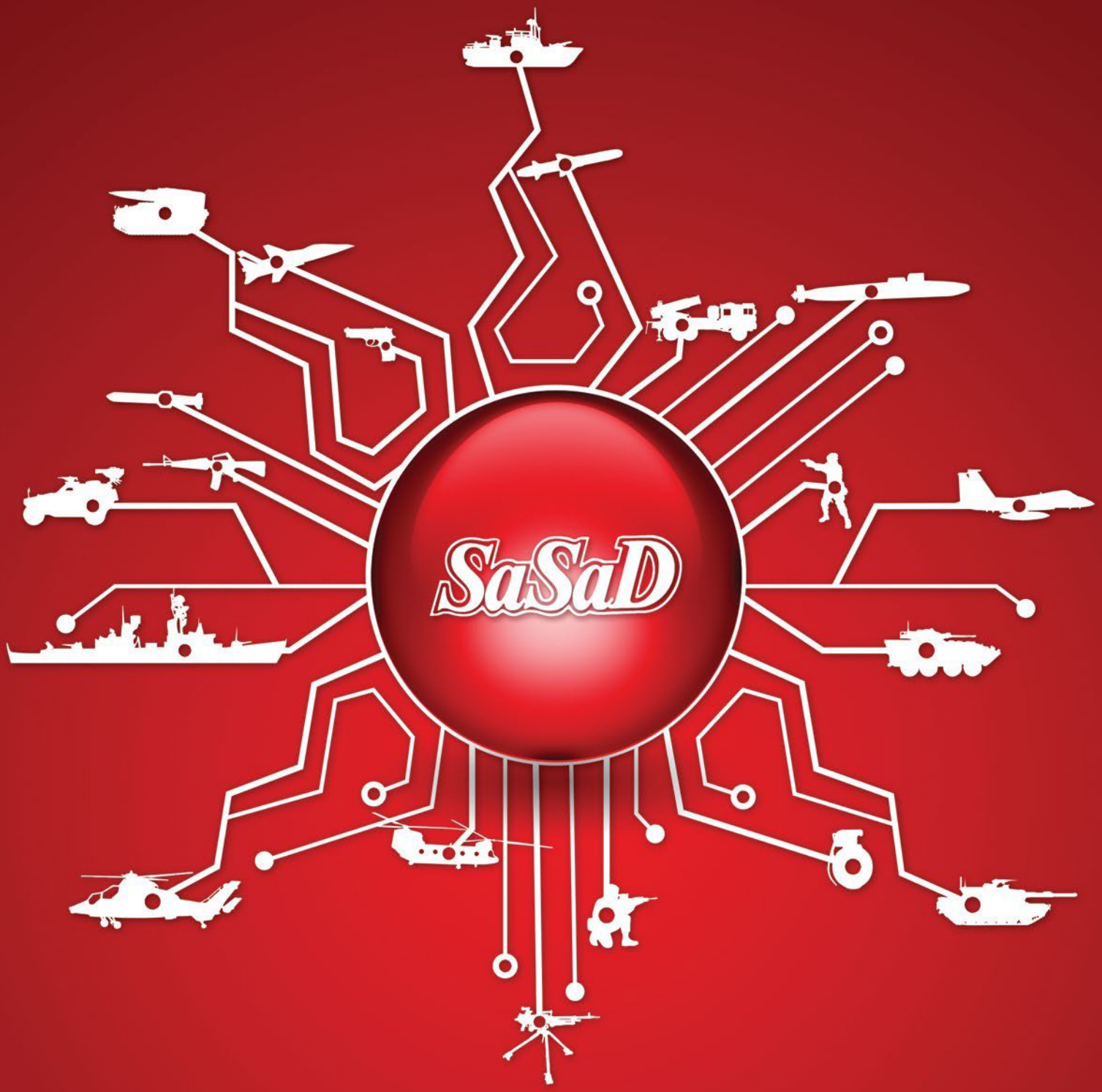
Dr. Bingöl mentioned that many reports covering all areas have been prepared in the sector so far and said, "We examined approximately 200 publications, accessed international databases and gathered documents. In all the reports published until today, almost everything regarding the sustainability and future of the sector has been said. So, we tried to establish a different point of view in our study and attempted to identify the grey areas through a critical reading. We accomplished top-down, horizontal negotiations with the Turkish General Staff, Ministry of National Defense, Undersecretariat for Defense Industries, Defense Industry companies, SMEs and Sub-Industry companies and most of these efforts were reflected to our report".

Mentioning that they included several new concepts in the report Dr. Bingöl continued, "We seem to require defense and security industry conceptualizations. We need to make more comprehensive and in-depth assessments in theoretical and academic levels that would cover all sectors and the relevant sector. This fact has been examined in the report. Moreover, we underlined the model to which we refer as the eco-system and developed a 'military'ecole model as well. Unless there is a doctrinal dependency between the producing countries and the purchasing countries, it is not easy to market a product merely on the basis of technological competence. The doctrines determine the way a product is sold, too. As Turkey, we are unable to develop doctrines regarding this issue. We have the products, yet we lack any global or regional doctrines in military and defense aspects. Especially our major companies should form doctrines in parallel with their product development activities. The relation between the concept and the doctrine should be well established for achieving the technological alignment and association". Dr. Bingöl mentioned that they attached special importance to the security industry diplomacy concept in the report and added, "All the actors taking part in the defense industry have certain demands. We identified a communication gap between the actors here. The communication and trust issues have to be established again in a further strengthened manner. All actors are going through many problems during many stages such as the supply and procurement processes, bureaucratic processes and information sharing". Dr. Bingöl also stressed the unique structure of the defense industry regarding the transparency and confidentiality aspects and emphasized the importance of establishing a balance in these issues for the companies. Dr. Bingöl said, "All our companies need transparency from top to bottom. Being informed about the steps to be

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taken by the governmental institutions and authorities are of vital importance for the investments. Therefore, we believe that this balance should immediately be established and required mechanisms should be launched".

Dr. Bingöl mentioned in summary that considering the overall report, their joint assessment as the science and consultancy board was that the Turkish Defense Industry has already reached a saturation point with the help of the major moves and added, "If the saturation point is reached before achieving the identified goals then a strategic problem must arise. Certain severe limitations may arise during progress towards the future with proper steps, and for the protection of a sustainable industry and acquired capabilities and for gaining new capacities".

Dr. Ali Bilgin Varlık, one of the authors of the report with Ret. Brigadier General Dr. Oktay Bingöl, stated that the aim of the report was to pave the way for designing and planning the human resources, structures and strategies for increasing the sustainability and export potential of the Turkish Defense Industry for the future and to identify the measures to be adopted to this end and said, "This report consists of five main chapters. In the first four chapters, we tried to put forth the factors identifying the issues and in the last one we suggested the measures to be adopted to overcome the assessed issues".

## Defense Expenditures Declined by 9.5 % between 2009-2013 in European and American Continents

Dr. Varlık underlined that the worldwide defense expenses reached to the level of $ 1.7 trillion as of 2013 and continued, "Compared with the figures of the last era, we come across a change rate of 25.2 %. During this ten-year-period, there was 17 % increase in defense expenses in every five-year long period. Evaluating the last three-year-period we see a decrease of 2%. Except for the People's Republic of China, where the defense industry budget of 2013 was around $ 625-656 billion, the sales turnover of the top 100 companies operating in defense industry was $ 455 billion and this amount equals to 70 percent of the global turnover. Taking a look at the period between 2009 – 2013, the resources allocated to defense in the African continent back then reached to $ 10.9 billion with a 34 percent increase, whereas in the American continent it recessed to $ 76 billion, a decrease of 9.5%. The decrease in the defense expenses of the European and American continents has been without doubt one of the most notable developments. Considering the data of 2013, the greatest suppliers are the countries suffering from security issues and the developing countries. Saudi Arabia, India and United Arab Emirates remain on top of the list while America, Russia and France are the greatest weapon manufacturers and suppliers".

Dr. Varlık added that the technological superiority and their role as a ecole model country are the factors thar are allowing these countries to become the greatest suppliers and said, "As they create doctrinal dependency, these countries are able to create the imperfect competition conditions in the market. This strategy is formed around the 'win and win little principle'. What we refer here is that the information transfer in the relations between the strong and weak countries could not be fully realized most of the time, therefore we cannot speak of a full competency transfer. On the other hand, the rising economies are obliged to accept less profit. The major consortiums control the market through both legal and illegal methods. Due to the huge investment expenses, the rising economies (the developing countries) do not have the capability of competing neither in quality nor in prices with the major consortiums. The developing countries will have to either accept less than what they have expected or have to skip the technology where there are only a few best practices".

In his presentation, Dr. Varlık underlined that as a result of the global economic crisis and the U.S. Budget Control Act accepted during Obama's Presidency, approximately $ 600-700 billion will be cut from the U.S. Budget by 2020 and added that with the limitations in defense expenses set by the UK and Western European countries, a severe market shrinkage and fierce competition conditions would be arising. Dr. Varlık expressed that Turkey would also be affected from this fluctuation and continued, "Surely, these conditions will cause certain threats and risks. Then again, we believe some opportunities will be emerging in this period as well". Dr. Varlık stated that all products with demand have a place in the market and determined important points regarding the supply and demand market. "We observe that the supply and demand market is formed in a structure with two qualities. In the normal operations, the demand based structure is affected by a tough competition in the global market despite the profits gained in the investment expenses and the first sale. Meanwhile, we see that the supply based structure which

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utilizes high technology becomes more successful in the global market" said Dr. Varlık.

Dr. Varlık stated that within a fifteen-year-period since the 2000s, the Turkish Defense Industry has reached the capacity to operate in the international arena and added that despite these positive developments, the resources allocated to the defense budget from gross national product started decreasing since 2010. Dr. Varlık mentioned that the defense industry turnover of 2006-2012 increased two and a half times and reached to $ 4.75 billion in 2013. He also underlined that in 2008-2013 a distinct increase of 56 percent was observed in the export performance and added that especially taking the supply method of the projects into consideration, increase in the joint production and indigenous production models were noted in certain groups.

## Turkey allocated $ 17 Billion to defense in 2004-2013

In the report, it was stated that a total of $ 17 billion was allocated to Turkey's defense expenses according to 2004-2013 data. It was mentioned that 58 percent of this budget was allocated to staff expenditure while the remaining 42 percent was assigned to current expenditure and half of this current expenditure was allocated to MRO activities. According to the report, in the ten-year-period, Turkey allocated merely 19 percent of this $ 17 billion budget to armament. The report underlined that the Turkish Defense Industry was still not at the desired level in indigenous and domestic design aspects and touched upon the importance of decreasing foreign dependency especially in raw materials and high cost energy inputs.

Important points were stated within the conclusion of the report. The great number of company profiles that the Turkish Defense Industry had and therefore it also had many weak actors that cannot cope with the international competition circumstances were underlined in the report in addition to the fact that many companies relied on their strategy to fulfil Turkish Armed Forces needs in order to maintain their sustainability and that this caused many problems.

The lack of interest in other sectors considering the civil products in particular both in domestic and foreign markets, the failure in diversifying the market and product options were among other titles existing in the aforementioned report. The most striking point identified in the conclusion of the report was that the contracts of most of the comprehensive projects were completed and that the sector will go into a major recession in the domestic market opportunities. The report suggested that Turkey would escape from this recession merely by putting forth high technology and high quality products. Additionally, the strategic approaches developed by Turkey in the current status were mentioned in the report. Turkey's implementation of a strategy with the international consortiums and as their sub-contractor was assessed as a success in the report. Operating as a main contractor to the countries with less fierce competition conditions was suggested as another strategy for Turkey by the report. Countries such as Pakistan, Iraq, Georgia, Azerbaijan, Malaysia, Turkmenistan, Bahrain, United Arab Emirates, Egypt, Qatar, Nigeria, Afghanistan, Bangladesh, Rwanda, Colombia, Kazakhstan, Philippines and Slovenia were suggested as the ones where these strategies can be launched. In this part of the report, it was stated that as a result of the strong relations established with such countries, the Turkish Defense Industry would be heading towards the first row of the third league. Moreover, as stated in the concluding comments, Turkey's failure to create a global brand in the international arena besides the success of a few companies, due to its failure in forming an 'ecole' (school-model) was mentioned in addition to the limitations in sector's market activities due to the international regimes, the embargoes and sanctions implemented to third parties by the governments with whom Turkey allies with.

Following these points, the things to do in order to resolving the problem was mentioned in the report. According to this, it was stated that civil-military relations had impact on the overall functioning of the defense industry sector. Therefore, the report underlined the importance of the establishment of a strong architecture that would allow the structuring of the sector while decreasing the need for coordination. The need for restructuring the Turkish Armed Forces Foundation to be in line with the necessities of the time, was underlined in this chapter as well.

Providing contributions to other ministries' defense budgets during budget preparation activities, increasing financial and administrative support, increasing the representation and efficiency in Europe and in international organizations as part of the European Union, developing new security and defense policies, gaining the concept approach to the defense industry, restructuring education institutions in accordance with the requirements of the defense industry were mentioned in the suggestions portion of the report.

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# Augmenting Turkish Industry Through Establishment of Successful Relationships

An insightful and candid interview with Ms . Carey Smith, the President of Defense and Space at Honeywell Aerospace. The latest updates from Honeywell Aerospace's Defense and Space division include: New developments in Performance-Based Logistics, the flourishing Turkish Market, updates on the CTS800 engine, Turkish Regional Jet Program, who's collaborating on regional production efforts, and Cyber's 'Critical Infrastructure Protection' team.

**Defence Turkey: Firstly, Ms. Carey Smith, thank you for the time you've set aside for us. Could you please enlighten us regarding your company's unique strengths and expansion inhome and international markets?**

From a broad perspective at the Honeywell level, about 55 percent of our sales are outside of the US. We are an extremely global company, set up around the world in over 100 different countries. In addition to our sales we have about the same representation in terms of employees. Within defense and space, international has been a major focus. We've been very focused in Turkey. From a company perspective, we have over 250 people in Turkey, we have operations in both Istanbul and recently set up an office in Ankara which I'm excited about because this is where our customers are for defense, and we have had a long presence here, we've been doing work for many years and have very well established relationships with many other Turkish companies.

**Defence Turkey: How did Honeywell and Honeywell Turkey specifically perform operationally in 2015?**

We've been growing as a company in Turkey and we expect the growth to continue. This is in addition to the recent agreement that we received through our Light Helicopter Turbine Engine Company (LHTEC), a 50/50 partnership between Honeywell International and Rolls-Royce plc. being awarded the CTS800 engine, which is a continuation of providing the engine to the "Atak" helicopter, so we are very excited about that.

**Defence Turkey: The Leader of Turkish Aerospace Company, TAI Selected LHTEC's CTS800 to Power Turkish Light Utility Helicopter Program. Could you please inform us about the production model? How will it be processed and what are the details of the model such as work-share, local content and program schedule?**

Right now we've sold about 500 of these engines internationally, so we are already on many of the AgustaWestland platforms including the Super Lynx, the Lynx and the "Atak" platform, we are also on the Japan US-2 platform with this engine. We feel the engine itself has a lot of potential for the future, so being able to have this solid base is very important for us.


LHTEC CTS800 was displayed at IDEF 15'

**Defence Turkey: Honeywell has a long-standing and reliable partnership with the Turkish Defense Industry for many years. Could you please share with us more about your strategy in Turkey and your activities or plans with Turkish Defense Industry companies in the coming period?**

For the "Atak" program, the Turkish industry is manufacturing one of the critical components (Power Turbine Module) for the engine, with this program, collaboration will increase. We are looking at several different licensing options, so once those details are worked out, we will know exactly how the Turkish industry will participate. We signed the first phase of the contract with TAI, for the next 5 years, TAI is developing the helicopter and we are going to help them to have a successful product. We expect the relationship with the Turkish industry to be formalized by the first quarter of 2016. We recognize the need for indigenous content and also the aspirations to become a global partner with Honeywell.


**Defence Turkey: Can you provide some details about the TLUH program schedule?**

In 2018 we will see the first flying prototype and in 2020 the EASA certification is scheduled to occur, after that point serial production will start.

**Defence Turkey: The Turkish industry contributes to the engineering of the CTS800 at a local level in Turkish Light Utility Helicopter program. Could you please provide details about the work-share ratios of the Turkish industry on this program?**

At this time, we've had some discussions with companies but there's no committed ratio at this time.

**Defence Turkey: Any other major players?**

Actually, we are engaging with most companies, we are looking for the candidates' capabilities, maybe others will come into the picture, and now work share figures are under discussion.

There are many opportunities for Honeywell in the Turkish market, what are the future plans for Turkish programs such as TFX or Turkish Regional Jet?


We're interested in both of those programs. The Turkish Regional Jet program is very important to us, Honeywell is the incumbent today on the Dornier 328 aircraft, we provide the avionics system, the auxiliary power unit, the environmental control system and the air turbine starter system. Our objective is to continue to provide the products that we've provided in the past, and likewise, similar to what we talked about with the CTS800, to establish relationships with companies from Turkey, to be able to do some localization aspects to the projects, which is going to be very important, particularly as the project moves to the 628.

**Defence Turkey: Regarding the Dornier aircraft, you are getting accustomed to working together, will you use this experience for the Turkish Regional Aircraft projects?**

Most definitely, being an incumbent on a current aircraft provides a huge advantage because we understand the aircraft, we understand all the interfaces, we developed the interface control documentation, and we did all the installations, so we have a significant strength in knowing that aircraft, we've been working on it for many years.

**Defence Turkey: Is TFX an opportunity for you as well?**

The current statusis that we've responded to several subsystem RFIs – request for information –from TAI and we are looking at both applications of our avionic systems, as well as our mechanical systems.

**Defence Turkey: Turkish industry partners with BAE systems; what type of relationships do you have with BAE systems, what type of projects?**

We support BAE systems quite a bit, particularly on the aircraft side but we also work with their naval division as well. We have long-standing relationships with BAE systems.

**Defence Turkey: Could this be an advantage for future projects?**

I think what's beneficial is that we know each other, the companies have worked together, there's a lot of trust and collaboration so I think that will definitely help again with relations. They will be more in the role of a technical consultant, looking at the aircraft as well as the subsystems.

The real benefit will come via our broader portfolio, such as thefifth generation fighter development; there are many complex systems both mechanical and avionic. We can bring our variety of solutions to that platform.

**Defence Turkey: What is your approach on cooperation with the Turkish Defence Industry to export to third countries?**

We view Turkey as the hub for the central Asia region, we see this as a very important location. We mentioned the fact that on the CTS800 we're potentially looking at companies getting involved in our supply chain. So, if companies start to participate and build part of our product offering in certain part numbers, then they will be part of supply chain and will be able to offer that product to the world on the global market.

**Defence Turkey: Can you share some success stories or activities regarding this?**

We have formed several relationships in Turkey and many more will be announced in the near future, so we are certainly achieving success in the country with more to come.

**Defence Turkey: Any specific regions?**

It wouldn't be a specific region, for example if we partner with a company to build a part number for one of our products, and we sell that product anywhere in the world, they then become part of that supply chain, being able to offer it to the global market.

**Defence Turkey: There is strong demand for retrofit and upgrade technologies and Performance-Based Logistics (PBL) services in the market today and Turkey is willing to become a hub in its region. What are your comments on this issue?**

We've been involved in performance based logistics programs since their inception, they really started based in the US.

We see that as important for Turkey, it's a very good business model, a cost efficient business model, it really provides the government a huge advantage.

**Defence Turkey: Honeywell has great experience in Cyber warfare and security field in all over the world. Cyber Security is a primary issue in Turkey. Do you have any plan to expand your presence in the future?**

We have cyber capabilities in all three of our business groups: Aerospace, Automation and Control, and Performance Materials Technology. We pulled together what we call the Critical Infrastructure Protection team, and that team focuses not just on cyber security but also on physical security solutions.

From a cyber perspective, we took a look at the critical infrastructure protection sectors that have been identified by The Department of Homeland Security, there are about 16 of those sectors, and we identified where Honeywell could best participate and offer the most value. We looked at areas where we had a current install base, at areas that were high threat driven which we will have the most need for cyber capabilities, and we looked at areas that were the most regulatory driven because that's where Honeywell does the best.

We decided, out of those sectors, that the areas that we were going to focus on were Transportation (that's everything from cars, airlines, port security, all those aspects) Information Technology, Government Facilities, Healthcare (which we already have many contracts for) Energy and Chemical (we do industrial

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control systems that we provide to powerplants). We've won contracts in all of those vertical markets, and those are the areas that we can best offer our capabilities.

**Defence Turkey: What are your activities right now in Turkey related to cyber warfare?**

We are exploring various opportunities in Turkey and we are under discussion with several companies. We focus on cyber defense not cyber offense.

**Defence Turkey: In next decade, within the context world military needs, what type of vision has the Aerospace and Defense Department of Honeywell identified for itself and where will it position itself?**

From a world perspective terrorist threats will continue and that is important regardless of where you go in the world, coming up with technologies and capabilities to help there, we will need improved intelligence personnel tracking, cyber security and much more. Other areas that we intend on participating in are intelligence, surveillance and reconnaissance. Also included, which is not part of ourdefense portfolio,is commercial helicopters which is going to be a growth area as you start to see the oil and gas market turn around over time. We fortunately have been growing in that area regardless of the market so we expect that that's going to be significant play for us.

The other area I would mention would be retrofits, modifications and upgrades, we have many systems that are deployed for which we can provide enhanced capabilities. For example, if we deployed a cockpit system, like we have the Primus Epic 2.0 cockpit and we have a certain software release, we can add new features and enhancements to that, such as integrated visual environment capabilities. Retrofits, modifications and upgrades worldwide, to all of our platforms, are going to be important.

**Defence Turkey: In addition to Technological development, Honeywell places great importance on Education, as demonstrated with Honeywell's Educators and Space Academy. This year many teachers have attended this program from Turkey in the second quarter of 2015. Do you plan to spread training and education programs with the relevance of Space, Aerospace and the DefenseIndustry with the cooperation of Turkish Academies, Institutions and Universities?**

I'll describe a couple of areas, there's actually three that come to mind. One that we do is a program called FMA Live! The show is an interactive, traveling hip-hop concert that teaches Newton's Universal Law of Gravity and Three Laws of Motion. Named after Newton's Second Law of Motion [Force equals Mass times Acceleration], the show connects science and engineering to everyday life. This show has also gone outside of the US as well. It basically teaches young children about getting interested in science in a way that they will resonate with.

Another program is Honeywell Educators @ Space Academy (HESA), it provides educators with the opportunity to reinvigorate their classrooms with ideas, lessons, and other materials to create an unforgettable learning experience for the next generation of scientists. We bring teachers every year to NASA, and we help them learn about better ways of teaching their students back in their classrooms. There have been 12 teachers from Turkey that have attended that session.

The third way, that I've had the opportunity to participate in myself, is we take students to NASA for a week and they work on projects and compete against each other on teams, focusing on science, technology, engineering and math (STEM). It's a tremendous opportunity for them to learn from the ground up and get them interested in science at a young age plus work with experts from NASA and Honeywell. We have students and teachers already participating from Turkey.

**Defence Turkey: Any R&D technologies, activities for the next year?**

Currently we have a program on going with The Middle East Technical University – METU/ODTU, a corporate grant through which we donated an experiment set last year to their Electrical Engineering faculty. Students can now simulate a factory and a refinery and simulate the process and apply process automation technologies. This year we are working with ODTU again, but with the Mechanical Engineering faculty. We donated another experiment set for HVAC (heating ventilation and air conditions system) and students are able to see and work on a HVAC unit and run experiments; these activities have been more related to automated and control solutions but of course in the future there may be some projects related to aerospace with the universities. We started with ACS (automation control solutions) but that doesn't mean we will always work on those systems, of course we can enhance the types of projects that we do.

**Defence Turkey: Would you like to add something and give a message to our readers?**

We look forward to continuing our business in Turkey. It's a high growth region country for us, with Mr. Orhan Genis as our appointed President for Honeywell Turkey & Central Asia. It's very important, so it is one of a handful of countries that we are extremely focused on. We recognize the criticality of having indigenous Turkish capability. Our effort is to really work with local companies to ensure collaboration and make sure that we are augmenting Turkish industry, also helping to give the Turkish industry access to the global marketplace which we understand is very important to companies.



Ms. Carey Smith met with Ms. Ayşe Akalın, Editor in Chief of Defence Turkey Magazine in Honeywell Ankara office.

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# A400M – 'Game Changer in Transport and Tactical'

Reorganization of Transnational Teams Aligned for Program Driven Organization Strategy - Program Executives share the latest updates; A400M testing, certification, production ramp-up, nations simultaneously entering into service, company reorganization.

By Cem Akalın-Editor

Airbus Defence and Space hosted media representatives from all around the world including Defence Turkey Magazine at its facilities in Seville on the 26th and 27th of October. In the press briefing that took place in Seville, Spain, Mr. Antonio Rodriguez Barberan - Head of Sales, Mr. Fernando Ciria - Head of Marketing ISR, L&M and UA, Mr. Antonio Caramanza - Head of MRTT Program, Mr. Joey Borkenstein - Senior Advisor Air Combat Operations, Mr. Kurt Rossner - Head of A400M program, Mr. Eric Isorce - Head of A400M Flight Tests, Mr. Miquel Angel Morel - Head of Engineering and Stephan Miegel - Head of Transport Services gave presentations, market outlook and production line overviews; Light & Medium Transport and ISR programs, A330 MRTT program, product development and the recent operations of Eurofighter, the latest status of the A400M program and flight tests. After the presentations the A400M final assembly line was visited in Seville.

With its new formation in all fixed wing military market segments, Airbus Defence Space has a large and versatile family of platforms and services covering the A400 M, Eurofighter, A330 Multi Role Tanker Transport, C295/ CN 235, C 295 ISR, CN 235 MPA and Unmanned Aerial Systems. It is seen that the creation of Airbus Defence Space multiples its market scope with 1,800+ aircraft sold to 145 operators in 70 countries. In the medium transport segment, Airbus maintained leadership with its sales: In total 160+ C295 were sold to 23 different operators in 22 countries numbers of 2015. Airbus expects an over 59% cumulative, 10 year market share, in 2015 in the medium transport segment.

The new generation Tanker Transport Aircraft A330 MRTT expanded its presence all over the world during the last decade. 11 RAF (Royal Air Force), 5 RAAF (Royal Australia Air Force), 3 UAE and 6 RSAF (Royal Saudia Air Force) in total 26 MRTTs in service and have been operating in real military operations (Yemen and Middle East) for the first time in 2014-2015. Airbus Military


received contracts from Singapore and India for a total 12 A330 MRTT (6+6) in 2013 and from Qatar for 2 A330 MRTT in 2014. Singapore (6), France (1+8+3) and South Korea (4) ordered total 22 MRTTs between 2014-2015 period. Within the scope of program schedule, Airbus Military declared that all the aircrafts are on schedule to be delivered to the aforementioned countries during 2015-2018.

Airbus holds a 28% market share with 174 A400 M sold. It is estimated that 300 plus A400 M aircrafts sales will be performed over the next 30 years and 50 aircrafts in the next five years.

## Airbus Military to Ramp-up the A400M Production on 2016

Turkey joined the A400M New Generation Transport Aircraft program, launched as a multi-national program with the participation of countries such as Germany, Belgium, France, UK, Spain and Luxembourg in 1988. The Program Board Decision ,regulating the affairs between the participant countries and project management was signed and entered into force on 22 May 2003 by the representatives of the participant countries. The A400M Agreement was signed between OCCAR on behalf of the participant countries and main contractor AMSL (Airbus Military Consortium) on 27 May 2003 in Bonn. Turkey announced a purchase of 10 A400M transport aircrafts for the Air Forces Command, according to the agreement text on which the participant countries reached a settlement. Malaysia joined the program in 2005 and the total number of aircraft orders reached 174. A400M's Roll-Out was accomplished in the summer of 2008 and the maiden flight took place in September 2009, a year after the intended date. Several issues emerged during those years. In 2009-2010, the decision maker of six countries met up and revised the contract, determined a new schedule and went to several changes in the technical specifications. These studies revitalized the project and the first A400M aircraft was delivered to French Air Force at the end of September, 2013. The second aircraft was intended to be delivered to Turkey in November, 2013 within the scope of the program, but as a result of the conflict between the two parties on technical specifications and financial issues, the delivery took place in April, 2014 to the Turkish Air Force after a five-month delay.

After two aircraft were delivered to France and Turkey, tail number MSN 08, tail number MSN 09, between July 2014 - March 2015 a total of 9 A400Ms had been delivered to allied countries. After Turkey and France in this process, the German Air Force, Royal Air Force and the Malaysian Air Force received

their first aircraft deliveries. In March 2015, after the delivery of tail number MSN 22 to the Malaysian Air Force, the 3rd aircraft, tail number MSN 23, was scheduled to be delivered to the Turkish Air Force in the second quarter of 2015.

However, on May 10, 2015, while the maiden flight, MSN 23 failed and crashed; the engines malfunctioned due to a software error. Turkey was preparing to receive this aircraft and lost out on the delivery of the 3rd aircraft. After this shocking and unexpected tradegy, Turkish Air Force temporarily stopped the flights for aircraft tail numbers MSN 13 and MSN O9, keeping them grounded during the month of May.

With the release of the preliminary accident report, and after production delays in the development and the delivery process, activities began to normalize again in July 2015. Within the period between July-October, a total of 4 more aircrafts were delivered to the United Kingdom (3) and France (1). While Airbus Defence and Space and the Turkish authorities were evaluating the accident reports, and working on the future strategy to be drawn for the next term, the predicament of the 4th aircraft that was planned to be delivered the last quarter of 2015, made the public opinion curious.

In the Trade Media Briefing 2015 meeting, the tail number MSN 28 of Turkey's 4th aircraft, was revealed to the press for the first time. The Maiden flight of MSN 28 was accomplished in September 2015. The Flight Acceptance test was scheduled for the first day of the media day, which was scheduled to be held on 26th October. The first testing flight that was scheduled to be completed by the Acceptance committee, of the Turkish Air Force 221 filo commander center, however, the first acceptance flight was postponed due to technical difficulties. (After the flight tests the aircrafts, official acceptance for MSN 28 occurred on 25th November, and was delivered to the Air Force Command at the beginning of December).

On the other hand, in the TMB 15' meeting, the Head of the A400M Program, Mr. Kurt Rossner, made an important statement after the discussion with the Turkish Air Force Command, regarding the replacement aircraft tail number MSN 28. Mr. Rossner said that their negotiations are continuing with OCCAR regarding the replacement aircraft configuration and the capability of the aircraft to be fitted to the Turkish Air Force. Mr. Rossner stated "No clear agreement yet, but two parties are in close to contract. Until the end of the year we expecta conclusive decision regarding the scheudele of delivery." On the other hand, Rossner indicated that the 5th and 6th aircrafts are scheduled to be delivered to Turkey in 2016, however the schedule cannot become clear as the primary goal is to replace the MSN 23 aircraft before moving forward with the other aircrafts.


MSN 28 of Turkey's 4th Aircraft

HO of A400M Program Mr. Kurt Rossner shared the latest situation of A 400 M aircrafts on the manufacturing lines on Trade Media Briefing 15'. Mr. Rossner said that "7 aircrafts between MSN 29- 37 are in the Final Assembly Line. 11 aircrafts between MSN 38 to MSN 48 are in IFA (Integrated Fuselage Assembly) and 9 aircrafts between MSN 49 to MSN 56 are in the long lead items procurement process"

Information about the aircraft will be delivered by the end of this year, Mr. Kurt Rossner indicated that the MSN 29 and MSN 30 aircrafts will be delivered in November 2015 to the German Air Force. In the same manner, a rapid delivery process will occur with aircrafts MSN 32 MSN 33 MSN 34 and MSN 35, to be delivered until the end of the year.

## A400M – New Capabilities - Game Changer in the Transport and Tactical Area

Mr. Kurt Rossner, head of the A400M program provided insight into the A400M aircraft. With its unique in size and the capabilities that will be provided to nations in the near future, he said "very soon this will be the world's leading transport and tactical aircraft of this size." With a current total of 5 nations visible in the air, he said "it is a symbol that this aircraft is out of the development stage and it is in use and will be much more in the future; this aircraft isa game changer in the transport and tactical area and in a few months you will see the aircraft in a totally new environment."

Mr. Rossner provided the following updates on the current main Certified Capabilities, as of October 2015: Transport of Heavy Vehicles i.e. French VBCI of 28 Tonnes, Medevac of 66 Stretchers (Full), Transport of Outsize Helicopters i.e. French EC725 Caracal, Transport of 9 Military Pallets, Transport of 116 Troops/Personnel, Combat Offload of Vehicles i.e. RAF Scimitar and Land Rover. Paratroopers free fall through side doors not simultaneous, Paratroopers free fall through Ramp, Paratroopers Static Line (BT-80 parachute) automatic delivery through Ramp with HUPRA procedure, Aerial Bundles delivery through side doors, Loads Aerial Delivery by gravity Using RAS/ Wedge system, EVS –FLIR Night Vision, System and Fuel Tank Inerting System certifications. New capabilities also include; Full Flight Domain: Max Speed (M0.72) & Alt. of 40 000 ft, Full Envelope of Manoeuvrability: Up to 120º Bank Angle, Unpaved Natural Soil at high CBRand Low Level Flight: 500 ft AGL minimum in VMC conditions.

In addition, Mr. Rossner provided updates regarding the positive momentum of the team's production capability "through execution of industrial recovery, we ramped up the production capability from about 7-8 aircraft over the last year (2014) and this year 18 aircrafts (2015) next year in an area of 23 and more (2016) – this was clearly only possible due to the improvements in production capabilities and adopting improvements in the final assembly facility in Seville."

## A400M Flight Tests are Successfully Fulfilled

As of 19 October 2015 the aircraft has completed 7903 hours for a total of 2,901 test flights. AAR as receiver behind A330 FSTA & C160 certification tests day &night, DASS–Radar Warning

Receiver, Defence AIDS System, Airdrop Gravity Loads, Airdrop Platform 2x4 tons using X-locks & ERGs, Airdrop Paratroops Live jump, Air drop CDS by gravity, AAR as Tanker with 2xF18 certified for day & night, Operations on Unpaved Runway (Grass) were fulfilled in 2014-2015.

Mr. Eric Isorce - Head of A400M Flight Tests provided details regarding test activities, certification and up-coming test campaigns for the A400M. The specific details of certification testing are as follows: Military Systems NVG & EVS flying LLF in free flight in 2014 Night vision goggles operation at low level conditions - down to 500ft (short runs down to 300ft), low level flight over France corridor by night in May 2013, Enhanced Vision System certified end of 2012, NVG& EVS certification tests completed in 2013, in July 2013 in LLF & Nov13 for formation flight, LLF free flight certified in August 2014 down to 150ft AGL in VMC day and 300ft in VMC night, Defensive Aids Sub-System in 2014 & 2015 Infrared Sensors (MWS-PE) - Background recording campaign: Ride Along IR recording Dedicated flights for Afterburner recording (F4 Phantom) Flares ejection recording from Transall Low Level Flight over Germany for Industry, Airfield, Urban, Rural recording Flares ejection recording from own aircraft. EDS certified & qualified in March 2014 More than 1000 flares ejected during these 5 test campaigns Partial Jettison done in June 2013 Full flares Jettison in March 2014. EDS + DAC certified in October 2014 Certification and first Qualification of DASS including DAC, EDS, RWR and MWS done up to Sept. 2015 11 test campaigns done in 2014 & 2015, in Cazaux, Manching, Meppen, Moron, Greding and El Arenosillo, the recent test campaign in October 2015 over El Arenosillo is showing strong improvement for DASS RWR, Next test campaign scheduled for Q2/2016 with full performance.

A400M - Flight Test Achievements Unpaved Runway operations: First campaign was completed in 2012 for unpaved runways tests in Cottbus Germany on grass runway low CBR, the second test campaign in July 2013 in Ablitas, Spain on Soil Gravel surface medium CBR for development, the third test campaign in November 2013 with series of 25 take-off&landing including RTOs and U-Turn for certification. Step 1: for ops on soil gravel surface for SOC1 down to CBR22 to CBR11 depending braking action/aircraft weight. Certification tests completed Nov 2013. CQP approval Oct 2014, and the fourth test campaign completed in Sep-Oct 2015, in Ecury-sur-Cooley (in France), with ops on GRASS Runway with additional tests on natural soil, to identify effect of surface and of low CBR. Step 2: Certify tests on Grass Runaway completed, with average CBR down to CBR9; Step 3: Next tests coming in Q1/2016 for operations with low CBR and on sand surface type with a possible runway candidate in England. Tests are still ongoing for cw43/44 Airdrop Operations – Paratroops, Ramp dispatch stick of 12 paratroopers using S/L & new HUP proc. (EPC bags mod.)Dev/Qualif of paratroopers jumping in auto through PTD (Alternate door, stick 30 to 40 PT), AD Task force ongoing Oct 2015, Objectives to solve crossover issue, AD tests ongoing Q1&Q2/2016, Full capacity 2x58 paratroopers in one stick, High altitude AD operations above FL120, Airdrop Loads by gravity and Extraction parachute towing tests, Certified in 2014: RAS / Wedge loads up to 4000kg, Dispatch of loads up to 4 tons, Dispatch of Bundles from PTD up to 320 kg. Tests done for Development:Loads Drop by gravity CDS containers & Platform, 24 CDS containers (1042 kg ton each) → 25 tons in total, 3 Platforms 4 tons each → 12 tons in total, Loads Drop by Extraction Parachute Towing, 1 platform 2 tons with 22 ft parachute, Extraction parachute towing 2x28 ft, Roadmap for Oct-Nov 2015 Single pass - single drop of: CDS by Gravity with ERG (up to 8 x 1042 kg CDS) from most Aft position → Completed cw4, Platforms by Gravity with ERG (1 or 2x4T) from most Aft position → 1x1147kg & 1x3971kg done. It remains 2x1147kg ATADP expected cw44, Tests of Extraction (1x4.6T platform from anywhere in CH) expected to be resumed in November and on the roadmap for Q1&Q2/2016. Full capacity 24x1042 kg CDS / 25 tons and platforms up to 16 tons by extraction parachute, Air to Air Refuelling as Receiver Certification & qualification tests completed in February 2015 for: Day & night conditions, AAR behind C160 Transall, AAR behind A330 Voyager,

Integrated Fuselage Assembly line (IFA)

Development and certification Flight Test programs have been success fully completed: 32 take-offs and landings achieved to assess A/C performance, general handling and runway compatibility, Significant weight range tested for tactical ops (90T to 115T), Tests performed on low bearing capability surface (down to CBR6), Very good A/C handling thanks to Landing Gear and Flight Control Law design, Specific maneuvers success fully completed (taxi, U-turn, back-up).

## Turkish A 400M's Playing a Major Role in Operational Fields

A total of 16 A 400Ms were delivered to five allied countries by Airbus Military as of 2014 and all aircrafts have played a major role the relief and transport operations all over the world in the last two years.

Turkish A 400M Aircrafts were executed to the Dakar and Africa missions as well as the Somali Mission of Turkish President between 2014-2015. In the Dakar Mission, MSN 9 took off with the maximum take off weight of 141 tons on a direct flight from Wunstorf to Dakar in one day. A water treatment plant for the advisory group of the German Armed Forces and additional material was transported on the mission. On the way back, 9 tons of material from UN Mission for Ebola Response was brought back to Europe. 1st real logistic operations and the longest flight was

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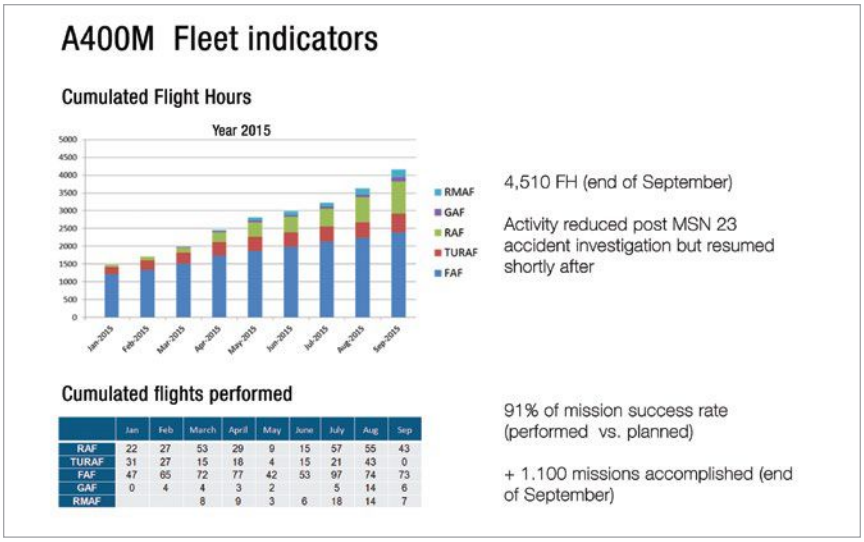
put on the record in the Dakar Mission. In the following Africa mission that was executed by the Turkish A400M, the trip was to validate different functionalities and performance of the Aircraft in the first time. The aircraft took-off with MTOW (maximum take-off weight) 141t and 11 officers ( 4 pilots, 3 loadmasters, 4 technical engineers). The Aircraft flew about 23.000 Kilometers and touched ground in five countries. During a stop in Abu Dhabi, a temperature of 52C and 60 % humidity was reached inside the aircraft.

The Aircrafts also accomplished carrying S-70 Black Haws from Ankara to Kabul, Afghanistan in a non-stop flight and brought an inoperative H/C upon return. Before the A 400M, these kind of operations and flights were performed with USAF support. Within the same period the 1st transatlantic mission was completed with the direct flight from Istanbul to US.

A total of 174 cumulative flights and approximately 2800 cumulated flight hours were performed by the tail number MSN 9 and MSN 13 from January to September of 2015. In the September Turkish A 400M Aircrafts flight hours were declined due to retrofit activities (MSN 9) and landing gear malfunction (MSN 13 was ground for the landing gear failure during the three weeks in September). MSN 9 was on the ground as of the September and currently in Getafe for retrofit activities. Upgrade version of MSN 9 are expected to be delivered the TuRAF in January 2016. After the completion of the retrofit activities of MSN 9, in 2016 MSN 13 also will pass through retrofit activities.




| | Jan | Feb | March | April | May | June | July | Aug | Sep |
|---|---|---|---|---|---|---|---|---|---|
| RAF | 22 | 27 | 53 | 29 | 9 | 15 | 57 | 55 | 43 |
| TURAF | 31 | 27 | 15 | 18 | 4 | 15 | 21 | 43 | 0 |
| FAF | 47 | 65 | 72 | 77 | 42 | 53 | 97 | 74 | 73 |
| GAF | 0 | 4 | 4 | 3 | 2 | | 5 | 14 | 6 |
| RMAF | | | 8 | 9 | 3 | 6 | 18 | 14 | 7 |

## Airbus A 330 Aircrafts are being Converted to Multi Role Tanker Transport (MRTT)

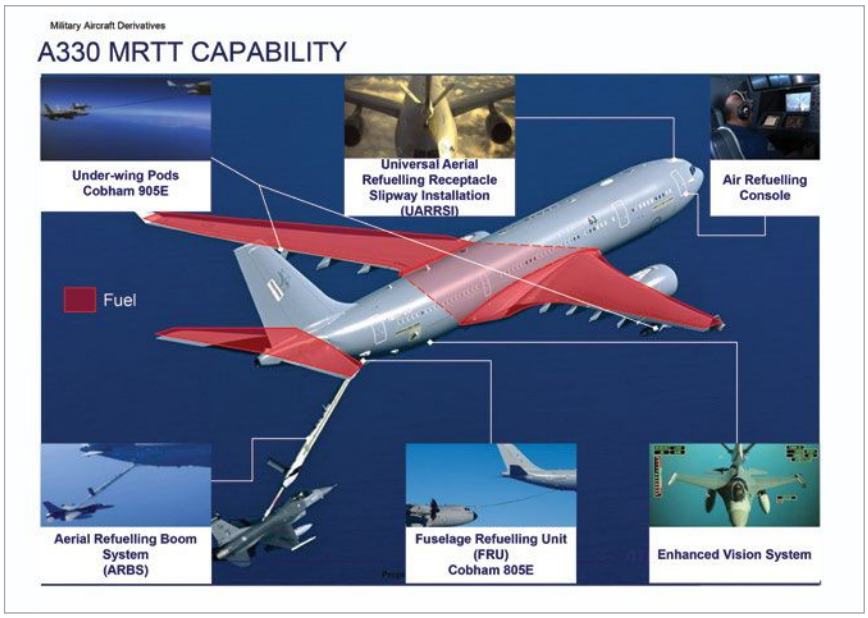
The Airbus A330 Multi Role Tanker Transport (MRTT) is an aerial refueling tanker aircraft based on the commercial Airbus A330. The A330 aircrafts from Toulouse are converted to MRTT at the Getafe facility with the conversion process of a single aircraft taking 10 to 11 months. As of 2015, 26 A330 MRTT has been operating in full service: 5 MRTT at RAAF (Royal Australian Air Force), 3 MRTT at UAE Air Forces (United Arab Emirates, 6 MRTT in Royal Saudi Air Force (Saudi Arabia) and 11 MRTT and 1 civil 3PR/TC in the Royal Air Force (United Kingdom). The A330 MRTT has been ordered by Singapore Air Force (6), French Air Force (1+8+3) and South Korea (4) as of the year of 2014.

## A330 MRTT New Green Aircraft

A330 MRTT enhanced version covers new green aircraft with new structural, aerodynamics and avionics pack and upgrade of military modifications (Mission system upgrade, MPS upgrade, BOOM Upgrade 3, solutions for implementing IFF M5/ ADS-B, improvements in industrialization process). Prototype will start conversion in October 2015 and flight tests in second half of July 2016. Deliveries will commence in late 2017. All new A330 MRTT customers will receive aircrafts with this new configuration. New configurations optimizing standardizations while providing flexibility for customer requirement customizations.

Mr. Antonia Caramanza - Head of MRTT, presented the updates regarding MRTT, their flight tests activities and up-coming plan in TMB 15'. "We have flown 56k flight hours 14k flights, averaging 200 flight hours per month, 25k flight hours per year. " According to plans, by summer 2016 first French prototype conversion will commence, then third will be the Korean prototype, the delivery schedule of all three customers (Singapore, France and South Korea) will be completed in 2019.

On the subject of maturity and reliability growth of their products, he said "we are conscious that the world and technology moves on, we have launched internal programs directed toward product policy and upgrades for the future, upcoming tankers and previous tankers – wide-band sub communications, increase of weight capabilities, increasing air to air refueling capabilities, IFF Mode 5, all these capabilities that the fleets of the futures will need. The first one is IFF Mode 5



and we are currently in negotiations with Australia."

*Mr. Fernando Alonso: " Airbus have to rapidly response the requirements of the Clients"*

CEO of Airbus Military, Mr. Fernando Alonso, in the gala speech, provided insight about the company's restructure as a program driven organization and initiatives guided in the spirit of agility and rapid development.

"We have an excellent product line with a lot of challenges in front of us and I think I really want to focus the organization now on program execution. It's not good having programs if you don't know how to execute them correctly. " He continued, sharing details about the company wide reorganization. "We are a program driven organization. Programs will define what types of products customers need, time scales, price, quantity and centers of competence, engineering, services and production. We have taken the opportunity of the reorganization to unite the teams, to be one single transnational team, working together based on their competence irrespective of nationality. I think this will be a source of motivation, a way of liberating energy and skills, to get people thinking of how to do things differently. We are planning to roll this out in the beginning of January."

## Focus on Agility and Rapid Development

Another focus that he discussed was development cycles and the differences he has observed between his tenure with Airbus Commercial, compared to his recent time with Airbus Military since joining in March, "I'm coming from a world where over the last years we have been significantly involved in the time it takes to design, build, manufacture, test and deliver a new product. In Airbus Commercial over the last years, we have made a significant improvement in the reduction of the cycles, for example the A380 was delivered after a 20 month flight test period and the A350 was delivered after a 14 month flight test period. Here in this organization, I'm a bit surprised about the long-leap times it takes to design and build modifications for an existing aircraft. I think we have to do something about that. If we are not able to develop products in a sufficientlyshort time we will not be able to fulfill the needs of our customers. Customers today want products today, if they want a product


Mr. Fernando Alonso, CEO of Airbus Military

that we don't have today and we tell them they have to wait 4 years, maybe 4 years from now they won't need that product anymore. "Looking forward in the up-coming months he said "I will be focusing on product program execution, agility, and how can we build products quicker in a more simple way, a more modular way, so that if at any point in time, the market, nations, the air forces of the world, need a product that we don't have, we are capable of answering to that requirement in a relatively short time."

"Overall we have improved significantly in the capabilities of the aircrafts; refueling, paratrooper dropping and cargo dispensing. The accident basically put a hold on our development activities for about 2 months, so that is why those activities that were initially planned for the summer are being done now, and we believe that before the end of the year we will have done all of the testing required to certify these capabilities, so it will just be a question of paper work, so the aircrafts that we will be delivering will have the capabilities available and only missing the stamp of the authorities, but the data will be available from the flight tests."

## Nations Simultaneously Entering into Service

"Another challenge with the A400M is supporting a number of nations simultaneously entering into service with a brand new aircraft. Right now as we speak we have the UK, France, Germany, Turkey and Malaysia. 5 nations introducing aircrafts at the same time.In previous programs, I typically had one home nation which would be developing the aircraft, getting used to the aircraft, developing its capabilities and validating operational scenarios, then export companies would participate. Here we are having to support 5 separate nations independently each ones with different ways of operating and maintaining the aircraft and it's a tremendous challenge for our teams and I really want to pay tribute to them also. We have teams in the different nations that are doing a terrific job supporting the nations flying. "Regarding the sales horizon he indicated that "Sales – we are very active with collaborating with a number of nations. I am confident that within the next 24 months we will start getting contracts with other nations, the interest that they are showing is very important."

## Market is Responding to MRTT

MRTT – "It's the most capable, the only one available today and the market is responding to that. It's a combat proven aircraft, in service to full satisfaction, fulfilling the expectations of the nations. We have a fantastic solid, rugged, well known platform, the A330, it's a big aircraft, lots of volume lots of space, we will be looking at ways that we can use the space, the big wings of the airplane, how can we add other sensors, part of our strategic roadmap."

## Exploring the Combat Theater of the Future

"We have launched a global study to explore what we think the combat theater of the future going to be? Is it going to be about airplanes? Manned unmanned, stealth not stealth, combination of both, the cloud, what would be the role of unmanned vehicles, drones, what is the role of satellites, all of these activities are within one division of Airbus, Defence and Space. It is the right moment in time to have a complete thought, a clear picture of the future, how do we see the future of air combat, once we have a clear picture of that then we can translate that into a product. Clearly the strategic thought will tell us what type of products we need, as well with the MRTT, what other things can we hang on those incredible wings? What can we put on the roof, the sides, how can we develop the MRTT, again within the spirit of agility and rapid development. Our policy for both manned and unmanned will be driven by the strategy of how we see the future of combat and military and how it translates into a product."

# 3D Printing in Aerospace - Revolution or Evolution?

## Overcoming Challenges for Wider Adoption

Report by Frost & Sullivan

**Introduction**

After highlighting additive manufacturing (AM) as one of the most important technological trends in aerospace and defence, Frost and Sullivan attended the Additive Manufacturing for Defence and Aerospace summit in London in February 2015 to evaluate and align its current research with the industry. Looking at how many people attended this event and the variety of organisations represented (aircraft and engine manufacturers, lower tier suppliers, academics, and so on) the first conclusion is additive manufacturing is clearly drawing a lot of attention. Many attendees and speakers agreed that additive manufacturing will not replace the conventional processes. However, in many cases, it will be a great substitute that will play a major role in the future developments in aviation. The industry perception is that AM will be adopted, but how quickly it will be adopted is the current question. Will AM processes be adopted faster than composite and carbon fibre material on aerospace platforms had been? The military forces could adopt it quicker and drive its evolution in the commercial world as the qualification and certification processes are not as stringent in the forces as they are in commercial aviation. In this market insight, the current achievements of additive manufacturing in the aviation industry have been highlighted, along with the main motivations to implement AM, the major challenges, and the importance of understanding AM as an end-to-end process. Industry stakeholders have identified this as an essential step towards reaching a high level of reliability, driving wider adoption.

### Additive Manufacturing, Current Achievements

Adoption of AM is currently still quite low in the aerospace industry. Only a few polymer parts are used in service aircraft. The rate of development of AM varies depending on the material. As AM was first developed for polymers (plastics), the experience acquired on this material is higher than the experience gained on metals. However, due to the original structure of the aircraft, additive manufacturing for metal could maximize gains, such as weight reduction. As a result, aerospace and defence participants are making significant efforts in this direction.

The first firm to produce AM parts for in-service aircraft and use them in commercial flights was Boeing. About 15 years ago it developed an environmental control system duct for the F/A-18, which was later introduced on the Boeing 787. So far, Boeing has produced about 20,000 ducts which are in service. The environmental control system ECS duct is a polymer component developed and produced with Selective Laser Sintering (SLS) machines.

The engine manufacturers, General Electric Aviation (GE Aviation) and its subsidiary Avio Aero, Pratt & Whitney (UTC Group), and Turbomeca (Safran Group) have developed metallic parts for their next generation engines with AM. These engines are soon to be in service.

The most famous example is GE Aviation's fuel nozzle developed for the Leap engine (CFM International). It was made public in 2012 when GE Aviation decided to acquire Morris Technologies. This part is in cobalt chrome (CbCr) and has been specifically developed with AM in mind. It includes an intricate internal cooling system thus improving the original design. Moreover, originally the nozzle was an assembly of 20 parts and now with the direct metal laser sintering (DMLS) process, it is built from powder layer by layer as a single unit. Not quite yet in full production, it is currently undergoing a series of flight tests. It will reach full production in the early 2020s with about 40,000 fuel nozzles to be produced in a year (19 fuel nozzle per engine). The Leap engine was selected to equip A320 Neo, 737 Max, and Comac C919.

More recently, Turbomeca, a helicopter engine manufacturer, has also announced that it has developed a fuel nozzle. This fuel nozzle will be installed on Turbomeca's new engine, the Arrano, which is used for test and productions units. The Ardiden 3 combustor swirlers will also be produced with AM leading edge process. To develop this nozzle, Turbomeca has used the selective laser melting technique.

Avio Aero, a subsidiary of GE, has also used an additive manufacturing process, the Electron Beam Melting (EBM) to develop light weight titanium (Titanium Aluminide-TiAl) blades for jet engine low pressure turbines (LPT). These blades have been printed in a different size for every commercial engine of the GE portfolio (leap, GEnx, GE90, and GE9x). This part was tested at the end of the last year on the GEnx engine (the Boeing 787 and 747-8 engine) and will most certainly be produced for the 777-x engine—the GE9x.

These first technological breakthroughs indicate that propulsion systems potentially offer plenty of good components to develop AM as many parts are rather small which is ideal for powder bed systems.

On the defence side, Lockheed Martin employs 400 engineers dedicated to additive manufacturing. During the summit, Lockheed Martin's presentation mainly focused on AM processes for the development of titanium parts (electron beam melting (EBM), electron beam additive manufacturing (EBAM), and wire and arc additive manufacturing (WAAM), indicating the company's interest in manufacturing larger parts with AM. As an example, Lockheed Martin already worked on a Flaperon spar, a large titanium part of the F-35 with the EBAM process. Other industry participants (BAE Systems, GKN Aerospace, Airbus, and so on) are investigating metal deposition techniques in order to build larger parts mainly in titanium. As the technology matures and reaches wider adoption, AM will potentially compete with the forging process.

Two conclusions arise from the

development and the adoption of AM in the aerospace industry. On one hand, AM parts have been first developed for legacy systems, particularly for those that have gone out of production, (for example, Avro 146, A310). In this specific context, AM allows a quick turnaround in terms of production with a high return on investment. This is because AM usually necessitates only a small production batch and is significantly less expensive than setting up the original and traditional manufacturing process.

On the other hand, AM developments are being driven by new programmes (re-engine options and new platforms) which are currently under development or being fly tested and will soon to be in service (Bombardier Cseries, A320 Neo, 737 Max, C919, 777-X, F-35, and so on). These platforms will be the first to have a few AM parts on board as it is easier and makes more economic sense to implement them in new programs rather than in current ones which have only a few years of production left. Below is an example of adoption of AM parts in re-engine options for the single aisle programmes of Airbus and Boeing.

Exhibit 1 shows the adoption trend of AM parts and processes.


Exhibit 1: Adoption trend of AM parts and processes

## Additive Manufacturing, the Main Motivations

Additive manufacturing is considered to be this century's leading breakthrough. Not only will it open new manufacturing horizons, it will enable parts and systems optimisation to develop better products for the aerospace industry. Parts, which could not be produced before with the subtractive and conventional manufacturing methods, will now be developed and become a game changer in the aerospace industry.

With AM, lead production time will be reduced as it is more flexible and enables just in time production. For some parts it could be a great advantage, considering the ramp up on aircraft production recently decided by the two main airframe manufacturers. In this context, the possibility to build part quicker is a great advantage. Shorter lead time will also have a direct impact cost wise as it will allow reducing direct production cost in the long term when processes will become more robust. Both the line fit and the aftermarket could benefit from just in time production as it could reduce the amount of parts they store thus decreasing the money capitalized in warehouses and stocks.

Additive manufacturing can also streamline the production as one machine can build a part layer by layer as a standalone unit rather than assembling smaller parts to build the same finished part. Taking out the extra stages of production also creates the opportunity to have only one operator for the AM machine rather than many for each sub-part and one to assemble it. As a result, it reduces the cost of production throughout the supply chain. Ultimately, as parts become more complex and their functionality increases, the total number of parts could decrease requiring less labour force to build the aircraft.

Some AM processes could become an excellent substitute to metal forging, particularly for large titanium parts. These large titanium parts are extremely costly to produce and the lead time is high as there are very few forgers in the world capable of producing these types of parts for the aerospace industry. Moreover, with the increased use of composite (carbon fibre) materials, the proportion of titanium material has increased as well on board. This new process (AM) could open up the market and increase the competition with the forgers resulting in cost reduction.

The reduction of material wastage is another advantage of additive manufacturing. When compared to subtractive processes, AM will use just enough material to build the parts layer by layer limiting surpluses and the quantity of raw material bought. Only when AM powder or wire is more competitively priced, there will be greater cost saving with AM.

With regard to technology improvements, AM gives the opportunity to re-design and optimize (removing unnecessary, unloaded material) the current design as it creates opportunities beyond the current expectation and allows for greater complexity. Adding an extra level of complexity and creating more functionality within a part together form a major incentive for adopting AM. Simply redoing the original parts makes AM too costly.

For example, GE fuel nozzle now includes a cooling function which enhances its performance, that is, it can support higher temperature. In a nutshell, AM gives the ability to build exactly what was developed digitally on CAD software, that is what we see on the screen. With AM processes improving, and engineers becoming more aware of its capability, more complex parts will be designed and fabricated which eventually could lead to a reduction of the total number of parts and as a result to lighter air vehicle. Reducing weight in the aerospace industry is one of the main objectives as it will increase aircraft efficiency, that is, lighter platforms require less power and thrust to fly as a result airplanes will consume less fuel.

## Challenges Remain

It has been established that AM could be a game changer for many participants of the aerospace industry. It gives an extra option to build aircraft parts and could result in weight saving and thus lighter and more efficient

aircraft, which is essential for the airlines operating them. However, adoption of AM is being slowed down by some challenges. AM is a relatively new technique in the aerospace industry, particularly for metals. To make it even more complex there are plenty of different AM processes or techniques making it harder for the industry participants to choose the right one.

Surface finish is one such challenge voiced by some manufacturers as a reason not to adopt AM yet. Many aerospace parts are in contact with liquid or are directly involved in the drag, thus the specifications for these parts require a high level of surface finish to avoid weakening the aircraft performance. As a result, extra machining and surface treatment are required to ensure high quality of the

Exhibit 2: Illustration of surface finishing after EOS DMLS AM and after polishing

components that may significantly increase the cost of implementing AM. This is particularly a problem for metal parts as the process is not as well-known as the processes developed for polymers even though the powder bed systems tend to give a relatively good surface finish (buy to fly ratio of close to 1). Fortunately, there are many parts in an aircraft that could start using AM as they do not require a very high level of surface finish.

Exhibit 2 shows an illustration of surface finishing after EOS DMLS AM and after polishing.

Some other processes such as the direct deposition have economy issues due to poor surface finish that requires a lot of post processing to remove the extra raw material. As a result, at the moment, the buy to fly ratio of direct deposition is too high (greater than 2). This makes direct deposition economically unsustainable as the costs of the extra material and post processing need to be considered. In order to commercially use direct deposition, the buy to fly ratio for large titanium parts needs to be about 1.5 or at least smaller than 2 and as close as possible to 1. A research group at Cranfield University is developing the wire plus arc additive manufacturing (WAAM) process with the support of some industry participants. Large titanium parts with a buy to fly ratio lower than 2 are expected to be produced through this manufacturing process solving the issue the industry is facing in terms of costs.

Another issue the industry is faced with is the problem to reproduce and repeat parts simultaneously across multiple locations and operators. Certifying parts is a particularly difficult issue for the industry. Even though the difference is not big, not being able to have the same output from the same design raises concern with regard to the ability to produce parts at high production rates with a high degree of accuracy from one production lot to the other.

To add to these challenges, designing parts for additive manufacturing requires specific new skills. At the moment, there is a shortage of engineers with a solid base in additive manufacturing restraining the adoption of the technology. A radical change in mindset is required to design parts specifically for additive manufacturing and not create components that are merely an imitation of conventional manufacturing units. Only a few people are experienced enough to understand additive manufacturing and thus make the most of it. For example, some AM processes require metallurgist capabilities which are quite unique or at least specific. At the moment, lack of knowledge about metallurgy prevents the AM machine from being operated efficiently. Expertise in AM processes and designing is essential for mastering additive manufacturing. Some people have mentioned that one of the principal reasons for GE to acquire Morris Technologies was to acquire the skill set, that is, the people and their expertise as AM skills are in short supply in the aerospace industry. Designing better parts that will result in weight saving is critical to justify the investment in AM, as a result design and skills optimisation are key for AM development. As for every new technology, the aerospace industry needs to prepare for the future by collaborating with universities with established programmes on additive manufacturing and by supporting such programmes in other universities. This will ensure that design engineers have the appropriate skills and will be able to support the industry participants with AM. At the moment, most of the knowledge is gained through on-the-job training.

Another concern that slows down the adoption is the verification, certification, and qualification process. Industry experts see this as one of the most critical challenges as it is often a long and costly process. Qualifying parts requires qualifying each step of the process from the material used to the machine and costs a few million dollars as it is test extensive. Inspection techniques for parts built through conventional manufacturing do not work properly with AM parts, mainly because of the rough surface finish. New specifications need to be written for AM parts. This process is thus very expensive and not every firm can afford to spend this type of money. This reduces the possible number of firms likely to invest in and develop AM, particularly the lower tier suppliers. Moreover, these lower tier suppliers usually receive “orders” from OEMs which tend to restrain them from developing this complex solution. This qualification, certification issue is more of a problem for commercial air vehicles rather than military ones. Involving airworthiness in the early phases of the development facilitates the validation process.

## Understanding the End-to-End Process

Overall, the lack of end-to-end process is the key hurdle for a wider adoption of AM in the aerospace industry. Industrials want to understand the process from design to qualification to better control the AM technology

AM brings together, combines directly the design and the manufacturing. This technology pushes the industry towards a design-to-print mind set thus forcing everyone to participate in the conception of an AM part to understand every single aspect of the development, from design to the machine capability and qualification process. Without this overall understanding, it is very challenging to develop a component that is optimise the functioning of a machine and will be certified. The qualification process is very expensive, (in the $ 1 million range), thus facilitation of these operations from the very beginning

when designing is a potential solution. Moreover, involving the airworthiness early, proving that at each stage of the development AM complies with their indication will facilitate the process.

In order to understand the end-to-end process, some industry participants that have gained experience about AM have advised new participants to get familiar with AM, by re-doing parts that are currently produced using conventional manufacturing without trying to redesign and optimize it. This will give the opportunity to compare the parts made from conventional and additive manufacturing while gaining experience. Once AM is well known and understood from designing to post processing, finishing, and qualification, it is time to develop a complex part to justify the investment in AM as mentioned previously. This part can now be designed and rethought with the experience gained from redoing a simple part with AM. However, even though this approach is somewhat risk averse and has led to positive outcomes for some participants, it is a very expensive process and only major participants can afford to have this time and money to develop an AM component stage by stage.

Testing remains very expensive and adding this extra stage of development is increasing the cost which cannot be borne by lower tier suppliers, and is very expensive for industry leaders as well.

More collaboration, cooperation, and data sharing among firms could accelerate the adoption of AM as the qualification of AM parts could be done quicker. However, the aerospace industry is a very competitive one where sharing is not really in the DNA. Firms are willing to adopt an open innovation model but mostly to get the idea flowing in rather than sharing internal information.

## Conclusion

At the moment, only the premise of a long story between aerospace and additive manufacturing is being witnessed. As mentioned previously, it is not whether AM will be adopted but when. The aerospace industry participants are slowly gaining knowledge and experience about AM and are starting to understand what they can and cannot do with it. The technology is getting better, although there is still a difference in terms of technological readiness for polymers and metals, the former being more advanced. Now it is mainly about understanding the overall process. The first metal AM parts will be flying very shortly on series aircraft. However, only with the next generation of aircraft (end of next decade) will we see a greater percentage of AM parts on board with a wider adoption coming from the military aircraft first.

# 3D Medical Technology - Implantations in the Treatment of Firearm Injuries

by Mr. Alper Erken

Biotechnica Engineering, Medical Co. Ltd.

## Introduction

Unfortunately, we currently come across more gunshot wounds (GSW) due to military conflict, increasing range of armed attacks, suicide cases, terrorist attacks towards civilians and troops. In certain societies, the number of GSW cases exceed the injuries related with motor vehicle accidents. In the United States of America, where usage of weapons is extensive, the annual number of nonfatal GSW cases is around 100,000. (1)

## Ballistic Impact

The rate of destruction varies due to the mass, caliber, speed, groove of the bullet/particle. The firing distance is another factor affecting the impact of the bullet. The penetration power of the bullet/particle that enters the body is closely related with the amount of its kinetic energy. The penetration capacity and lethalness of the bullet/particle increase in parallel with its speed. (2,3,4). The destruction capacity of the bullet also changes when the bullet/particle changes its direction as it hits the bone in the trajectory and when it loops. The particle effect of the broken bone alters the ballistic impact of the bullet as well.

## Introduction to Medical Technology

Following the first response to the injured patient as soon as they enter the hospital and after they overcome the trauma, in order to let themreturn to daily life and to feel better psychologically, it is of vital importance that the injured body part is repaired back to its former functional and cosmetic structure. At this stage, during the treatment of the injured bone structure, in addition to the patient's own bone tissue, implants designed especially for that patient are utilized. The period during which the patient is anesthetized is decreased when the operation simulation is conducted before narcosis and meanwhile the locations of the bone segments are identified, screws are selected and positioned beforehand. This decreases the duration of the operation as well as the rate of failure, thus increases the success of the operation. According to research, every hour under the influence of narcosis delays the patients' adaptation to previous daily life for one additional day.

## 3D Imaging of Patients

Through the developed and highly sensitive 3 Dimensional Computer Tomography (CT) devices, the internal organs of the patients can be imaged accurately (DICOM, TIFF, Interfile, GIF, JPEG, PNG, BMP, PGM, MRC, RAW). The special software used in this area segment the tomographic scans and converts them into the format utilized by the operation simulation, 3D medical model devices and design software (.stl). Via this software, the 3D images of even the stones and tumors emerging in the bones, veins and muscular tissues can be identified with their relevant positions depending on their level of density.

## 3D Medical Models

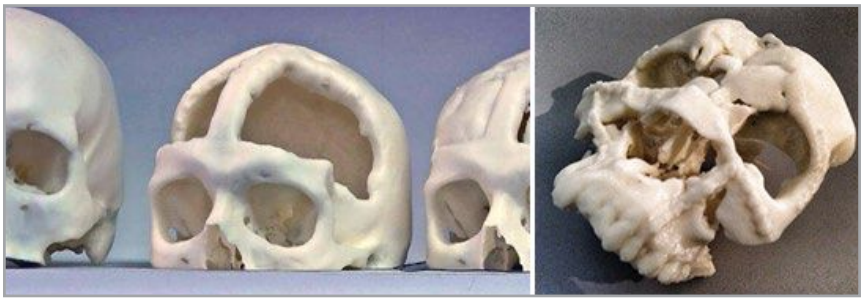
The 3D models of the positions of the bones and tissues relation to each other are used by the surgeon,for patient communication and to predeterminefaultles implant lines. Building a clear communication with the patient, informing the patient, making precise decisions for the treatment of the patient and perfect compatibility of the implant with the patient result in the rapid preparation of the patient for the surgery, quicker recovery and accelerates the adaptation of the patient to future life. Three-dimensional physical models are quite valuable assets, both for surgeons and surgical patients nowadays. Identification of the screw orbits, screw selection, selection of the surgical devices and technical operations can be conducted through these models.

## Planning Surgeries on Models

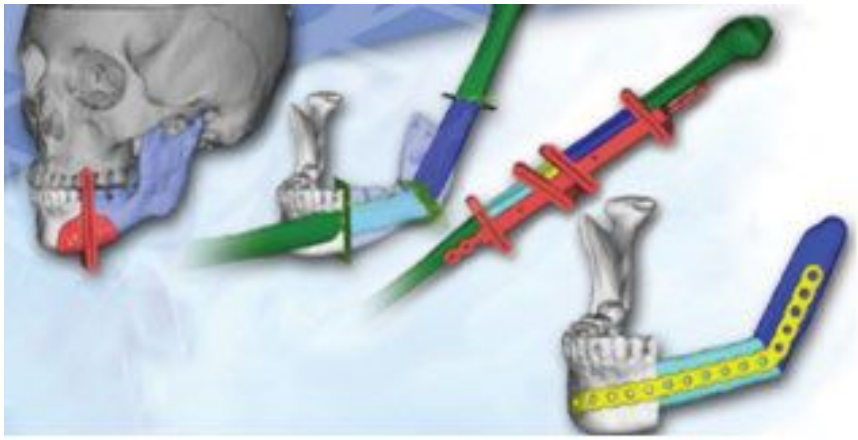
Dislocated bones, due to trauma, are brought to the position where they should be through the related software interfaces as a result of the studies conducted jointly by the relevant doctors and engineers. Meanwhile the softer elements such as the veins, muscles and connective tissues are imaged and studied. Since an implant applying pressure to the vein, a screw coinciding with a nerve or an implant that cannot be located to its place due to the connective tissue should be avoided, these points must be taken into consideration. Moreover, through this software; distance, angles, volume and density can be measured.

## On Bone Structure

The bone is divided into two parts on a macro level; the cortical (or compact) and cancellous (or trabecular) bone. These two structures are different from each other in their density and porosity. The micro variations in density cause significant changes in the endurance and elasticity module values. The cancellous (trabecular) bone is composed of bone material in the form of a short stick known as the trabecula and has a spongy look.

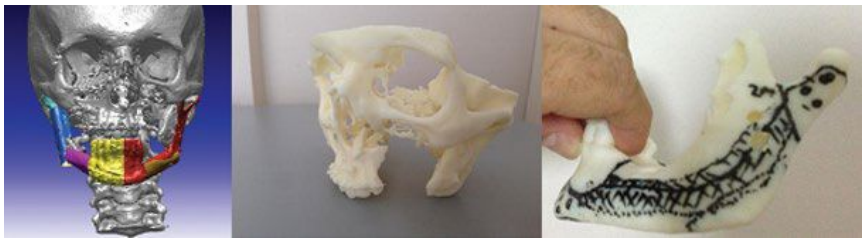


Cancellous bone is mostly situated at the inner surface of the cortical bone and at the ends of the long bones. Both bones are basically composed of the same material. The irregular yet optimized arrangement and orientation of the components results in the heterogeneous and anisotropic bone material. The skeleton system is a structure protecting the visceral organs while creating a durable kinematic link, providing the muscles a point for adherence and eventually supporting the body movements. The biomechanics of the bone is specialized in order to conduct such complex tasks. The bone is a tissue that is capable of auto-repairing and adapting its internal structure and configuration in accordance with the varying mechanic requirements. Long-standing overload or underload definitely alters the bone density. Compared with iron, bone is three times lighter and ten times more flexible. The collagen content is in charge of resisting against contortion, while mineral content applies resistance against the pressure. The significant terms herein are endurance and rigidity. (5)



## Using Patient's Own Bone Tissue

During the restructuring of the bone, treatments through using the patient's own bones (flaps) extracted from other parts of the body can be executed. The flap is removed from the places of the tissue particle fed from the named or anonymous blood veins in the body, and used for providing tissue that is missing in a remote or close part of the body. The flap tissue is transported to another part,either without pausing blood circulation or repaired in the place where it is removed, and fed through the veins at that location.



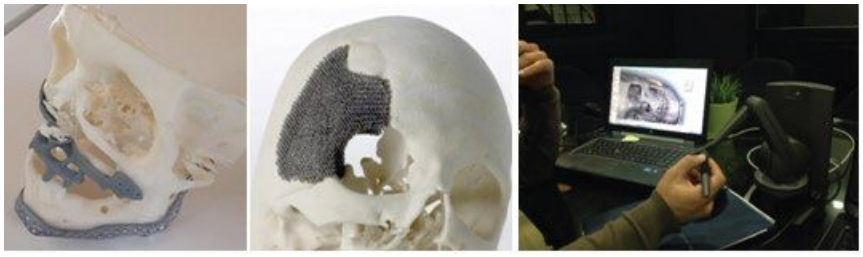
As they are thicker, bigger and since numerous tissues could be simultaneously used for transportation, the flaps are applied for the treatment of wide, deeper and more complex injuries. The skin, muscle, bone and fascia tissues can be used individually or collectively. The most important difference of the flaps from the grafts is the existence of the aorta and/or nerves in the flaps. Tissues such as the dermis, subcutaneous tissue, muscle, bone, cartilage, nerve, vein, tendon, and fascia can be located either individually or collectively (6).

Within this scope, during the full placement, osteotomy, puncturing and referencing of the flap removed from the patient, surgical guides are used. Surgical guides are guiding parts that are designed in order to increase the surgical success and for shortening duration of the surgery, for abolishing the risks that may occur during the surgery and that allow the exact application of the 3D and computer aided surgical planning, usually manufactured with polymer or sometimes from metal. The production of the guides is accomplished with maximum 0.1 precision rate through developed 3D printers. They allow sterilization with ethylene oxide or autoclave. They do not react with the body in any way, they are designed for single use and they could not be left in the body (7).

## Example of the Surgical Guide Designed for the Application of the Fibula Bone in Reconstruction of Mandibula.

Guides are designed with anatomical compatibility; they are perfectly located on the bone and fixed from their relevant parts to the given reference points so that they do not move during the osteotomy or puncturing. They are designed with the joint efforts of the doctors and engineers in a computer environment for the surgery simulation results, executing accurate, faultless incisions and punctures.

The principal advantages of this method; as fewer incisions are conducted less bone tissue is lost. As a result of the planned incision sections, full contact is accomplished between the bone segments and the healing – ossification and stability would be improved. Since the surgery planning is conducted beforehand, the surgery and as the issues that may arise can be foreseen, the duration of the surgeries are shortened, the fault



rate is decreased and the success rate increases (8).

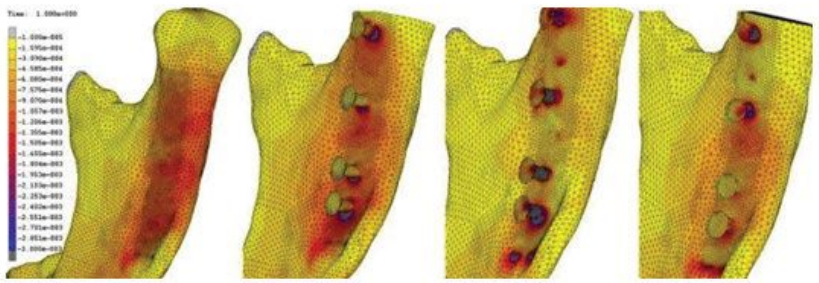
## Patient Specific Implant Design

The detailed imaging of the visceral organ via the high-technology imaging devices (CT, MR), converting this image to operable details via computer aided designs, taking the biocompatible material's characteristics in addition to the anatomic structure and bone features into consideration, and thus solving the existing problem of the implant, designing and developing the solution without harming the tissues, are required.

The methodology is generally as follows;

- Before the design, the detailed tomography of the diagnosed patient who lost a bone limb is taken.
- The captured section images are united through a computer-aided study, and the existing bone loss, the losses endured until the surgery if the loss is caused by cancer disease, the part to be removed during the surgery are determined and plans as well as related information are identified by the relevant doctors and engineers.
- Bone density measures are executed for all the bones that the implant will relate with.
- The weight, age and biomechanical movements of the patients are important points to be taken into consideration.
- Length, angle and area measurements are conducted over the image.

The designs compatible with the bone structure and convenient for the locations where bone loss occurs are executed based on the acquired 3D data. These designs obtained through a point cloud could be accomplished by getting surfaces and installing reference planes and curves from available locations as they could also be realized with systems allowing flexibility. In addition to biologic compatibility, the endurance of the implant is the most essential requirement. For instance, in the fractured spots where the soft tissue thickness is less, a bone implant's distracting the tissues from the bone can damage these tissues and cause complications. If the implant is designed for high mechanic endurance and fatigue resistance, it can be too rigid and that will result in the deficiency of the bone in enduring the physiological loads and in poor reshaping of the bone. Considering the implantation and the selection of the implant material, the mechanic and physical features of the bone must be perceived well. Between the implant material and the surrounding tissue, there are always mechanic and biological interactions. The resistance between the implant and the bone depends on this interaction. The rigidity of the screw and the implant utilized during the fixation must be proportioned to each other and to the bone, if not the screw's tooth may be scraped from the bone or the screw may be broken.



## Analysis

Throughout their utilization period, the implants and prosthetics designed in alignment with the human anatomy, must resist the loads. The interaction with the bone and the selected screws should be foreseen, the impact of fatigue and corrosion on the lifetime of the implant and prosthetic must be well calculated. The implant and prosthetics inside the body should be used in environments with hyper-variable conditions in the body. Average load on a single hip joint may increase up to three times of the body weight. During activities such as jumping, this value may be tenfold of the body weight. This stretching of our body constantly repeats itself during activities such as standing, chewing, sitting and running.

## Manufacturing the Implant Through 3D Technology

At this stage of the material and manufacturing technology development, titanium (Ti) alloy powders are combined in layers via high technology and form complex geometries in pored and dense structures (sintering in gas environment between Ti6Al4V 1100 °C-1350 °C temperatures). With sintering, as a result of growing particle contact points the specific surface area shrinks, decrease in bore density or its globalization is enabled, moreover the atom spaces that may occur in the structure or crystal faults such as dislocation are decreased.

# AKKOR Intercept Anti-Tank Missile

Aselsan to produce and design Indigenous Active Protection System (AKKOR) for "Altay"MBT

The contract for the development of the Active Protection System (AKKOR) that will detect the anti-tank missiles and rockets and hit them in mid-air was signed between the Undersecretariat for Defense Industries and Aselsan at a signing ceremony. Regarding the contract amounting to € 54 million Prof. İsmail Demir, the Undersecretary for Defense Industries and Dr. Faik Eken, Aselsan General Manager attended the signing ceremony, representing their institutions.

### Altay MBT to Reinforce with AKKOR

AKKOR System is to be designed and developed in order to be used for the "Altay" Main Battle Tank. It is an active protection system that could be fitted on various types of armoured vehicles due to its modular architecture. Aselsan has been working on this system, adopted by few armies in the world, with its own resources since 2008. The tests, during which the radar, main computer and the physical destruction munitions related to the system are tested, have also been successfully conducted since 2010.

AKKOR, that will be developed indigenously by Aselsan,will form a full 360 degree shield of protection. AKKOR will be able to detect an approaching rocket or an anti-tank missile with the help of its state-of-the-art technology radar. Through the installed sensors, the physical destruction ammunition to be directed will explode at the nearest point to the approaching anti-tank threat and defuse it.


Prof. İsmail Demir, Undersecretary for Defense Industries, Dr. Faik Eken, General Manager of Aselsan

With the smart sensor over the munitions, the AKKOR System will exert superior performance compared tosimilar systems around the world. This sensor, functioning as mini radar, will destroy the threat by performing the explosion at the point where the defense munitions are nearest.

# BAE Systems Stand Out in T-FX Programme

Turkey and BAE Systems are starting the negotiations on the pre-design phase in the Indigenous Fighter Jet Programme (T-FX).

The Undersecretariat for Defence Industries (SSM) will start negotiations with BAE Systems in the forthcoming days and is expected to conclude negotiations in February-March 2016. If no results are achieved from the negotiations with BAE Systems, the discussions will continue either with Sweden's SAAB or Airbus Military.

At this phase, that has lasted for 4 years, one model out of three different models designed by TAI will be selected. The studies with candidate companies on three models having different configurations are still continuing. The selection of engine and configuration is expected to be finalized in the upcoming period.

Within the scope of the T-FX programme, the rollout of the first fighter is planned in 2023 and the maiden flight is expected to be accomplished by 2025. Following the completion of test and certification phases, the first fighter is expected to be in the inventory of the Turkish Armed Forces in the 2030s.

# Will Turkey Hit the Target of $ 25 Billion Set for the Year 2023?

During the Turkish Union of Chambers and Commodity Exchanges (TOBB) Turkish Defense Industry Board Meeting in which the sector's problems and solution suggestions were discussed, the main issue on the agenda was the vision for 2023 and exports. The vital importance of exports within the context of a sustainable industry was underlined while the difficulty of reaching an annual growth of 35 percent in order to hit the target of an export of $ 25 billion, that was identified as part of Turkey's vision for 2023, was stressed.

Turkish Union of Chambers and Commodity Exchanges (TOBB) Defense Industry Board Meeting was held at TOBB premises with the participation of Prof. İsmail Demir - Undersecretary for Defense Industries (SSM), Dr. Celal Sami Tüfekçi - Deputy Undersecretary for Defense Industries, Ms. Asuman Vangölü - Department Head of the International Cooperation of SSM, Mr. Latif Aral Aliş – Chairman of Defense and Aerospace Industry Exporters' Association, representatives of the sector and many invitees. Addressing the opening speech, Mr. Yılmaz Küçükseyhan - TOBB Turkey Defense Industry Board President was the moderator of the meeting during which the sector's problems and solution offers were examined. In his speech Küçükseyhan stated that sector's 2014 foreign sales revenue was $ 1,855 billion, pointing out sector's export increase of 15 percent throughout the period of 2010-2014. Küçükseyhan noted that as part of the export target of $ 25 billion within the framework of 2023 vision, Turkey set a $5 billion target for the Defense Industry, $10 billion for Civil Aviation, $ 5 billion for Security and a target of $ 5 billion for Civil Aviation MRO (Maintenance, Repair and Overhaul) were identified and added, "In order to reach the determined figures, starting from today, the sector needs 35 percent of export growth annually".

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## Defense Budget Constitutes 1.7% of the Defense Products

TOBB Defense Industry Board Vice Chairman Mr. Haluk Bulucu made a presentation titled "Facts about Homeland Defense and Turkish Defense Industry Revolution 2015" in the meeting. Touching upon the inadequacy of the 1.7 % share Turkey allocated to the Defense Industry, Mr. Bulucu mentioned the amounts allocated by Turkey's neighbours in the region. Telling that despite the NATO's advice to its allies that at least 2 percent of the GNP should be allocated to defense budget, Turkey remained under this bar where Greece allocated 4 percent of its Gross National Product to defense budget while Russia allocated 3.5 – 4 percent of its GNP.

Mr. Bulucu stated that the budget allocated for the defense products announced as $ 30 billion in 2005, decreased to the level of $ 7 billion in 2015 according to unofficial figures and added the fact that according to the latest report issued by the Eurasian Strategic Research Institute of Turkey (TASAM), currently 168 of the 257 projects in the agenda were represented by the industry. Pointing out that the sector reached the level of satisfaction according to the recent report, Mr. Bulucu continued: "There are some remarkable facts in the report prepared by TASAM. In the report, it is stated that the Turkish Defense Industry reached its peak and that the medium and long term requirements of the Turkish Armed Forces –Turkish Defense Industry's main customer- were mostly fulfilled while the existing capacity aligning to the project schedule reached its saturation point and therefore our Defense Industry needed to direct its activities towards the export". Mr. Bulucu emphasized that within the context of the on-going conflicts and balances of power in the region, Turkey would always need a powerful army capable of coping with all types of threat and attack and added that the sector has not yet reached its peak within this scope and said, "It is not quite possible to agree with this view. Turkey needs to put forward its national strategy with the participation of the government and the opposition parties along with challenging projects. We have to spend 3.5% of our revenue to our army. As the companies, we are capable of conducting the export, export is a different area. Then again, we have to spend at least the amounts allocated by Russia and Greece".

*Head of Foreign Trade Department Mr. Ali Rıza Oktay: "Turkey aims to reach foreign trade volume of $ 1.1 trillion in 2023"*

Ministry of Economy's Undersecretariat for Foreign Trade Department Head Mr. Ali Rıza Oktay made an overall assessment on the incentives given to the defense industry and extended information to the participants on the overall financial targets identified for 2023.

Mr. Oktay expressed that they aimed to have a share of 1.5 percent in the world export in 2023 with Turkey's foreign trade volume of $ 1.1 trillion and added that they identified these figures as a result of a study conducted

in coordination with all the shareholders from all sectors. Mr. Oktay spoke of the export target of $ 25 billion of Turkish Defense Industry for 2023 and expressed as the Ministry of Economy, they launched the governmental incentives in three phases consisting of investment incentives, export incentives and business regimen on the path to be identified by the Ministry of National Defense and Undersecretary for Defense Industries to this end. Mr. Oktay pointed that Turkey became 25th in the world ranking in 2014 with its total Defense, Aerospace and Space Industry export of $ 1.827 billion, adding that they aimed to exist amongst the first 6 countries in 2023.


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## Turkey's Defense Expense of $ 17.94 Billion in 2014

On behalf of Undersecretariat for Defense Industry's International Cooperation Department, Mr. Ersoy Aksoy - Expert made a presentation titled "Development of an Export and International Cooperation Strategy" in the meeting. In his presentation Aksoy mentioned Turkey's current export status, potential export performance in the upcoming period and shared the details of SSM's export strategy report prepared by the Undersecretariat covering the period of 2017-2021. Stating the fact that Turkey allocated $ 17.94 billion to defense exports according to SIPRI data of 2014, Mr. Aksoy mentioned that Turkey became 18th in the world with a share of 0.43% in defense industry export between 2007 and 2014, while it was the tenth country in world's import ranking during the same period. Aksoy said that, in light of the data of the last seven years, if the existing export increase of 15 percent is preserved, the revenue from the Defense and Aerospace activities is estimated to reach to $ 6.02 billion in year 2023.

## Undersecretariat for Defense Industry's Export and International Cooperation Strategy for 2017-2021

Stressing that as the Undersecretariat for Defense Industry's International Relations Department they have been working on the Project for developing an export and international cooperation strategy, Mr. Aksoy enlightened the participants on the strategy model and project schedule they planned to introduce soon. Mr. Aksoy stated that the preparation and planning period was initiated in August 2015, that they would be conducting the situation analysis in September and December 2015 and announced that the strategy development process would be launched during January – March 2016. Aksoy also informed the audience that the strategies would be implemented in the level of projects and activities as of April 2016 and they would be moving on to performance management starting from the last quarter of 2016. Sharing some details on the on-going process, Mr. Aksoy mentioned that they included their in-house views in the Strategic Planning and Situation Analysis activities adding that they asked the views of the relevant institutions and companies, that they focused on developing country's procurement reports, examined the world defense markets in detail and exerted efforts to initially identify the products and services bearing export/cooperation potential.

Mr. Aksoy added that, within the scope of 2017-2021 Export and International Strategy, they would be conducting product and country targeting through institutional/global strategy, forming potential international cooperation programs and identifying regions to execute the potential foreign investments, joint ventures and technology transfer while reconsidering the reconstruction of the foreign offices as part of this strategy. Mr. Aksoy stressed that the companies conducting export activities within the framework of the Export Strategy should develop institutional and global strategies, business strategies and functional strategies under the caption of strategic management and marketing approaches and added that these companies should especially focus on market/product diversification, civil market orientation, merger and acquisition, foreign joint venture aspects.

Mr. Aksoy expressed that while shaping their institutional strategies the companies should ask themselveson which products' (military or civilian) export they should focus and at which stages of the Procurement Chain (raw material, compound by-product, integration and production, marketing, sales, after sales services, logistical support) should theybe involved in. Mr. Aksoy added that during the establishment of Global Strategies, companies should initially identify their strategies by identifying the regions of the world they would aim as well as their

market entry method (export, licensing, company acquisition, cooperation agreements, investing on shares, joint venture).

Within this context, Mr. Aksoy shared a Strategy Development Example with the participants over the case of a company operating in Space Sub Sector. Mr. Aksoy expressed that in the given case, Company A asked itself the Product Diversification question (What shall I produce?) as part of the Institutional Strategy and decided to operate in Communication Satellites (Military/Civilian), Task Computer (Software and Hardware), Encryption and Test services. In the following step, Company A asked itself where it should be standing on the Vertical Integration and Procurement Chain and placed itself on integration and production, after sales services regarding the Communication Satellites and task computer, encryption, test services considering other satellites and continued, "After this stage our company worked on its Global Strategy that is the identification of the regions to conduct its sales and prepared its market entrance strategy by determining the countries it is capable of reaching in Africa. Eventually, Company A identified its strategy by establishing that it could sustain its existence in Country A through exports, in Country B by joint production and in Country C through Joint Venture and thus positioned itself in that region and market".

### *Undersecretary for Defense Industries Prof. Demir: "It is a tough yet achievable target"*

In his assessment, Undersecretary for Defense Industries Prof. İsmail Demir claimed that reaching the export target would not be easy, yet still could be achieved and mentioned that the sales figures would be increasing severely as soon as the export of the platforms were launched. Saying that "Our sector's export performance is an important indicator for us besides its function of a dynamic enabling the sustainability of the sector", Demir asked the representatives of the sector to attach importance to the approaches that add intelligence to the products in order to create added value.

Prof. Demir emphasized on the need for adopting more aggressive and effective methods in marketing of the platform products in the future and drew the attention of the audience to the necessity of creating the "common sense products" and "integrated working environment". Prof. Demir said, "In order to receive our assistance, you need to complete the necessary preparations and identify your strategic targets. Asking for our help in issues that require governmental support and your arrival with concrete expectations would be more meaningful. You, industrialists, should closely follow the Undersecretariat's strategy. Besides, you must be aware of Armed Forces' defense strategies and plans. This should continue as a bilateral information exchange and hopefully carry us to our export target".

Stating that the defense industry is not an industry that could survive merely through good and high quality products, Undersecretary Prof. Demir underlined the importance of the international relations and the political conjuncture of the world among the required dynamics. Prof. İsmail Demir, "We are experiencing an interesting situation especially in our activities conducted in the friendly and allied nations. The official negotiations are conducted in a highly positive atmosphere. Yet, as soon as the subject moves onto the initiation, execution of the business and cooperation, the tempo slows down. We are experiencing difficulties in abolishing the western or eastern dominance still existing in these countries. We need to remain patient. The quality and performance of the products, approach of our companies, and their transparent and honest attitude would be effective in overcoming the prejudices. I would like all of you to know that our leaders are supporting us to this end as long as we are successful and assertive about certain subjects."

Following the presentations, the current status of the sector and forecasts regarding the future were examined within the scope of the problems and solution suggestions and the participants searched for the responses. Considering the opinions of the prominent representatives of the sector during the Q&A session and the overall atmosphere of the meeting, it was observed that each day Turkey lagged behind its $ 25 billion export target set as part of the 2023 vision. Defense authorities underlined the importance of the common sense and synergy in order to elevate sector's export to desired levels and told that despair should be avoided. On the other hand, in order to reach the determined figures, the need to skip the barriers of export restrictions and foreign dependency considering the critical areas such as the systems and sub-systems with added value namely the engines, transmissions, electrical – electronics, sensor technologies wash emphasized throughout the meeting. The necessity of decreasing Turkey's foreign dependence regarding the abovementioned areas was stressed. In light of all these, the message underlining Turkey's obligation to immediately take the required steps was uttered once again by the whole sector. It may seem hard to hit the identified targets now when the current status is taken into consideration but, the technological depth to be acquired in the compound and system – sub-system level and the indigenous system products emerging as a result of this depth will allow these competencies to function for the main platform products as well and additionally assure the figures bearing great importance regarding imports remain within the country. The matured, developed and multiplied portfolio of qualified products, companies with depth of field, correct and effective marketing strategies and launch of Government to Government Sale (G2G) mechanisms such as the FMS, the sector will become more competitive in the foreign markets and gain trust. Meanwhile, the indigenous products emerging as a result of the rapidly increasing interaction between the locomotive sectors of Turkey will find new markets in civilian and commercial fields in addition to their market for defense industry sales and thus create new opportunities. In order to activate all these facts, the capabilities should be identified correctly, capacities should be initiated in a cost-efficient manner in line with a time schedule, and without doubt the government should support the sector at all levels with proper and effective strategies. As a result, Turkey will absolutely achieve outstanding success.

# UTC Aerospace Systems - Global Leader in the Long Range Reconnaissance Market, DB-110 Reconnaissance System & TacSAR Showcased at the Dubai Airshow


UTC Aerospace Systems, one of the world's largest suppliers of technologically advanced aerospaceand defense products, showcased the latest advances in ISR systems at the Dubai Airshow, held at the Dubai World Central Airport from between 08-13 November 2015. This was the largest Dubai Airshow to date, with 1,100 exhibitors from over 60 countries, media representation from every corner of the globe, over 160 aircraft on display.

UTC Aerospace Systems met with Defence Turkey Magazine to discuss the DB-110 Reconnaissance Pod and the TacSAR pod. The meeting attendees were Mr. Kevin Raftery - Vice President ISR & Space Systems, UTC Aerospace Systems, Mr. Larry Mayer - Director, Business Development Airborne Systems, Mr. Michael Don - Director, Tactical Reconnaissance Systems, Dr. Richard Wileman - Director of Business Development International.

UTC Aerospace Systems shined as a market leader at this event. They discussed their strategic partnership agreement with Selex ES, how theircustomer centric approach and focus on market expertise has given rise to a portfolio product providing the customer with day night and all weather capability.

## Developing Customers for the Future

UTC Aerospace Systems currently has 13 international customers that operate on the DB-110 system on various platforms, F-16 being the largest. The DB-110 Reconnaissance Pod and the TacSAR pod provide seamless integration into existing operations using the same aircraft interfaces, real-time data links and intelligence exploitation systems.

## ISR Systems - Significant and Growing Presence in Global Defense Programs

UTC Aerospace Systems' Intelligence, Surveillance and Reconnaissance (ISR) business has contributed to significant advances in ground, air, space and imaging technology for over 85 years. ISR Systems have a significant and growing presence in global defense programs, in air and ground environments as well as space. Mr. Kevin Raftery, Vice President ISR & Space Systems, shared with us the history behind DB-110, its development, application growth and customer growth.

"The thrust of our product in tactical reconnaissance is built off of our for purpose export sensor called DB-110. That sensor was developed about 15 years ago; predominantly the launch customer was the Royal Air Force, for a program called RAPTOR. The system has gone through multiple upgrades and in 2005 we developed the upgrade and integration path for the largest application users, that's the F-16. In fact, most of the growth in the market segment has been putting our sensor on to an F-16. If we fast forward a decade of very robust sales, of various versions, we would enhance the DB-110 first generation, second generation and each time we would listen to our customers and determine what they were actually seeking, resulting in tremendous amount of growth, application and customer growth. Right now we have 13 international customers that operate on the DB-110 system on various platforms. F-16 is the largest. This region has many customers. Today, as well as this team here at the Dubai Airshow, we are working on developing these customers for the future." He continued, "Based on the voice of the customer, listening to what the customers needed and in parallel working with the state department for export approval, it took about 3 years and 3 products were introduced."

## Establishment of a Strategic Supply Agreement with Selex ES in Edinburgh, Scotland

The first major thrust stemmed from the fact that the systems worked exceptionally well day/night, but they lacked performance in all weather conditions. Mr. Kevin Raftery elaborated, "If you've got cloud coverage you're not going to see through the clouds with optical imagery, so with that we introduced a radar version of the system "TacSAR". We conducted a worldwide search of current radar

suppliers as a development partner. At UTC, we did not want to develop our own radar; we wanted to seek out a proven leader in the industry. We did this both foreign and domestic, in the same time we obtained export approval, we knew the system size we wanted, we wanted the range in performance to closely match the range in performance of our DB110 system. A few years ago we established a strategic supply agreement with Selex ES in Edinburgh with their product portfolio; we take our DB110 system, take out the imaging sensor and we replace it with the radar sensor and now we can offer a portfolio product where the customer gets day/ night and all weather. Selex ES is the prime subsystem technology, radar provider. We rely on their expertise. The size of the investment they've made and the core of their technology is so huge we would not want to recreate that. The segment that we are in is imaging radar for ISR. It's not combat radar it's intelligence radar. With a combat radar or fire control radar the pod is on the nose and they are looking ahead and doing air-to-air and some airtoground. In our business we're looking side to side, left to right and we are standing and collecting information and mapping it, and we overlay that intelligence that we get from the SAR with map data and prior electro optical imaging data; so it's an exceptional fit, it allows Selex ES introduction into markets that they would not normally have entered because we are the airborne integrator, we have the F-16 integration approach, the F-15, it potentially provides them inroads into the US market because we are a US based company, and at the same time we get access to some very good technology."

Mr. Raftery continued "Another key part of the market is that UTC's existing customers do not have to make a huge investment into this capability because they can reuse the ground exploitation that we produce in the UK, the data links to get the information to the ground, most of the training and ground support and test equipment and a handful of the spares that are common are all reused. These factors really excited our customer. We began in earnest about a year and a half ago of just targeting one or two customers to get


the expression of interest because we don't want to do is introduce a 'first to the market product' even though we've been working on it for three years, and everyone comes up and says they want one. It is in the integration stage right now. Currently we are negotiating with our first customer and then it will likely be followed 6 months later with our second customer and so on. The first customer would get the operational system around 2017. Right now there are at least a half a dozen existing customers that have expressed a desire to learn more about the new product."

In September 2015, UTC Aerospace Systems held its second users conference with their customers, also known as the 'the DB-110 Operators Conference' which is held approximately every two years. This year's event was held in Krakow, Poland; chosen for its central location. At this event, all of their existing customers are invited. Mr. Rafterysaid "If there is a strong desire by a new or potential customers to attend, an expression of interest, we will invite them too. Customers really value this event because they get an opportunity to say what they like about the product what they don't like, and we put together an action plan and report back to them, in a big open forum, and discuss strategies about how best to use the system, we use this forum to introduce pre-products."

## DB110 Already Moving to the 4th Generation

The second major thrust involves the offering of multispectral imagery for some customers. DB-110 refers to dual band 110-inch focal length. The US has been operating multispectral imagery, providing more intelligence out of the same imagery, getting spectral content, which enables the identification of materials of interest, viewing through haze, determination of whether a product is man-made or natural. All of these elements have been used by the US in their ISR. Following a three-year process, the State Department granted license approval to UTC Aerospace Systems, so that this is technology can be shared with allied partners.

"We introduced this product at our global conference, and now we are working with a customer now for the launch of that product, that product will also be fielded in 2017. The DB-110, which is now in its 3rd generation, is now moving to the 4th generation, from a two-band DB to multispectral 6-7 band, depending on which customer. Our customers get to procure new systems, they can send the DB-110's back to our facility, getting a full retrofit up to multispectral standards so there's real affordability" stated Mr. Raftery.

Mr. Mike Don - Director, Tactical Reconnaissance Systems, said, "Our only competition for a multi-spectrum provided commercially today is what countries can buy from satellite assets. There are some satellite providers that are providing multi-spectral capability, but that has some weaknesses because you have to rely on positioning the satellite and the time of the day and so forth. There's much greater flexibility to the user when they have the capability on a platform that they can control. We are currently flying on F-15 and F-16 Fighter Aircraft. We've looked at other FighterJet possibilities, French Aircraft, Gripen, F-18 Super Hornet, the technology to be able to attach our pod is not necessarily difficult it's more of a question of the desire and the mission requirements of the customer."

### "Our Business is Really About Providing Customers with Information"

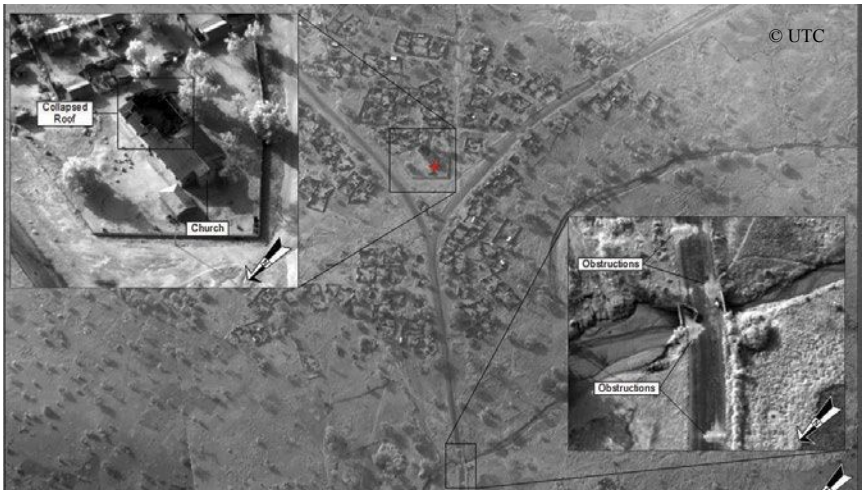
Mr. Kevin Raftery shared details about the third part of their strategy. "We can build the best sensors in the world but our business is really providing customers with information. Our UK entity does the information, they build network clustered exploitation tools and hardware and software solutions, such as the new product SCI toolset (displayed at the show) which provides the customer ease of rapid collection and rapid dissemination of information." The use of technology and working with subsystem providers is building momentum. "When you consider when we go to TacSAR and we go to multispectral, we are delivering up to 5 times more information than previously received with prior systems and our UK entity is prepared to give them transparency. It's going to be an exciting 2 years."

### Designed for Precision and Quick Flexibility to Respond; Mr. Raftery Discusses the 'roll on roll off design'

"Tactical speed is brought to the customer, as weather changes over a target area, because all of these are in the same pod configuration they can roll on and roll off very quickly, which means their time to target is reduced, as soon as the weather changes they can swap one pod for another and when they collect the intelligence over the target and overlay it with the previously collected imagery and identify the contexts that the targets are now sitting in. Because of the accuracy of the imagery, every pixel has its coordinates, overlay of the imagery can occur very quickly, very precisely and it gives quick flexibility to respond, and from a military point of view it is very important, there's no delay."

### Global Leader in the Long-Range Reconnaissance Market

In closing, Mr. Kevin Raftery shared details about their team's readiness for a growing customer base "The ground architecture is done in the UK, airborne is done in the US, the radar is done in Edinburgh, we are truly a global footprint. We are considered the global leader in the long-range reconnaissance market. Our customers will either purchase directly or procure through the US government's foreign military sales, we can provide support either way, and we have a dedicated team as well a global support center to work with these customers in the region. Traditionally a program takes two years from inception to when they start getting capabilities and by the time they are done with entry into service it's three years. After equipment and training, we are alongside with the customer supporting that integration 24/7, then they decide if they will maintain the system themselves or do they want to contract with UTC to support that. About half of the customers say they want UTC to stay with them, so we will establish an in country field service location, providing logistics."



High Resolution spot SAR image

### UTC Aerospace Systems is a Supplier to the Turkish Air Force and Industry

"Turkey is a proud user of the DB110 system and in fact Turkey is looking to expand it into not only the product we have today, which they want more of, but also into next generation products" said Mr. Kevin Raftery, Vice President ISR & Space Systems, UTC Aerospace Systems. He added "Turkish industry is exceptional with network ground exploitation ISR ground systems, these are the areas we've looked at and as we continue to grow. There was an immediate need for this program, very fast. It's been a desire to have Turkey as a customer and from the time we went to contract. It was a quick and successful project. "

### DB-110 Reconnaissance Pod

UTC Aerospace Systems offers a SEEK EAGLE certified pod for F-16 and other fast jet applications. The UTC Aerospace Systems pod offers advantages over competing systems by relying

on dual environmental conditioning systems, to provide robust ground cooling and multi-altitude operations. Full-size fore and aft data-link antennae enable maximum data-link range throughout a full 360° azimuth.

UTC Aerospace Systems also offers a smaller, lighter weight pod designed for long-endurance

UAV operations. Housing the same DB-110 reconnaissance system, this pod provides stand off and vertical imaging capabilities and air-to-ground communication over constrained bandwidth systems.

### A True Force Multiplier Providing Battle-Winning ISR – TacSAR

UTC Aerospace Systems offers the new TacSAR Airborne Reconnaissance System. Built on the operational pedigree ofthe DB-110 EO/IR system, in partnership with SelexES,TacSAR provides commanders with a vital all-weather ISR capability. The TacSAR pod has seen the integration of the Selex-ESAESA and offers 24/7 mission effectiveness for multiple combatI SR missions. The multi-mode TacSAR allows commanders to use their existing fast jets for true multi-role combat operations.

# Final Peace Eagle "Batı" AEW&C Aircraft Delivered to Turkish Air Force

Turkish fleet reaches full strength with four aircraft and ground support systems

Boeing delivered the fourth and final Peace Eagle Airborne Early Warning & Control (AEW&C) aircraft to the Turkish Air Force (TurAF) at Konya Air Base on 9th December, completing the Turkish AEW&C fleet and enhancing Turkey's airspace surveillance and battle management capabilities.

This final aircraft includes upgraded software for the platform and the final element of the ground support segment, the Software Support Center (SSC). Previously delivered Peace Eagles will receive the upgraded software in the second quarter of 2016.

Boeing worked with Turkish industry partners Turkish Aerospace Industries, Turkish Airlines, Havelsan and Aselsan to complete the delivery of the final aircraft as well as establish technology capabilities like the Software Support Center, updated mission simulator software and mission support center software.

"Turkey is currently the only nation in this region with the AEW&C capability. By combining Boeing's innovative engineering with the expertise provided by local Turkish industry partners, we've delivered an advanced world-class airborne surveillance system to our customer," said Ms. Aysem Sarginlsil, Managing Director, Boeing Turkey.

Turkey, Australia and South Korea operate AEW&C platforms.

Based on Boeing's 737-700 commercial airplanes, the 737 AEW&C aircraft's advanced radar and 10 state-of-the-art mission crew consoles can track airborne and maritime targets simultaneously. The battle management capabilities allow mission crew to direct offensive and defensive forces while maintaining continuous surveillance of the operational area.

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With this final delivery, the number of AEW&C aircraft in the inventory of TurAF has reached to 4 aircraft. When these 4 aircrafts operate simultaneously, the radar coverage of Turkish airspace will reach to 4 million km$^2$. The Peace Eagle's endurance is 10 hours unfuelled and 18 hours with refuelling. It reaches to maximum 40.000 m altitude, has 850 km/hr cruise speed and 7000 km range and can detect 1500 targets within 350 km under all weather conditions.

Possessing a wider range than ground-based radars, the AWACS aircraft can back-up ground radars with its continuous air communications capability in situations where ground-based radars are disabled from time to time as a result of uneven terrain. The Peace Eagle aircraft can detect, identify, and undertake reconnaissance and surveillance of all elements over Turkey's airfield and additionally when entrusted with the task can undertake air traffic control operations for civilian air traffic. With the identification friend-or-foe (IFF) feature that is mounted on the mission radars, the Peace Eagle aircraft can recognise all friend and foe elements.

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Modernized with the military avionics and systems of the Boeing 737 aircraft, the AWACS aircraft consists of five sub-systems: the Mission Radar, the Friend-or-Foe Detection System, Mission Computers that enable interface to user personnel, the Electronics Support System and the Communications Data-Link.

A synthesis of the additional capabilities of the Boeing 737-700 and the 737-800, the Boeing 737-700 IGW (Increased Gross Weight) Peace Eagle aircraft carries 1.5 tonne radar. Aside from the increased payload capacity, the Boeing 737-700 IGW aircraft also possesses reinforced landing gear and Head-Up Display screens as with the F-16 fighter jets in limited visibility conditions. Equipped with the ability to refuel, the Peace Eagle aircraft can jettison its fuel in emergency situations.

# Bayraktar Tactical UAV Hit the Target

Tactical class UAV Bayraktar TB2 manufactured by the Baykar Makine and included in the inventory of the Turkish Armed Forces in the previous period, executed the first armed flight and firing test on 17th December 2015. Two MAM missiles that are the engineless configuration produced for the unmanned aerial vehicles of the UMTAS anti-tank missile manufactured by Roketsan were utilized during the firing test realized after a-year-long study.

Following an intense labor of a year, Bayraktar TB2 took-off with the ammunition of 22,5kg placed under both of its wings. Under convenient weather conditions, Bayraktar TB2 was fired with a free fall from an altitude of 16.000 feet and a range of 8 kms. The laser guided missile was directed to the 2x2 metered target on the ground from the operator at the ground station and the target was hit directly. TB2 Bayraktar, hitting the target right on, accomplished a successful landing with the remaining ammunition under its other wing. With this hit, a firing from an UAV of tactical class was realized for the first time following the firing tests of Anka's MALE class with the "Cirit" missile.

Bayraktar's General Manager Mr. Haluk Bayraktar shared the details of the firing test with the public at the UAV Road Map Seminar organized by SETA and the Undersecretariat for Defense Industries. "We achieved 100 percent success at these precise firing tests. The weather conditions of that day were not as we expected and we accomplished the flight in overcast. Despite these negative conditions, we accomplished the mission success fully" said Mr. Bayraktar. Stating that the Bayraktar TB2 has endurance,24 hours operationally with its 50kg payload camera system, Bayraktar added, "With this ammunition we currently have three alternatives. We are able to integrate the "Bozok" developed by TÜBİTAK Sage, MAM-C and MAM-L missile systems of Roketan to the UAV. We were capable of accomplishing flights for 27 hours with payload camera system. With the 22.5kg ammunition and 52kg Gimbal, we are able to operate for up to 17 hours"

With the smart micro ammunition developed and manufactured by Roketsan and unveiled at IDEF 2013, the targets at a range of 8 km can be hit through free fall from high altitudes. No engines are utilized in the smart system, and ammunition direction systems and more explosive warheads could be installed into the remaining part. No additional propulsion systems are required in the system that could be launched from high altitudes.

# The New Airframe Design of Anka Accomplished the Maiden Flight

A milestone as part of the Anka-S project designed as the mass production version of TAI's Anka UAV system was passed on 5th December 2015. The maiden flight of the new airframe design with updated features of the Anka-S system that will be Turkey's first unmanned aerial vehicle featuring control capability via satellite was accomplished successfully.

A total of eight sorties were realized and the altered aerodynamic features, auto-pilot system and automatic take-off and landing systems of the aircraft with satellite integration were tested. The productions of the avionic units that will provide many new features to the Anka-S system are ongoing while the aircraft with tail number 14-006 is being utilized as the test platform.

The test program will continue to be conducted in 2016 as well. Many operational capabilities such as controlling 6 air vehicles simultaneously from a central station via satellite communication, radio relay, research and rescue task, surveillance through a high-resolution camera and crypto communication will be acquired with the Anka-S configuration. The software studies to this end are continuing at full steam.


# Turkish Army Selected "Cobra-II" Armored Vehicles

Otokar's Cobra II, Tactical Wheeled Armored Vehicle, unveiled in 2013, is entering the inventory of the Turkish Armed Forces. According to a statement from Otokar, the Turkish Armed Forces will procure armored vehicles worth a total of € 47.5 million. The vehicles deliveries are expected to be completed in batches during the first half of 2017. The € 47.5 million package includes a variety of systems, including maintenance and support services.

The Cobra II 4x4 Tactical Wheeled Armored Vehicles stand out with a high level of protection and transport. Cobra II was developed from the Cobra, the preferred class of vehicle and used in 15 countries. Cobra II features a higher payload capacity and internal volume. With a modular structure, Cobra II provides a high level of protection against ballistic, mine threats and IEDs.

With its wide range of weapon integration and mission equipment options Cobra II can serve various types of missions including urban and peacekeeping missions with optional amphibious feature. The vehicle provides a remarkable performance in a wide range of challenging terrains and climatic conditions.

## Ural 4x4 Armored Vehicles Ordered by one of the Gulf Countries

In 2014, an order was placed by a Gulf Country due to the successful performance of the Ural 4x4 tactical wheeled armored vehicle, supplied for internal security, as indicated by the General Directorate of Security. The amount of the order that was placed is unspecified in the 2015 end sales publicly disclosed by Otokar. On the other hand, delivery of the first batch has been completed for Armored Internal Security Vehicle (ISV) export orders received last July. A sale will occur worth $ 73 million, to an undisclosed country, which includes spare parts and training of personnel. Production and completion of the vehicles for the relevant country is expected within the first quarter of 2016.

## Altay MBT Program on Track

Otokar, in its November newsletter, announced that with its continued success as the prime contractor for the Altay project,that they are in the last stage of "Prototyping and qualification" within the system qualification and acceptance testing framework agreed upon by the committees of the Defense Industry Undersecretariat and the Turkish Land Forces. With the conclusion of the tests phase 1 will be completed.

# Turkey Discusses Airworthiness Certification for Indigenous Air Platforms

In the Indigenous Air Platforms Certification Seminar, STM shared the know-how acquired on the Airworthiness Certification with the authorities and industry representatives. STM General Manager Mr. Davut Yılmaz emphasized the major ongoing aviation projects in Turkey and said "the deceleration, halt and sometimes retardationof the developments in aviation during the last 85 years may be used as a good answer to the criticisms. However, especially the developments in the last ten years abolish all the excuses".

STM General Manager Mr. Davut Yılmaz made the opening remark of the event organized again by STM and stated that the certification issue that stood for "airworthiness" in aviation was still regarded as a problem and added that they have been taking concrete steps to overcome this issue. Mr. Yılmaz said, "Vecihi Hürkuş built his own aircraft through his own resources and managed to fly it approximately eighty years ago. Then he applied to the relevant authority known as the ministry of economy for the certification of that aircraft. The ministry declined his approval for there were not enough personnel capable of coping with the technical capabilities of the aircraft and Hürkuş had to go to former Czechoslovakia. Thus, the certificate was granted by the Czechoslovakian authorities before Turkey. Actually, this problem has not been solved since the Vecihi Hürkuş' case. Despite the last 85 years, we are still regarding certification as an issue and discussing it. On this very point, we have to initially criticize ourselves as a country; from the private sector to governmental organizations, from universities to private training centers. We may use the deceleration, halt and sometimes retardation of the developments in aviation during the last 85 years as an answer to the criticisms. Yet, the developments in this area, especially in the last ten years, give us no excuses. A little time is remaining regarding the numerous aerospace platforms such as the regional aircraft project that started recently, or is about to start soon, the Indigenous Fighter Jet Project, "Anka" and Hürkuş" and the eco-system of the private sector, government and universities have to take immediate and concrete actions to this end. Actually, the term 'concrete steps' is the keyword here".

Mr. Davut Yılmaz, General Manager of STM

## All institutions should be organized and systematic

Mr. Davut Yılmaz underlined that "human resources" was the keystone of the aviation eco-system and continued: "Focusing of all the shareholders on this issue is of vital essence. As STM, we are currently providing services to the sector with our engineers who are also certification experts. We aim to increase the number of our engineers who are experts on certification by fifty percent within the next year. Meanwhile, we started trainings at the STM Academy. With in 2016, we will be offering training in 40 different areas by our experts on certification. Offering training on 40 different areas of certification is a severe attempt and service. Still, this initiative we take as STM is not sufficient. Many more institutions, associations and universities' approach to this issue in an organized and systematic manner is required".

Civil Aviation General Manager Mr. Bilal Ekşi pointed out that Turkey was considered amongst the most rapidly growing countries in the airway arena in recent years. Mr. Ekşi mentioned that this development has assigned additional tasks to the sector and stressed the need of the sector's existence not merely as a consumer but also as a manufacturer. Mr. Ekşi expressed that the military and civil aviation projects transformed the certification studies/activities to a requirement and added that with the certificates granted in Turkey, it was possible to fly all around the globe, yet regarding the commercial context, the international certificates were still required. Mr. Ekşi stated that there were no legal deficiencies in the legislative infrastructure considering the certification subject although improvement in technical competence was still required.

Deputy Undersecretary for the Defence Industries Dr. Celal Sami Tüfekçi stated that as the main focus was on the immediate accomplishment of the helicopter and aircraft platforms, the certification subject was neglected and thus the development in civil aviation still did not reach the sufficient level. Dr. Tüfekçi insisted that the same amount of time and effort should be given to the certification process, as much as the design process and said that even though national certificates were deemed sufficient for flying, international certificates were still regarded as essential for the exports that are considered to be the cornerstone of the development of the industry.

# TAI and LHTEC Signed Contract for CTS800 Engine

Deal between TAI, Honeywell and Rolls Royce will establish local assembly, parts manufacturing, inspection, and test and depot repair capability in Turkey.

Turkish Aerospace Industries (TAI) and the Light Helicopter Turbine Engine Company, a 50-50 partnership between Honeywell International Inc. and Rolls Royce, have signed an agreement to supply CTS800 turboshaft engines for the Turkish Light Utility Helicopter, a program of the Undersecretary for Defense Industry (SSM) since September 2013.

The agreement, which confirms a memorandum of understanding signed at this year's Paris Air Show 2015, consists of a five-year development program to integrate and certify the CTS800-4AT engine model on the Turkish Light Utility Helicopter (TLUH) platform. The agreement is expected to result in a production program that will provide helicopters to the local Turkish military and civil market, as well as globally. With the CTS800, operators will benefit from a proven commercial and military propulsion system that expands mission range and payload.

In addition to the development program, Light Helicopter Turbine Engine Company (LHTEC) plans to industrialize production and maintenance of the engine in Turkey, boosting the Turkish aerospace market by providing local opportunities for manufacturing and depot repair.

"This deal will deliver a wealth of employment and industrial benefits to the Turkish aerospace industry," said Daryl Mastin, president, LHTEC. "LHTEC is committed to working with local Turkish companies to manufacture the CTS800 engine as well as establish a local depot with maintenance and repair capabilities to support these future fleets."

In addition to the positive impact on the local workforce, the development program also delivers technical and commercial advantages. For delivery in 2020, Turkish Aerospace Industries (TAI) will design a 5-ton, twin-engine utility helicopter equipped with the CTS800, the same engine model that powers the T129 "Atak" helicopters currently in use by the Turkish Land Forces.

With almost a quarter of the Turkish gross domestic product stemming from its manufacturing sector, the Turkish Light Utility Helicopter program brings significant potential for domestic Turkish suppliers to provide manufacturing and support for both the production program and engine development. By working directly with local vendors, the CTS800 global support network will help create further job opportunities that match local skills with domestic work demand.

"For TAI's new locally developed helicopter, the LHTEC CTS800 engine is a clear choice thanks to its proven capabilities in the most challenging environments," Mastin said. "The synergy between the Atak and TLUH fleets will allow greater efficiency in logistics, maintenance and familiarity for engineers, with a streamlined support network compared with other engines on the market."

# Protective Shield from Havelsan Against Cyber Threats

Havelsan is not allowing cyber threats which are accepted as the fifth dimension of the threat of war. Adding one more new project to its portfolio regarding the security of critical infrastructure, Havelsan has become the cyber protective shield for nine hydroelectric power plants (HEPP) of Electricity Generation Corporation (EÜAŞ).

HEPP IT Security System Project initiated by Havelsanat the end of 2014 has come to the final stage. Within the scope of the project initiated for nine HEPPs of EÜAŞ, the IT security systems of two plants were established and the acceptance processes of which were completed. The systems to be established for the remaining plants are planned to be completed and activated within the first half of this year.

Following the completion and activation of all plants, the Havelsan's Cyber Defense Technology Center (SİSATEM), the opening of which is to be realized within the next months, will be able to deliver monitoring and protection services to all plants.

The objective of the project is to create the inventory list of automation and IT systems of EÜAŞ's HEPPs operated by SCADA, protection against possible cyber threats and risks, process of the required maintenance periodically during the project implementation.

Within this scope, in order to improve IT security of nine HEPPs SCADA network and ensure system sustainability, Havelsan assumes the tasks of improving system rooms, installing backup systems, establishing and implementing security architecture topologies, creating ability for cyber incident monitoring and improving security

### Cyber Protection of Critical Institutions

Havelsan, in addition, has been continuing activities also in the field of IT systems cyber security improvement of some public institutions within the scope of "critical institutions" listed in National Cyber Security Strategy in the Decree of Councilof Ministers issued on the Official Gazette dated 20th June 2013.

# Satellite Based Flight Systems Becoming Popular

The traditional approach and landing systems utilized in aviation are being replaced by "Satellite Based Approaching and Landing Systems".

In line with the technological developments emerging in the aviation sector, the replacement of the traditional navigation support devices with satellite based navigation and correction systems is expected in addition to the increase of their popularity in parallel with the road maps identified by the worldwide aviation authorities as critical technological areas.

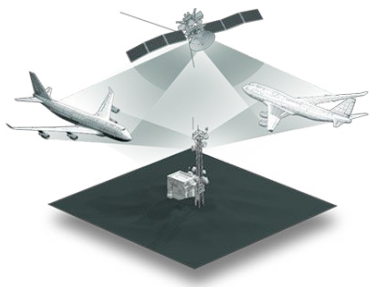
According to the "Satellite Based Approach and Landing Systems Technology and Market Assessment Report" issued by STM in the last quarter of 2015, it is reported that the satellite based systems increase the flight safety, reduce the fuel consumption and decrease the maintenance and operation costs. It is also stated that the air traffic efficiency is supposed to increase due to these systems while uninterrupted service under all weather conditions will be enabled.

In the report, the wide coverage zone, low maintenance and operational costs of the Satellite Based Approaching and Landing Systems and their capability of providing service to all runways and to all types of air vehicles are underlined and it is stated that the systems are not affected by the environmental restrictions.

## The Growth in GNSS Market to Reach up to € 8.32 Billion in 2021

In the report in which the increase of the utilization of the satellite based systems in aviation and their rise of market shares are emphasized, the following facts were mentioned: "Considering the global navigation satellite system (GNSS) market, an average annual growth of 11% is foreseen for the period of 2012 – 2021. This growth is expected to turn out around 6-8% between the years 2012-2017 and 10% after 2017. The market towards the GNSS applications is around € 65 billion around the world, and this figure is expected to reach the level of 134 billion Euros in 2021. Where the GNSS market share regarding the aviation applications was around 5% in 2012 (that is € 3.25 billion Euros), it is estimated that it will reach 6.2% (€ 8.38 billion) in 2021".

Moreover, in parallel with the market share regarding the utilization of the GNSS systems in aviation applications, it is stated in the report that the market volume of the SBAS and GBAS was approximately $6 billion and that this figure will be increasing in the coming years. The report drew the reader's attention to the global market share in the upcoming period in addition to other important facts and read "The number of Boeing air vehicles with



GBAS compatibility is over 1000 as of 2015 and when their current order/production rateis considered, approximately 25 air vehicles per each month are added to this figure. For instance, nearly one third of all Boeing 737s in the world feature GBAS avionics and for 787 and 747-8 aircrafts these avionics are introduced as standard hardware. The introduction of GBAS avionics as standard hardware, it is assessed that the number of air vehicles featuring GBAS capability, the number of airports with relevant infrastructure and the global market share will be increasing directly".

In the conclusion of the Report, it is written that as a result of the international aviation authorities' programs and road maps, the traditional approach, landing and navigation support systems will be replaced by cost-efficient satellite based systems that offer operational efficiency, and additionally Turkey's strategies in this regard are mentioned.

In the Report, it is stated that through the national systems to be developed as a result of combining Turkey's industrial infrastructure and academic know-how, the country will become a potential shareholder both on the user and manufacturer side and the opportunities will be utilized through the middle and long term plans.

It is aimed that STM, subsidiary of the Undersecretariat for Defence Industries, leads the way in the domestic production of the aforementioned systems that are planned to be actualized in the future.

# Camcopter S-100: Deterrence of Illegal Trafficking

## An Interview with Mr. Nikolaus Weihs, Sales Manager of Schiebel

**Defence Turkey: What are Schiebel's core capabilities, state-art- technologies, and products?**

Founded in 1951, the Vienna-based Schiebel Group focuses on the development, testing and production of state-of-the-art mine detection equipment and the revolutionary Camcopter S-100 Unmanned Air System (UAS).

**Defence Turkey: Camcopter S-100 is a successful UAS system developed by Schiebel. Could you please inform us more about the UAS, theatre capabilities and advantages from the rivals?**

Schiebel is at the forefront of UAS development and production and its highly versatile and fully autonomous CamcopterS-100 Unmanned Air System has been in series production for over eleven years and sold over 200 to global customers to date.

The Vertical Take-off and Landing (VTOL) UAS needs no prepared area or supporting launch or recoveray equipment. It operates in day and night, under adverse weather conditions, with a beyond line-of-sight capability out to 200 km, both on land and at sea. The S-100 navigates via pre-programmed GPS waypoints or is operated with a pilot control unit. Missions are planned and controlled via a simple point-and-click graphical user interface. High definition payload imagery is transmitted to the control station in real time. Using "fly-by-wire" technology controlled by a triple-redundant flight computer, the UAV can complete its mission automatically. Its carbon fiber and titanium fuselage provides capacity for a wide range of payload/endurance combinations up to a service ceiling of 18,000 ft. In its standard configuration, the Camcopter S-100 carries a 75-lbs/34 kg payload up to 10 hours and is powered with AVGas.

**Defence Turkey: In which are areas mostly Camcopter S-100 is effective and can we talk about the cost effectiveness?**

Wherever surveillance from the air or sensor measurement is required, the use of the Camcopter S-100 is possible. The Camcopter S-100 especially stands out for its hovering capability, which is of advantage to many surveillance applications. Fields of application for

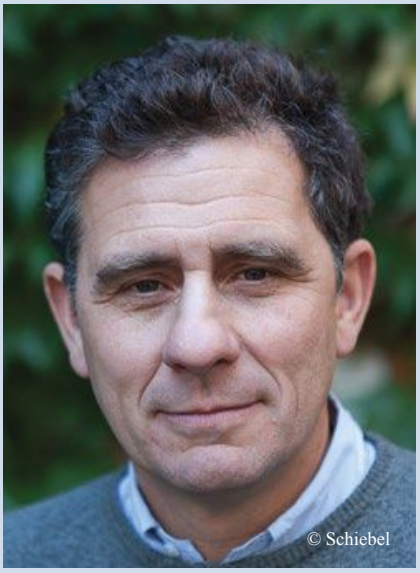
© Schiebel

the drone are manifold. The costs of a flight hour are considerably less than those of manned helicopters.

**Defence Turkey: Camcopter S-100 act in a major role in rescue operations of the refugees in Mediterranean Sea. Are there any other success stories you can tell us?**

At this point of time the Camcopter S-100 is in service for the OSCE (Organization for Security and Co-operation in Europe) SMM (Special Monitoring Mission) in Ukraine.

The deployment of the S-100 aims at supporting the OSCE SMM to fulfil its mandate through complementary information gathering on the security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situation in the area of operations. Four UAVs are in operation in the Ukraine to provide 24/7 day and night surveillance. The UAVs are deployed near Mariupol in the South-East of Ukraine.

The unmanned helicopters are being provided, flown and maintained by Schiebel under contract to the OSCE and operated under the authority and direction of the SMM, with the mission's monitors in close attendance. The data collected is the property of the OSCE and for the Mission's use only.

The Camcopter monitors concentrations of weapons, military movements, military installations and infrastructure damage. The obtained information is reported to the 57 participating states of the OSCE in order to provide a more comprehensive picture of the current security situation on the ground.

The flights take place mostly along the contact line and within the 15 km "cessation of use of weapons zone" on both sides of the contact line where heavy weapons and equipment are prohibited according to Minsk Memorandum. The Minsk Memorandum, signed by all parties of the conflict on 19 September, specifically allows UAV observation to be conducted exclusively by the OSCE.

Initially, and until further notice, the S-100 will operate for the OSCE SMM over the area south of Donetsk down to the Sea of Azov, eastwards towards the Ukrainian-Russian state border and westwards as far as 120 kilometers

west of the line of contact.

**Defence Turkey: Turkey is located in midpoint of the illegal refugee traffics for a while. Within the scope of homeland security protection do you have any negotiations with Turkish Coast Guard or Turkish Authorities?**

Schiebel is open for any opportunities that may arise in the future and of course will consider the local requirements and conditions in Turkey. Therefore we would be open to corporate with the Turkish coast guard.

**Defence Turkey: "COMID" Compact Mine Detector was revealed by Schiebel in September 2015. Could you please inform us more about the product?**

As always for Schiebel, the interest of its many existing humanitarian demining and military customers was considered a vital element in the research process of the COMID. Many years of experience and development have produced a mine detector that incorporates advanced technology whilst retaining all of the proven and trusted capabilities of Schiebel's mine detection product range with the most operational benefits possible. With the COMID Compact Mine Detector, simplicity meets precision.

Schiebel's latest mine detector is characterized by easy handling in static search, quick calibration and improved visual and acoustic support functions, helping the user to implement the required actions quickly and safely. The COMID is able to consistently locate both large and small targets with precision and ease.

Simplified pin-pointing is made possible with different audio and visual signals for the left and right halves of the search head, aiming at maximum support with minimal training effort. Furthermore, the tone modulation varies depending on the size and geometry of as well as the distance to the detected object. Always in the visual field, an LED display, integrated in the search head, minimizes the risk of distraction.

Enhanced ground and saltwater compensation eliminates the difficulties of the terrain, helping the deminer to focus on his essential work in all types of military and humanitarian operations. The most recent ground calibration is retained for a steady workflow. The COMID design is totally compatible with its ATMID and AN/19-2 (U.S. Army designation AN/PSS-12) predecessors. Search head and electronics card / unit can easily be replaced for cost-efficient upgrade of older systems. The addition of an infrared data port allows the quick update with new software versions.


# As a Global Brand, FNSS Launches its Redesigned Logo


FNSS Savunma Sistemleri A.S., the international defense systems company and a major land systems manufacturer of Turkey, was built with a culture of growth, development and transformation. Today, as the company celebrates its 25-year history, FNSS signifies this evaluation by the introduction of its redesigned logo.

General Manager and CEO of FNSS Mr. K. Nail Kurt expressed his thoughts about the philosophy of new the logo: "We consider change as an opportunity for continuous development." Since production began in 1990, we have constantly improved our products and services. Recently adding new export contracts by competing with major defense companies in the global arena. FNSS` new logo will symbolize our capability on development and evolution, which has brought us here today and will carry us into the future."

## The new logo of FNSS will symbolize the determination, dynamism and reputation of our brand

FNSS designed a logo that symbolizes the strength and reputation of the company. The newly designed FNSS logo in red letters represents unlimited energy, a new generation, dynamism, agility and determination. The underlining steel arrow stands for "our faith in continuous development.

## At FNSS "Change" has always been welcomed

FMC-NUROL Savunma Sanayii A.S. was established in 1989 with the aim of manufacturing tracked armored combat vehicles for the Turkish Armed Forces, which was renamed as FNSS Savunma Sistemleri A.S. in 1997.

That same year, FNSS also received Turkey's first complete weapon system export contract. Since 2000, FNSS has extended its product range by adding its indigenous designed wheeled and tracked armored combat vehicles including weapon systems.

With facilities and headquarters based in Ankara, Turkey, FNSS is also exporting technologies by extending its design and manufacturing capabilities with local partnerships in the Middle East and South East Asia. In addition, FNSS provides integrated logistics support services in three continents for the thousands of armored combat vehicles the company has provided to its global customers.

# Aselsan Celebrates 40th Years

Aselsan, the biggest corporation of the Turkish Defence Industry, visited Anıtkabir (Atatürk's Monumental Tomb) at its 40th foundation anniversary with its 5.000 employees.

Aselsan Chairman of Board Mr. Mustafa Murat Şeker, the executives and employees kept minute of silence at Anıtkabir. Leaving a wreath on Atatürk's mausoleum, Chairman Mr. Şeker signed the Anıtkabir memorial book.

Aselsan Chairman Mr. Mustafa Murat Şeker wrote the following note on the memorial book: "Great Leader Atatürk, we, as Aselsan family, once more came into your presence with pride on our 40th foundation anniversary. As the leader of our national defence industry, we are continuing to exert efforts in great determination in order to maximize our level of technological independence. Each passing day, we are gaining more strength in competing with the leading global defence industry companies through our technological knowhow."

# Krauss MaffeiWegmann and Nexter Systems have Completed their Association

After all required approvals have been obtained, Krauss MaffeiWegmann (KMW) and Nexter Systems have completed their association on 15 December 2015. From now on, two of the leading European manufacturers of military land systems based in France and Germany will operate jointly under the umbrella of a holding company under Dutch law with headquarters in Amsterdam. The sole shareholders of each of the two companies have transferred all their shares to the holding company in the legal form of an N.V.; in return they have each received 50 per cent of the shares in the holding.

As part of the completion, the supervisory board of the joint holding company has met in Amsterdam for its constitutive meeting. It comprises seven members and is chaired by the Belgium national, Christian Jourquin. The French owner appointed Jean Severin Deckers (APE State Holding Agency) and Bertrand Le Meur (DGA French defense procurement agency) to the supervisory board; the owners of KMW appointed Dr. Manfred Bode and Axel J. Arendt. Alongside the independent chairman of the supervisory board, both shareholders appointed Antoine Bouvier (CEO of MBDA) and Prof. Dr. Dr. h.c. Utz Hellmuth Felcht onto the board as additional independent members. The shareholders' meeting appointed KMW CEO Frank Haun and the new CEO of Nexter Systems, Stéphant Mayer as Co. CEOs of the holding company.

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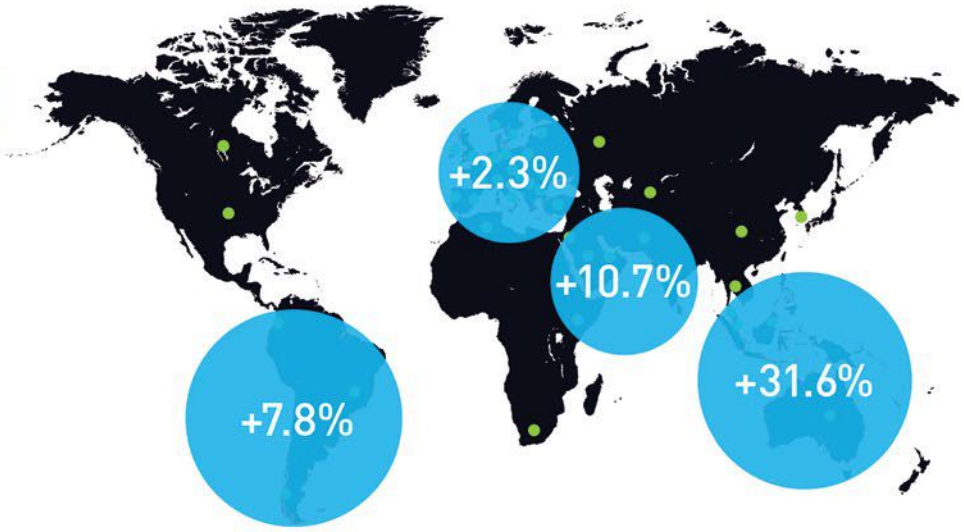


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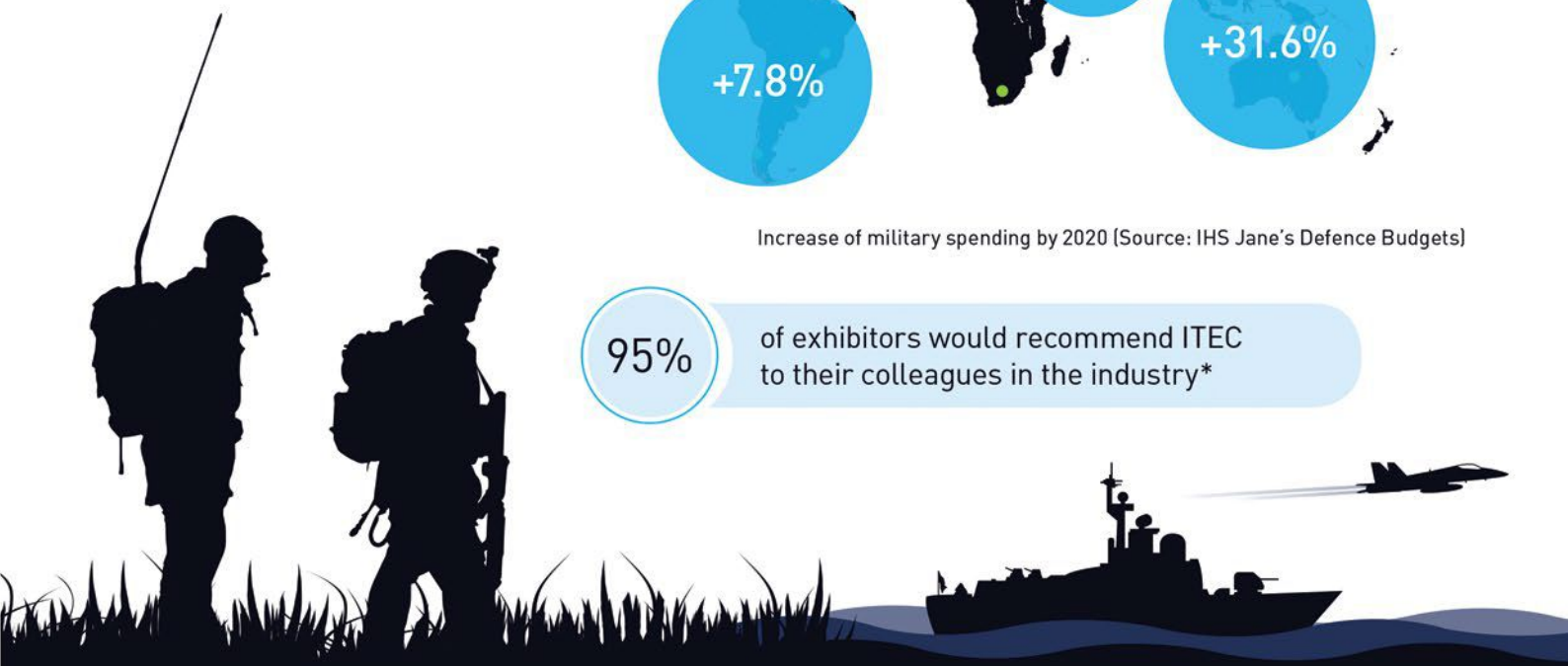

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* Internal survey conducted in June 2015.

# TRJet Positioned to Become the Next OEM at the Epicenter of Aviation Industry Growth

Global passenger air traffic is projected to double over the next 15 years with an unprecedented 6.6 billion travelers anticipated by 2030, according to a report from the latest bi-annual meeting of the Global Aerospace Summit (2014). Positioned to meet this increase in passenger air travel is TRJet, a new entrant into the global aviation market, and the industry's next Original Equipment Manufacturer (OEM).

While global passenger traffic overall grew 5 percent from 2008 to 2013, traffic between the Middle East and Asia grew 41 percent, and air travel between the Middle East and Europe saw 33.8 percent growth, according to the report's authors Strategy.

"The industry's center of gravity is shifting from West to East. While North America and Europe have previously seen the majority of global passenger traffic, we are now seeing increased growth in the Middle East and Asia," said Mr. Cem Uğur, a TRJet executive officer. "With TRJet headquarters in Ankara, Turkey, we're at the epicenter of this growth and uniquely positioned to meet the increasing demand."

TRJet will produce the 32-passenger 328 series aircraft and develop the 628 concept aircraft as part of the Turkish Regional Aircraft Project. These aircraft are targeted to fill an acute market gap for commercial aviation, making possible direct flights between small cities currently not feasible using larger airplanes.


"Regional aircraft, those under 100 passengers, are ideal for making short-range flights more economic and sustainable," added Mr. Ugur. "The TRJet aircraft will address an unmet market need, further stimulating regional trade and increasing leisure travel."



A substantial replacement market already exists for 30 to 90-seat regional aircraft. According to the 2015 Flightglobal Fleet Forecast, more than 4,000 regional jet and turboprop aircraft of this size will need to be replaced in the commercial market due to the aging fleet over the next 20 years. During this time, 4,700 new aircraft deliveries are expected, with additional demand for non-commercial uses such as VIP and multi-mission aircraft.

To meet this need, TRJet will utilize a modernized version of the Dornier 328 aircraft to first produce the TRJ328™ jet and the turboprop variant. With the first flight of the 328 series anticipated for 2019, it will serve as a stepping stone toward production of the 628 series, which will mark the Republic of Turkey's first domestically-designed passenger aircraft with its first flight anticipated for 2023.

The regional aircraft are expected to also support feeder networks operating out of hubs for airlines with bigger airplanes, further stimulating the economy.

Versatile aircraft, both the 328 and 628 series can land on unpaved runways, increasing accessibility to smaller airports. The 328 series has multiple uses and has certified options for VIP, cargo, military mission, maritime patrol and air ambulance use, in addition to commercial passenger travel.


# TAI Delivers First Set of A350-1000 Aileron to Airbus

Turkish Aerospace Industries Inc. made its first delivery of A350-1000 aileron set to Airbus in a ceremony held at TAI's facilities on 03 November 2015. It was the result of a contract that was signed nearly two years ago as an addition to the contract for A350-900 Program between the two companies.

The Airbus A350 XWB aircraft is a new family of Long Range Wide Body Jet Airliner developed by Airbus. The A350 XWB is the first Airbus aircraft with both fuselage and wing structures made primarily of carbon fiber reinforced polymer.

The aileron is a critical control surface, which is assembled to the wing of A350-1000 aircraft. As being a part of the wing, the component was designed and manufactured mainly from carbon fiber material entirely at TAI's facilities. As a risk sharing partner for the A350 Family, with the first delivery of the A350-1000 aileron set, TAI accomplished yet another important milestone, contributing to the success of the program.

By looking at the overall Airbus – TAI relationship, in addition to the above-mentioned achievement, the A400M, A330 (Rudder) and A320 Family programs should also be underlined in this respect. All programs are on the serial and ramp up phase and deliveries are being performed as per schedule.

All of these successes demonstrate the fact that Airbus and TAI strategic partnership carries potential to grow even further.

As aviation grows to meet the travel needs and business demands, Airbus designs new state of the art aircraft as per customers' requirements with the support from the strategic partners. As such, TAI, a strategic partner is continuously increasing its methods, procedures and engineering capabilities in order to contribute to more sophisticated Airbus' components.

# MPT-76 Serial Production Contract Signed Between Kalekalıp and SSM


Within the scope of the Modern Infantry Rifle Project conducted by the Undersecretariat for Defence Industries; the Serial Production Term Contract (Term-2), the contract negotiations of which were determined to be initiated by the Defence Industry Executive Committee, was signed between Kalekalıp Makina and Kalıp Sanayi A.Ş. and the Undersecretariat for Defence Industries on 15 December 2015. The contract value is approximately 60 million TL

As part of the project conducted for supplying 35,014 MPT-76s at the initial phase that will be delivered to the Land Forces Command, Naval Forces Command and the General Commandership of Gendarmerie, a contract was signed previously with the Mechanical And Chemical Industry Corporation (MKEK) for the supply of 20.000 MPT-76s. Following the serial production contract made with MKEK, within the scope of the Modern Infantry Rifle Project Serial Production Term Contract (Term-2) signed with Kalekalıp, 15.014 MPT-76s will be manufactured. With the first stage deliveries, improvement and development activities will be conducted as well.

All design, development and qualification activities of the MPT-76 are conducted through national resources. With the serial production of the rifle, it is aimed initially to fulfil Turkish Armed Forces requirements and then all friendly and allied countries' light weapon requirements.

# Coşkunöz Gains Momentum in Aerospace

Coşkunöz Defense and Aeronautics, Inc., one of the affiliated companies of Coşkunöz Holding signed an agreement for the KAI Korean utility helicopter KUH Surion's central fuselage assembly project.

Coşkunöz Defense and Aeronautics, established in 2006 and one of the youngest and rapidly growing companies of Coşkunöz Holding, met with Korean based KAI, one of the most important aerospace companies of the world, in Seoul at the Adex 2015 Aerospace and Defense Exhibition to sign a contract on the KUH Surion helicopter project. During the exhibition, which also hosted Mr. Bilal Aktaş, Head of the Industrialisation Department of Undersecretariat of Defense Industry, both parties conferred on the assembly of the central fuselage, one of the most critical parts of a helicopter, and signed a contract for a 10 year production project.

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Coşkunöz Defense and Aeronautics will produce 60 helicopter fuselages according to the contract concluded, and expedite the first one at the end of 2017, when they will become, after TAI, Turkey's leading aerospace enterprise, the first company producing a helicopter fuselage of this size and technology.

Coşkunöz Holding CEO, Mr. Emin Ataç, when assessing the subject, stated his belief that the collaboration between the two companies, starting with this project in which Coşkunöz Defense and Aerospace will produce the helicopter's main part directly affecting flight safety, will have fruitful results for both sides. Mr. Ataç added that Coşkunöz Holding was preferred for the production of such an important part due to their investments made in this field and accumulated experience, and drew also attention to this project's contribution to the Turkish aerospace industry. Mr. Ataç underlined the fact that Coşkunöz Holding will continue to establish similar partnerships through the Holding's vision"We shape the future", and added that they aim to create value together with studies which render service both to the country and social development.

Mr. Mehmet Coşkun, Coşkunöz Defense and Aerospace' General Manager, declared that investments concerning additional buildings of five thousand square meters and capacity increases in production due to new machine investments were rapidly on-going during the first months of 2015 and added that they will continue to efficiently pursue their activities for the aerospace and defense industry of Turkey.

## About Coşkunöz Defence and Aerospace Inc.

Coşkunöz Defense and Aerospace Inc., which produces airplane and helicopter structural parts and assemblies and also systems and subsystems for defense, operates at the Eskişehir Industrial Estate in a covered space of 7.000 $m^2$. The company is affiliated to Coşkunöz Holding, one of Turkey's biggest industrial enterprises operating in 6 different sectors with 12 companies, 2500 employees and 60 years industrial experience.

Coşkunöz Defense and Aerospace, which was established in 2006, started production within one year and, with commendable development, added more than 1,500 parts into their production, undertook its second move from 2012 on, and succeeded within a short time to integrate welding, assembly, integration, design and engineering services to its portfolio. The company received facility security certificates with NATO and national secret degrees on March 2015, and in April 2015 laid the foundations of the plant which will separate production activities for the defense and aerospace sectors.


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Mr. Emin Ataç, CEO of Coşkunöz Holding signed an agreement with the Counterpart in Seoul.

# Turkish Air Force Academy Joins the SAYP Program

A Protocol for cooperation within the scope of the Defense Industry Researcher Training Program (SAYP) was signed between the Undersecretariat for Defense Industries (SSM), Havelsan, TAI and the Air Force Academy.

Deputy Undersecretary for the Defense Industries Dr. Celal Sami Tüfekçi on behalf of the Undersecretariat for Defense Industries (SSM), TAI General Manager Mr. Muharrem Dörtkaşlı, Havelsan General Manager Mr. Ahmet Hamdi Atalay and the Commander of the Air Force Academy Major General Fethi Alpay attended the cooperation protocol ceremony held at the premises of the SSM.

In his remark at the signing ceremony SSM's Deputy Undersecretary Dr. Celal Sami Tüfekçi expressed that they previously signed contracts with nine universities, and today the Air Force Academy is included in this group, and adding that with this protocol signed with the Air Force Academy, a military Academy was included in the program for the first time. Stating that the goals set by the Turkish Defense Industry can be achieved merely by qualified human resources Dr. Tüfekçi said, "By deducting the post - graduate training in the Defense Industry from the companies' off-set debts, we aim to establish an eco-system for the training of human resources".


Commander of the Air Force Academy, Major General Fethi Alpay also underlined the importance of training personnel and added that becoming a planner in addition to a user in the defense industry would allow them an important opportunity.


Havelsan General Manager Mr. Ahmet Hamdi Atalay mentioned that by passing a threshold, the defense industry passed onto the indigenous product development stage. Mr. Atalay touched upon the importance of the R&D in this process and stated that this was not a task that can merely conducted by the defense associations and that the universities and research centers would also have to make contributions to such efforts. Mr. Atalay added that SAYP would contribute to the cooperation between industry and universities.

TAI General Manager Mr. Muharrem Dörtkaşlı noted that SAYP's signing with the Air Force Academy would have a positive reflection upon the user-contractor relationship.

SAYP program was first launched with the cooperation protocols signed in October 2011between METUand SSM, Aselsan, Roketsan, and TAI; implementation started in 2012. Within the scope of the program, as of November 2015, a total of 36 researchers are employed in 30 projects. Efforts toward including Anadolu University, Bursa Technical University, Uludağ University, Yıldız Technical University and İstanbul University in the SAYP Program in the upcoming period are being exerted.


Mr. Muharrem Dörtkaşlı, Major General Fethi Alpay, Dr. Celal Sami Tüfekçi, Mr. Ahmet Hamdi Atalay

# New Era Begins for Havelsan with the In-Flight Entertainment System

A new era entertainment begins inside the cabin. Havelsan and THY Technic collaborated to form the company SKYFE and with an entirely national effort, manufactured the Wireless In-flight Entertainment system (Wireless IFE), which has been approved by The European Aviation Safety Agency (EASA). With this approval, the road was opened to SKYFE to begin series production.

SKYFE successfully completed the EASA certification process for the Boeing 737-800 aircraft. The first domestic In-flight Entertainment system developed in Turkey, offers the opportunity for passengers to spend quality time using their personal electronic devices, for iOS, Android and web applications. With this system, within the civil aviation sector, Havelsan and Turkish Technic's contribution has the distinction of being a successful example of increasing local content.

The system was developed within the scope of the 3 year Strategic Cooperation Agreement between Havelsan and THY Technic. The system was tested on-board passenger aircraft Turkish Airlines Boeing 737-800 TC-JFO Edirne.

The first prototype was developed, integration and testing of aircraft interior space was completed, and with approvalit became a milestone for Turkish civil aviation. With EASA approval, THY Technic and Havelsan were given the green light to cooperate in the serial production of the developed system.

### SKYFE EASA Certification Wins International Validation

The International certification of SKYFE by the EASA has made the product available for use by many domestic and foreign airlines. SKYFE in this respect, Havelsan and THY Technic, was a harbinger, demonstrating the ability to make production comply with civil aviation standards, in cooperation with Turkey's "Regional Jet Program".


# Meteksan Defense to Set up R&D Office at Teknopark Istanbul

Meteksan Defense is setting up R&D office at Teknopark İstanbul in order to be more effective and efficient in the projects conducted with the Naval Forces and to get closer with the end user.

Meteksan Defense Vice President Mr. Özgür Çankara made a statement on behalf of Meteksan Defence regarding the projects conducted for the development of underwater acoustic, sensor and communication systems intended for the Naval Forces' requirements. "During the projects being conducted, the cooperation with R&D and operational units of Naval Forces located in İstanbul is inevitable. We will get closer with the end user for more efficient cooperation through our Teknopark İstanbul office. In addition, we will also establish an infrastructure for naval tests in a short while and integrate this to Teknopark İstanbul activities." said Mr. Çankara.


"We have set up an R&D office at Teknopark İstanbul in order to get closer with the Naval Forces which is very competent in sense of R&D and to involve our suppliers and partners located in Istanbul in our projects for the overall success of our projects.The vision of Teknopark Istanbul that supports innovation and our initiative fully overlap." said Meteksan Defense President Mr. Murat Erciyes.

Meteksan Defense has been developing radar, electro-optic and communication systems together with the sonar system and acoustic products and solutions for Turkey's National Corvette MILGEM program.

# Cyber Security Specialist Rivaled in "Capture the Flag"

Turkey's most extensive cyber security contest was held at Bilkent University's Sports Hall in Ankara.Cyber security experts from public and private sectors as well as universities competed with each other on their computers.

Cyber security experts from public and private sectors as well as universities showed great interest to the cyber security contest organized by the Undersecretariat for Defense Industries' subsidiary STM. At the event that took place on 27th October, 73 cyber security specialists gathered at the Sports Hall of the Bilkent University and raced against each other on their computers. At the cyber contest organized with the cooperation of Bilkent University under the title "Capture the Flag", the contestants teamed-up and competed with each other through these teams.


## System Deficiencies Detected

The specialists trying to win the competition through detecting the system deficiencies created by cyber security professionals seized the


opportunity to improve themselves as well. Within the scope of the "Capture the Flag" contest, cyber security specialists struggled to "capture the flag" before other competitors, by reaching the identified targets through taking advantage of the security flaws in the systems in branches such as cryptology, reverse engineering and Wi-Fi. At the event, it was aimed to gather a wide range of specialists from public and private sectors as well as universities under a single roof and to create an information sharing network in cyber security.

## Our Software has to be Unique

During his speech before the contest, Mr. Süreyya Yiğit, Electronic and Information Systems Department Head at the Undersecretariat for Defense Industries (SSM) mentioned that the first things that come to mind when "cyber security" is pronounced are plagiarism and damaging computers and added that nowadays the threats towards critical infrastructures gain more importance. Yiğit underlined the need for adopting certain measures beforehand and increasing the awareness of the risks in cyber security and added, "We have to make sure that the software running in critical systems is unique and we should develop the keys by ourselves and prevent them from being seized by others".

## Cyber Space Altered Our Lifestyle

"Cyber security changed our lifestyles. Currently, we are speaking of an era in which everything, from the refrigerator in our apartments to the car we drive is interconnected through the internet"said STM General Manager Mr. Davut Yılmaz. Stating that the cyber security concept that was in the agenda of only a few institutions now gained great importance, Mr. Davut Yılmaz continued: "Cyber security is such a dynamic area that new developments emerge almost each day. If one wishes to operate, become a specialist and exist in this area, he will have to update himself continuously. Now the word 'data' refers to our personal data, trade secrets, and governmental secrets. This area requires constant dynamism. It is not possible to protect the trade and military secrets through imported solutions. Today, there is no guarantee for perfectly functioning software not to service in favor of the enemy during warfare. We are focusing on national and indigenous products and we are in severe need of specialists. We are conducting an activity that has never been accomplished in this area. We lifted the rule of employing graduates for now because even an eleven-year-old child is capable of hacking major companies".


The institutions and associations attending the event seized the opportunity to test their own cyber security experts and detect their weaknesses. Various awards were distributed to those ranking the highest scores. The METU team was the winner of the competition and it gained the award of 6000 TL. The Universities Special Award was handed out to the Bilkent University Team, the Sector Special Award was granted to the Türk Telekom Team while the Public Special Award was given to the representatives of the Central Bank.

# Aerospace and Aviation Industry at the 14th Dubai Air Show

In 2015, between the 8th-12th of November, the 14th Dubai Air Show brought together about 1,100 participants from 61 countries and 65,000 sector professionals, in Dubai in the United Arab Emirates. In recent years, the Dubai Air Show has become ahub centeramong the Far East, Middle East and western states,and again it exhibited the latest technology products to many international and local defense industry companies .

In 2015, 14th fair exhibition consisted of passenger aircrafts, private jets, from drones to military oriented planes (plus Military Aircraft) helicopters and unmanned aerial vehicles, to the more than 150 aircraft in static display area. After the 2013 fair a total of $ 206 billion of business volume was created; the performance of the 2015 Dubai Airshow remains uncertain. It is noted that there has been a decline in hot sales compared to previous years, the decline in military and civilian sales are reflected in budget cuts. Fair organizers have openly indicated to the public set a target, reflecting these numbers, of $ 300 billion in orders for the year 2017;

© Defence Turkey

## 6 Turkish Defense Industry Companies at Air Show

With more participation than in previous years, the exhibition was represented by six of Turkey's defense industry companies, Aselsan, TAI, Havelsan, Roketsan, TEI and Turkish Technic, drawing attention to its capabilities and technologies in the world market.

Aselsan T-129 attack helicopters used in the "Avcı" Helmet Integrated Cueing System by the Turkish Air Force inventory, located in the F-16 and F-4 / 2020 aircraft in the certified " LGK "Laser Guided Bomb Kits System, Unmanned Aerial Vehicles (UAVs), helicopters and aircrafts including fixed-wing or those developed for rotary wing air platforms, high - performance electro - optical reconnaissance, surveillance and targeting system CATS (Common Aperture Targeting System) also were showcased at the fair. By participating in the most important fair in the Gulf Countries, the Dubai Air Show, civilian and military fields showcased their high-tech products. In addition, atthe TEI stand, the new generation component blisk (bladed disk) used in the new generation aircraft engine LEAP, and unmanned aircraft engine TJ90, developed by TEI,was introduced. First-time participant of the Dubai Air Show, Roketsan, was visited by an international multi delegation; Defense Ministers of several countries such as the UAE, Saudi Arabia, Mauritania, Japan, Ukraine, Indonesia and Tunisia, the Force Commanders, Logistics Command also visited the Roketsan stand. They obtained detailed information regarding 2.75"Laser Guided Missile "Cirit", Stand-off -Missile "SOM" and the New Generation Cruise Missiles SOM-J, Laser Guided Long Range Anti-Tank Missile "L-UMTAS", Laser Guidance Kit "TEBER" and the Air Defense Missile system"Hisar". During the exhibition, Havelsandemonstrated to participants the Training, Simulation and Test & Evaluation Systems models with the FMS 139 AW Simulator.

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For the first time, the event saw a 3D print pavilion and World's fastest, 3D-printed, unmanned aerial vehicle, was unveiled at the 2015 Dubai Airshow.The 3D Printshow made its debut at the 2015 Dubai Airshow, highlighting developments in 3D technology and its uses in both military and commercial aircraft, as well as in rocket development and in the space industry. More than 20 exhibitors participated, including D2M, 3DPS, 3D Vinci Creations and Ultimaker, with exhibitions featuring printed components as varied as aircraft models to engine parts, highlighting the technology's broad possibilities. The next show ( 3D Printshow Europe ) is to be held in May 2017.

The next Dubai Airshow is scheduled for the 12th – 16th of November 2017.

# Rockwell Collins Brings a New Dimension to Turkish Airlines Full Flight Simulators

Rockwell Collins has been selected by Turkish Airlines to provide its EP-8100 visual system for the airline's Boeing Next Generation 737, Airbus A320 and Airbus A330 full flight simulators. The agreement includes the option for additional visual system upgrades for legacy platforms.

"This agreement marks a first for Turkish Airlines, as it brings the highly realistic capabilities of our newest EP-8100 visual system and laser illuminated projection system to its training operations," said LeAnn Ridgeway, Vice President and General Manager, Simulation and Training Solutions for Rockwell Collins.

"We're pleased to receive the Rockwell Collins' EP-8100 visual system for our Boeing Next Generation 737, A320 and Airbus A330 full-flight simulators. We believe that this system will improve the efficiency of our existing flight training capabilities," said Mr.LeventKonukçu, senior vice president, Investment Management for Turkish Airlines.

The EP-8100's open, scalable architecture makes it possible to add new features and enhancements throughout the life of the system. By maintaining control over the hardware portion of the image generator, it keeps hardware replacement costs manageable over the life of the system.

The Rockwell Collins visual system raises the bar for realistic and affordable pilot training. The seamlessly integrated combination of the new laser-phosphor projectors with the EP-8100 image generator offers unmatched performance, which meets or exceeds all current worldwide regulatory commercial flight training requirements.

# Rolls-Royce Supports Turkey's Advancement in Manufacturing Technology

Rolls-Royce announced that it will be the first industrial lead and founder member of Turkey's Advanced Manufacturing Technology Centre (AMTC), a project led by Turkey's Ministry of Science, Industry & Technology and with the endorsements of the Ministries of Defense, Transportation and Energy.

The development plan for the AMTC was announced by the Government at a signing ceremony witnessed by the Turkish Minister of Science, Industry & Technology FikriIsik, and UK Minister of Trade and Investment, Lord Maude of Horsham in Istanbul, with the participation of Vice President of The Scientific and Technological Research Council of Turkey (TÜBİTAK) Prof. Mehmet Çelik and Director of Global Manufacturing for Rolls-Royce Dr. Hamid Mughal.

The AMTC will be designed to satisfy Turkey's ambition to develop advanced core industrial capabilities around its national indigenous programs. Based on a collaborative cross-industry research working culture, this Centre of Excellence will be a public-private partnership focusing on manufacturing capability development and technology application development in Aerospace and will include more areas such as civil nuclear, marine and other industrial sectors over time. The AMTC will be seeking both International and Turkish companies to join as members in its new state-of-the-art facility.

Minister Mr. Fikri Isik said: "We are well positioned to grow our manufacturing industry in high value sectors, and we find it great to be able to use a proven working model and partner with experienced companies like Rolls-Royce. This Centre will bring great economic value as it will focus on key success factors of supplier capability development across our industry, including training and skills development, as well as technology innovation."

Dr. Mughal said: "We will work closely with our Turkish Government and industrial partners in the establishment of the AMTC. The AMTC will be an integral part of our strategy to establish a global network of Advanced Manufacturing Research Centres. These centres operate a novel model of academic and industrial collaboration that is designed to accelerate the transfer of innovation from early university research to successful exploitation in industry. We have no doubt therefore that this environment of cross-sector know-how and team spirit will enable Turkey's AMTC to develop itself into a leading regional centre of excellence in manufacturing technology."

Patrick Regis, Rolls-Royce, Regional Executive – Turkey and Central Asia, remarked: "We are proud to be a founder member of the AMTC in Turkey. We have a well-established and mature advanced manufacturing model in the UK, Singapore and US, and have selected Turkey because of its high skill levels and manufacturing capabilities. Turkey is aiming to be within the top Aerospace and Defence nations by 2023, embarking on the development of a world-class manufacturing industry. We believe Rolls-Royce can be a partner to Turkey in this venture. This initiative will help shape the regional supply chain to meet the future needs of the aerospace industry in the region and we encourage other companies interested in being founder members to come forward."

# Corporation Welcomes Sikorsky, a Lockheed Martin Company

Lockheed Martin has closed its acquisition of Sikorsky Aircraft, a world leader in military and commercial rotary-wing aircraft. Aligned under the Lockheed Martin Mission Systems and Training (MST) business segment, Sikorsky Aircraft is now known as Sikorsky, a Lockheed Martin company.

"Today we are proud to welcome the Sikorsky team to Lockheed Martin," said Ms. Marillyn Hewson, Lockheed Martin chairman, president and CEO. "Lockheed Martin and Sikorsky share a legacy of innovation and performance that has shaped the history of aviation for more than a century. Together, we are even better positioned to provide the best value for our customers, employees and shareholders."

The acquisition advances Lockheed Martin's commitment to provide its customers with mission-ready solutions that are affordable and efficient, while expanding its core business into the growing areas of helicopter production and sustainment. Sikorsky's ability to leverage Lockheed Martin's scale will ensure it remains a technology leader at the forefront of vertical lift.

SIKORSKY
A LOCKHEED MARTIN COMPANY

Mr. Dan Schultz has been named president of Sikorsky, a Lockheed Martin Company. Schultz led the integration efforts for Lockheed Martin leading up to today's closure and previously served as the vice president for Lockheed Martin's Ship & Aviation Systems line of business within MST.

"Dan is a former Marine helicopter pilot and has decades of experience in the rotary-wing segment, including leading Lockheed Martin's helicopter system integration business," Hewson said. "He brings a wealth of leadership experience and a deep understanding of our international customer base. I am confident he is the right person to lead Sikorsky at this pivotal time."

Sikorsky, a Lockheed Martin company, will retain its headquarters in Stratford, Connecticut. The line of business employs nearly 15,000 employees in 11 countries. Its helicopters are used by all five branches of the U.S. armed forces, along with military services and commercial operators in 40 nations.

# Pakistan and Turkey Reaffirm Resolve to Deepen Defense Cooperation at the 11th HLMDG Meeting

The 11th meeting of the Pakistan-Turkey High Level Military Dialogue Group (HLMDG) was held in Ankara on 27-28th October 2015. Defence Secretary Lt. General (Retd.) Muhammad Alam Khattak led the Pakistan delegation, while Deputy Chief of Turkish Armed Forces General Yaşar Güler headed the Turkish delegation.

Lt. General (Retd.) Muhammad Alam Khattak, in his speech at the inaugural session, stated that both Pakistan and Turkey enjoy close relations and have similarity of views on all international issues. He particularly referred to the existing excellent cooperation between the Pakistan and Turkish Armed Forces and their mutual desire to further intensifying these ties. He also briefed about the successful military operation Zarb-e-Azb.

During the proceedings, the proposed programme for training and exchange of visits to be held during 2016 among the armed forces of the two countries was finalized. Both sides also reviewed progress in the field of bilateral defence cooperation and agreed to further enhance the scope of mutual collaboration. The two sides reaffirmed their commitment to continue to work closely for the promotion of sustainable peace and stability in the region.

The Defence Secretary during his stay called on the Commander of Turkish Armed Forces General Hulusi Akar, Undersecretary for National Defence Lt. General Sezai Bostanci, and Undersecretary for Defence Industries Prof. İsmail Demir. Ambassador of Pakistan Sohail Mahmood also attended these meetings. The Pakistan delegation visited the Aselsan Military Electronic Industries of Turkey as well.

Both sides signed an agreement for the transfer of 34 T-37 aircraft and spares, whereby Turkey will provide these on gratis basis.

The HLMDG is the highest level of institutional mechanism between Pakistan and Turkey, mandated to charter policies and action plans to promote ties in the defence field. The next session of the HLMDG will be held in Pakistan in 2016.

# The Future Navy Vessel: Zumwalt Class Destroyer

First Vessel of USS Zumwalt Class Destroyer "DDG 1000" has head out sea trials in the Atlantic Ocean on 7th December and was back at the yard after 7 days of builder's trials.

The first in a class of three revolutionary U.S. Navy vessels, known as the DDG 1000, was underway for the first time conducting at-sea tests and trials in December 2015. Within the 7 days trial tests,the shipbuilder, subcontractors and Navy personnel tested systems including small boat operations, integrated propulsion system and auxiliary systems over more than 100 hours of testing.


## The Procurement Cost of Three Vessels at $ 3,5 Billion

The DDG-1000 program was initiated in the early 1990s. The DDG-1000 is a multi-mission destroyer with an emphasis on naval surface fire support (NSFS) and operations in littoral waters. The DDG-1000 is intended to replace, in a technologically more modern form, the large-caliber naval gun fire capability that the Navy lost when it retired its Iowa-class battleships in the early 1990s, to improve the Navy's general capabilities for operating in defended littoral waters, and to introduce several new technologies that would be available for use on future Navy ships. The DDG-1000 was also intended to serve as the basis for the Navy's now-cancelled CG(X) cruiser. OnApril 2006 the Navy announced that the first DD (X) destroyer will be designated DDG 1000.On 14 February 2008 the Navy exercised contract modifications for the construction of the dual lead ships of the Zumwalt class (DDG 1000) to General Dynamics Bath Iron Works and Northrop Grumman Shipbuilding. The Construction USS Zumwalt (DDG 1000), named for former Chief of Naval Operations Admiral Elmo R. "Bud" Zumwalt, commenced in February 2009 and launched Oct. 28, 2013.

The first two DDG-1000s were procured in FY2007 and split-funded (i.e., funded with two-year incremental funding) in FY2007-FY2008; the Navy's FY2016 budget submission estimates their combined procurement cost at $ 8,797.9 million. The third DDG-1000 was procured in FY2009 and split-funded in FY2009-FY2010; the Navy's FY2016 budget submission estimates its procurement cost at $ 3,490.8 million.

## Zumwalt Reduce Operating and Support Costs

The DDG 1000 Zumwalt class destroyers will be a multi-mission surface combatant designed to fulfill volume firepower and precision strike requirements. This advanced warship will enable access in the open ocean, littoral and ashore and provide impressive forward naval presence while operating independently or as an integral part of Naval, Joint, or Combined Expeditionary Strike Forces. Armed with an array of advanced weapons, the DDG 1000 program brings sophisticated new technologies that will deliver evolutionary capability and help shape the future of surface warfare.

The DDG-1000 is to have a reduced-size crew of 142 sailors (compared to roughly 300 on the Navy's Aegis destroyers and cruisers) so as to reduce its operating and support (O&S) costs. The ship incorporates a significant number of new technologies, including an integrated electric-drive propulsion system and automation technologies enabling its reduced-sized crew.

With an estimated full load displacement of 15,482 tons, the DDG-1000 design is roughly 63% larger than the Navy's current 9,500-ton Aegis cruisers and destroyers, and larger than any Navy destroyer or cruiser since the nuclear-powered cruiser Long Beach (CGN-9), which was procured in 1957. The 16,000-ton destroyer is equipped with two high power Rolls Royce MT-30 gas turbines and two smaller Rolls-Royce RR450 gas turbines that can output up to 80 megawatts – giving the ship a wide margin for future power hungry sensors and weapons.

# An Assessment of Mr. Tuhin Quddus, Head of Defense & Security Portfolio, IRN about IRN Organizations

**Defence Turkey: Dear Mr. Tuhin Quddus first of all thank you for your time. Could you please inform us about your organizational structure, activities, goals and mission as IRN?**

International Research Networks Ltd. (IRN) is a B2B conference organiser with around 40 employees in London. Predominantly, we operate in the industries of Oil & Gas, Security, Energy, Commodities, Infrastructure and Mining, and we launched our Defence portfolio a year ago. We've executed 107 conferences in 34 global cities since the company started in 2009, and have endorsement and support from a wide range of Governments and Ministries across different sectors.

We've welcomed Prime Ministers, CEOs, Parliamentary Officials, major Institutions and Associations, and had our events renowned through front page news and major media channels worldwide.

Our goal is to ensure our events are carefully tailored to provide the high-level delegation with the ideal setting to learn about industry news, receive exclusive insights on key projects and initiatives, and establish new business connections.


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**Defence Turkey: The Turkey Defense Week 2015 (TDW)event was held in Ankara for the first time between 10th-12th November 2015 by the organisation of IRN. Could you please share with us more about the conclusion of the event?**

Overall, the conclusions of TDW were very positive and reflect the excitement within the Turkey defence industry right now. The event included high-level presentations on the defence sector in Turkey from the perspectives of the industry, NATO, international MODs, TÜBİTAK and Undersecretariat for Defense Industries (SSM).

It was evident that the potential Turkey carries is great and there are fantastic opportunities out there for international governments and private companies looking for joint projects across a variety of platforms. With Turkey's 2023 defence export target still a priority, global defence contractors remain largely interested in how and where they can partner with Turkey.

**Defence Turkey: Did the event meet with your expectations?**

Given this was our launch event in Ankara, I was happy with overall outcome of the event. Not only were we briefed with insightful presentations from both Turkish and international speakers, but the networking breaks and gala dinner were a big success. Although the presence of more international companies would have been welcome, I am confident we can build on this towards 2016 and 2017, a significant period for the Turkish defence industry.

**Defence Turkey: Are you planning to organize another event with different topics in Turkey for the defense industries in coming period?**

Although TDW had a very general and broad scope of topics, we are planning to organise an event that is more specifically focussed on armaments, capability planning and procurement within Turkish industry. This topic seems to attract the most attention and it will draw international defence companies to participate, especially those who wish to learn about offsets, procurement procedures and meet the necessary contacts for literally doing business in Turkey.

**Defence Turkey: What type of fairs and events, and in which places of the world, have been planned in the coming weeks and months?**

Despite having several events in the pipeline, our next event will take place in June 2016 in Prague under the official endorsement and patronage of the Minister of Defense of the Czech Republic – Eastern Europe Defence Week 2016 will focus on increased procurement activity of defence equipment on countries in Central and Eastern Europe.

Given the ongoing regional tension and the Ukraine-Russia crisis, many of the CEE countries have been modernising their militaries and increasing defence budgets, creating the ideal platform for international defence companies to support through international cooperation, co-production and joint-ventures.

It is very exciting as we are attracting National Armament Directors and Procurement Chief's from Ministries of Defence from countries such as the Czech Republic, Ukraine, Hungary, Austria and Estonia (amongst others) – a significantly important gathering of defense professionals given the current regional outlook.

**Defence Turkey: Lastly, is there a message you would like to convey to the readers of Defence Turkey magazine?**

It is no illusion that international cooperation is a significant topic within the defence industry at present – industry participants have got to find new wants to reach their goals and the concept of tailor-made conferences is something we try and practice.

I would encourage the readers of Defence Turkey magazine to contact us if they are looking to boast their work in the Turkish defence industry, or wish to demonstrate their expertise and offerings to the global market. Although our presence in Turkey is growing, we hope that our future work can assist your country in achieving the goals in the bigger picture.


# First International Delivery: F-35A in Italian Air Force Inventory


The first delivery of an F-35 outside the United States happened December 3 at the F-35 Final Assembly and Check Out (FACO) facility in Cameri Italy. The first Italian F-35A Lightning II, known as AL-1, to the Italian armed forces, marked a production milestone for Italy's national defense and aerospace industry.

"When Leonardo DaVinci first envisioned human flight as an Italian creation, there is no way he could have imagined what we have here today," said Lt. Gen. Chris Bogdan, F-35 Joint Program Executive Officer. "The F-35 aircraft built here in Cameri will take flight on the wings of Italian craftsmanship, ingenuity, and skill and will help build the first global fleet of fifth generation fighters."

Italy is the sixth nation to receive an F-35 joining Australia, Netherlands, Norway, United Kingdom and the United States with jets in their service's inventory.

The F-35s being assembled and delivered at the Italian FACO will transition to Italy's AeronauticaMilitare (Air Force) and Marina Militare (Navy). AL-1 first rolled out of the production facility in March with first flight Sept. 7, one month ahead of schedule. Italy's first two pilots have begun F-35 flight training at Luke Air Force Base, Arizona, where Cameri-built F-35As will be delivered in 2016 to support international pilot training.

"This is a monumental achievement for the F-35 program," said Lorraine Martin, Lockheed Martin F-35 Program General Manager. "The F-35 provides Italy's aerospace industry with high technology work, ensuring the future health and competitiveness for their defense industry. To date, Italian industry has contracts worth more than $1 billion, along with opportunities for additional work over the life of the program."

The F-35 is a next generation fighter which combines advanced low observable stealth technology with fighter speed and agility, fully fused sensor information, network-enabled operations and advanced sustainment. Three distinct variants of the F-35 will replace the A/OA-10 Thunderbolt II and F-16 Fighting Falcon for the U.S. Air Force, the F/A-18 Hornet for the U.S. Navy, the F/A-18 and AV-8B Harrier for the U.S. Marine Corps, and a variety of fighters for at least 10 other countries.

Following the U.S. Marine Corps' July 30th combat-ready Initial Operational Capability (IOC) declaration, the U.S. Air Force and Navy intend to attain service IOC in 2016 and 2018, respectively. More than 150 production F-35s have been delivered to customers and have flown more than 45,000 flight hours fleet-wide.

# OSSA Synergy Meeting Adressed Power of SMEI's

OSTIM Defense and Aviation Cluster (OSSA) organized the Synergy Meeting that brought together important actors in the sector. In this event, representatives of the business and bureaucracy world addressed the cluster's contributions to the defense and aerospace Industry.


The Synergy Meeting, organized by OSSA, was held in Ankara in order to share the status of the sector and the cluster's role in the country. The meeting was attended by board members and company representatives: Deputy Undersecretary of Defense Industries Dr. Celal Sami Tüfekçi, Ankara Chamber of Industry (ASO) President Mr. Nurettin Özdebir, OSTİM Chairman of the Board Mr. Orhan Aydın, Head of the Industrialization Department of SSM Mr. Bilal Aktas, USA Drexel University Biomedical Engineering Sciences and founding dean of the School of Health Systems Prof. Banu Onaral.

## ICDDA to be held for the third time in 2016

In her opening speech, OSSA's Cluster Coordinator, Ms. Hilal Unal,stated that "participation will continue in international events." Ms. Unal said "under the auspices of the SSM, with the support of the T.C. Ministry of Economy, the international level Aerospace and Defence Industrial Cooperation Days (ICDDA) will be held for the third time in Ankara in 2016. Major foreign companies in the sector haveal ready registered to take part in the event. In our work, the requests coming from our firms are very important to us. We would like to thank the T. C. Ministry of Economy, which is our biggest cluster supporter, and we will continue URGE projects."

*"Main aim, indigenoussolutions"*

Chairman of the Board of Directors of OSSA, Mr. Mithat Ertuğ; shared that the meeting intent was to increase synergy between the cluster members, to create new partnerships and to give more detailed information about OSSA activities to The Undersecretariat for Defense Industries. Mr. Ertuğ stated "OSSA was created with combination of NGOs, universities and public agencies. OSSA is beyond just a cluster. It is a national and sectoral cluster, having 160 members, from Ankara, Istanbul, Kayseri, Izmir and Bursa. Our goal; to implement local solutions in the Defense and Aerospace Industries and to increase the exports of SMEs."


Mr. Mithat Ertuğ, Chairman of the Board of Director of OSSA

*Orhan Aydın:" We succeeded altogether"*

OSTIM Management Board Chairman, Mr. Orhan Aydın, pointed out that OSSA is in a very good position since it was founded. Mr. Aydin said: "SSM's influence and interest in the sector, with the formation of these clusters, provides a significant contribution to the development of the sector. In the defense industry, there is an institution that is responsible for technology management, firms and the sector. In Turkey, there's a team that can achieve the seeminglyimpossible; and there is a strategy in place to meet it. The Ankara Chamber of Industry is also interested in our activities and has always stood with us. I think together we have come a good point."


Mr. Orhan Aydın, Chairman of the board of OSTIM

*Prof. Banu Onaral: "We have to decrease foreign dependency"*

US Biomedical Engineering at Drexel University and the founding dean of the Faculty of Health Sciences, Prof. Systems Dr. Banu Onaral touched upon the global success of Turkish scientists. Onaral said "Many individuals, from various countries, are coming to the U.S. to learn science and technology. This includes individuals from anywhere in Turkey; the last Nobel Prize winner is an example of this, always advancing beyond their peers."

There is an incredible synergy between the defense and health;the experienced academician stated

"Both sectors have a precision design and manufacturing process. Beyond that, we have a foreign

dependency rate of 85-90 percent in some of the highadded value products. We have the infrastructure, human capacity, and the brain power that we send all around the world, to reduce our foreign dependency; this brain power is always ready to work with you."

Dr. Celal Sami Tüfekçi, Deputy Undersecretary for Defense Industries

*Dr. Celal Sami Tüfekçi: "We could not reach any where without generating new ideas"*

Deputy Undersecretary of Defense, Dr. Celal Sami Tüfekçi, in particular to the defense industry, reported that a very valuable point has been reached.Without the support of the other industries, the sector it will not be possible to move forward." Tüfekçi, said "because I need a full-scale power industry ecosystem in this country. We are also proud to be involved as a pioneers. But there is much work to be done. Only pride is not enough, we need to do good things to be fully independent in every area."

Small industrialists' importance, also SSM's attribute as a 'thinking organization' Tüfekçi in his speech concluded: "Undersecretariat for Defense Industries's basic mission, is to further strengthen industrialists like you, to increase their number. Small industrialists, rather than taking standard business from the larger ones; currently in Turkey we are trying to produce more innovative technologies to produce new ideas and mechanisms as well. Without creating new ideas related to financial or mechanism, we cannot reach new heights. We expect to play role as firms that are open to technology. I would like to mention here again, we are also open to any kind of support."

After the event in 2014, more than 250 companies from 34 countries, 4,800 one-to-one business meetings,the upcoming 3rd OSTIM Defense and Aviation Industrial Cooperation Days is being planned to take place in Ankara on October 11 – 13, 2016.

# Aegis Ashore is a Verified Hit: US Successfully Complete first Intercept for Land-Based Combat System

In the first live fire intercept test of Aegis Ashore, Lockheed Martin the U.S. Navy and the Missile Defense Agency successfully destroyed a ballistic missile target at the Pacific Missile Range Facility (PMRF).

The test also demonstrated the system's "Launch on Remote" capability, where Aegis Ashore uses information from another radar system to launch an intercept missile before switching to Aegis Ashore's own SPY-1 radar to guide that missile to the target. This level of interactivity between radar systems, which greatly extend the range of Aegis protections, is a hallmark of the networked, integrated shield of defense that Aegis-both at sea and on land-provides.

"This Launch on Remote capability helps broaden the reach of Aegis systems by allowing individual Aegis units to use data from networked sensors to track and engage threats," said Brendan Scanlon, Lockheed Martin's director of Aegis Ashore programs. "This test speaks to the flexibility of the Aegis concept, where we can network together the proven capabilities of Aegis with other missile defense systems to create a total ballistic missile defense shield."

The PMRF Aegis Ashore facility was installed in 2013 and has passed every milestone leading up to this test. A second Aegis Ashore system is currently under construction in Deveselu Air Base in Romania, on schedule for completion by year's end.

Aegis Ashore is powered by the latest iteration of the Aegis configuration, called Baseline 9, which also includes the most current generation of ballistic missile defense programming, BMD 5.0 CU. It is the land-based version of the Aegis Combat System, a sophisticated collection of phased-array radars, fire control directors, computers and missiles installed on U.S. Navy warships and those of its allies. As Aegis Combat Systems Engineering Agent, Lockheed Martin led the development of the Aegis Ashore weapon system for the U.S. Navy and Missile Defense Agency. Aegis Ashore is a key component of the U.S. European Phased Adaptive Approach, Phase II, a plan to protect deployed forces and our European allies from ballistic missile attack.

# Amphenol Air LB Wins Airbus Electrics's Supplier of the Year Award

Amphenol Air LB has been awarded as the "Supplier of the Year 2015" by Airbus during the Supplier Day conference held in Toulouse.

Amphenol Air LB, world leading manufacturer of high performance standard and custom interconnect solutions and attachment systems for Aerospace, has been named Supplier of the year 2015 by the Airbus's Center of Excellence Electrics, in recognition of the best global performances and the perfect matching of Amphenol Air LB's and Airbus's strategies.

"This award makes us proud and honored. It confirms our results in terms of Innovation, Commercial partnership, Product Quality and On-Time delivery, achieved through our commitment for years in a continuous improvement process aiming to Zero defect, Operation Excellence and Customer satisfaction", explains Nicolas Battung, General Manager of Amphenol Air LB. "This award honors each employee of Amphenol Air LB, as it rewards the strong collaborative work achieved for more than 10 years".

The construction in 2014 of a brand new location offering 50% surface increased was a significant milestone in the development of Amphenol Air LB and a tremendous asset to obtain the Airbus's Supplier of the year Award. This new industrial complex provides Amphenol Air LB with strengthened innovation and development capacities to better support Airbus and other customers in their growth. Since Amphenol Air LB moved in the new premises, 38 people have already been recruited to reinforce the teams.

The € 11 M investment has been supported by the Europe, the Region of Champagne-Ardenne and the local "Porte du Luxembourg" council community. "With a central position in Europe, a skilled labor and a favorable environment for employees, the French Ardennes are perfectly suited for industrial development. I'd really like to encourage you all to come and see by yourselves this richness and potential for your companies", said also Nicolas Battung to the industrials attending the award ceremony.

# Turkey Defense Week 2015

Turkey Defence Week, took take place in Ankara, Turkey November 10th – 12th, at the Mövenpick Hotel. It was organized by IRN International Research Networks, with program development guidance and consultation by the SSM, SaSaD and TÜBİTAK. The conference covered areas such as requirements of defense technologies for international militaries and defense companies worldwide. In attendance were over 30 speakers, and industry participants from Turkey as well as allied nations.

Welcome and facilitation was provided by Mr. Tuhin Quddus, Head of Defence & Security portfolio, IRN (International Research Networks) along with opening and closing comments by Ms. Burcu Uslu Business Development Director RST.

The SSM, Undersecretariat for Defense Industries, has undergone major modernization with projects on target to achieve their defense export goal of $ 25bn by 2023. Turkey Defence Week 2015 brought together international defense companies to meet experts who are driving Turkey's defense sector forward – including senior-officials from: SSM Undersecretariat for Defense Industries, Turkish Ministry of National Defense, Turkish Armed Forces, TÜBİTAK and NATO.

Ministries of Defense from across Europe, shared details on their upcoming projects and current requirements – including Macedonia, Estonia, Slovenia. Beginning with an interactive workshop on procurement and industrial participation/offset guidelines, this exclusive workshop outlined the main objectives and principles for international defense companies looking to utilize the commercial opportunities in Turkey, enabling them to fully explore all the legal aspects regarding contracts and documentation.

# First Japanese-Assembled F-35A Components Mate at Nagoya Faco

The first F-35A Lightning II aircraft began its assembly at the Nagoya, Japan, F-35 Final Assembly and Check-Out (FACO) facility on 15th December. The aircraft, designated AX-5, has officially begun the mate process, where major components of the aircraft are joined together to form the aircraft's structure. F-35A AX-5, the first Lightning II aircraft slated to be assembled in Japan, will complete its assembly in the Electronic Mate and Assembly Station (EMAS) and roll out of the factory for delivery in 2017.

The first four Japan F-35As, aircraft AX-1 through AX-4, are in various stages of production at Lockheed Martin's F-35 facility in Fort Worth, Texas. The first, F-35A aircraft AX-1 is expected to deliver in 2016.

The remaining 38 F-35As in Japan's Foreign Military Sale (FMS) program of record of 42 aircraft will be assembled and delivered in country from the Nagoya FACO. Lockheed Martin and Mitsubishi Heavy Industries (MHI) are working together to complete the Nagoya facilities and install the remaining equipment and tooling required to assemble and deliver F-35A aircraft from the Japan assembly line. Lockheed is also providing technical assistance and workforce training. Additionally, the US Department of Defense selected the Nagoya FACO in 2014 for the North Asia-Pacific regional heavy airframe Maintenance Repair Overhaul & and Upgrade (MROU) facility.

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# Navantia Delivers Landing Crafts to Australia

Navantia has the pleasure in delivering to the Commonwealth in Sydney the final batch of four LLCs. This is a major achievement, where Navantia has played an important role – that of Prime Contractor for the first time in an Australian program. Since 2007, Navantia has been working in three important programs for the ADF, namely the Air Warfare Destroyers (AWDs), Landing Helicopter Docks (LHDs), and the LHD Landing Craft (LLCs), under different contractual schemes to deliver to the best of its ability.

On 16th December 2011, Navantia signed a contract with the then Defence Materiel Organisation (DMO) under JP 2048 Phase 3 to build and deliver twelve LHD Landing Craft (LLCs) to the Commonwealth. All twelve have now been delivered to HMAS WATERHEN in Sydney on or ahead of schedule and to budget. The LLCs were built and tested in Cádiz, Spain, and shipped out to Australia.

Navantia understands that the first eight units are in operation with the RAN and are performing to the full satisfaction of Navy, having achieved various missions


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during sea trials with HMAS CANBERRA, which has also been commissioned into the RAN. Her sister ship, HMAS ADELAIDE, is due to be commissioned in Sydney on 4th December 2015. Since delivery of the LLCs, Navantia has provided in-country support and is committed to ensuring its availability for service at all times. This commitment will be maintained by Navantia Australia Pty Ltd, which is also assisting BAE Systems with Through Life Support of the LHDs.

Navantia is fully committed to Australia and will contribute to projects as far as possible within its proven capacity and ability to supply. We look forward to working with the Commonwealth and industry even more closely than before, to achieve the program goals that we totally share. In this regard, Navantia is currently engaged in the SEA 1654 Phase 3 Maritime Operational Support Capability tender process, and is working in a collaborative environment in the SEA 5000 Future Frigate program and the SEA 1180 Offshore Patrol Vessels project.

# Launch of the first Satellite in the "SpaceDataHighway" Programme

SpaceDataHighway will provide high-speed laser communication in space of extremely high volumes of data transfer, up to 50 terabytes per day

EDRS-A, the first relay satellite in the SpaceDataHighway programme (also called EDRS), will be launched to geostationary orbit on 28th January 2016. The SpaceDataHighway will provide high-speed laser communications in space of up to 1.8 Gigabit per second. This major programme, which cost nearly €500M to develop, is the result of a public-private partnership (PPP) between the European Space Agency (ESA) and Airbus Defence and Space.

Using communication relay satellites such as EDRS-A, the SpaceDataHighway will be able to transfer high volume information (images, video, data collected by sensors) from Earth observation satellites, UAVs and surveillance aircraft, or even from a space station such as the ISS. Thanks to the very high communication rates possible with laser (up to 1.8 Gbit/s) and the geostationary orbit positioning of the relay satellites, up to 50 terabytes per day can be transmitted securely in near-real-time to Earth, as opposed to the often 3 to 4 hour delay currently experienced.

"SpaceDataHighway is the equivalent of optical fibre in Space. It will revolutionise satellite and drone communications, and help to keep the European space industry at the forefront of technology and innovative services," said Evert Dudok, Head of the Communications, Intelligence & Security (CIS) business at Airbus Defence and Space.

As lead contractor of the EDRS-SpaceDataHighway PPP, Airbus Defence and Space is co- financing, owning, manufacturing and operating the system as well as commercialising it. The German national aeronautics and space research centre (DLR) is also participating in financing the system and also in the development and operation of the ground segment. Thirteen European countries are involved in the consortium.

The first communication node of the SpaceDataHighway system, called EDRS-A, is a payload carried on Eutelsat 9B, a Eurostar E3000 type satellite built by Airbus Defence and Space and to be operated by Eutelsat. The main component of the EDRS payload is the Laser Communication Terminal (LCT) built by TesatSpacecom, a subsidiary of Airbus Defence and Space. Within the next few days, Eutelsat 9B will be sent into orbit from Baikonur on a Proton launcher and will be positioned over Europe at 9° East.

# MALE RPAS Programme Management Authorisation Approved

A major milestone has been reached in the European MALE RPAS (Medium Altitude Long Endurance Remotely Piloted Aircraft System) effort: The approval of the Programme Management Authorisation (PMA) by the OCCAR Board of Supervisors in November 2015 authorises the assignment of the programme to OCCAR for management purposes, with the initial participation of France, Germany, Italy and Spain. On the basis of this PMA, programme integration activities into OCCAR are now progressing at full speed.

On 18 May 2015, France, Germany and Italy declared their intention to conduct a definition study in order to prepare the development of a European MALE RPAS. Since then, Spain has become the fourth nation to participate in the study, which is planned to last 2 years. The main purpose is to identify a set of achievable operational capabilities, to define the corresponding set of system requirements and to perform preliminary design activities to allow the launch of a potential development and production phase with minimum residual risk.

Under the management of OCCAR, European industry will conduct the study. Contract award for the definition study is expected during the first half of 2016. The definition study will be the initial phase of the planned development of the MALE RPAS system. Subject to a decision to continue with development and production of the system, the first system will be delivered by 2025.

Once operational, the system will perform long endurance intelligence, surveillance and reconnaissance missions with a variety of payloads as well as ground support missions with precision weapons.

The European Defence Agency (EDA) was asked by the Participating States to support the programme in the areas of air traffic integration and certification and to facilitate the potential participation of other European states in the follow-on phase.


# Fokker Signs F-35 Contract for Inflight Opening Doors with Northrop Grumman

Fokker Technologies, a division of GKN Aerospace, signed an agreement with Northrop Grumman Corporation for the delivery of the in-flight opening doors for the F-35 Lightning II (JSF). The contract is valued at approximately € 100 million

The agreement was signed at the NIDV Symposium in Rotterdam. The signing ceremony was witnessed by Mr. MaximeVerhagen, former deputy Prime Minister of the Netherlands and currently the Dutch Special Envoy Industrial Participation F-35 Program. Under this agreement, Fokker will be responsible for the manufacture of the in-flight opening doors for the next batch of aircraft in low rate initial production lots 10 and 11.

This agreement continues the very successful current arrangement through the previous low rate initial production lots, with potential opportunities to continue for the full rate production phases. This agreement reaffirms Fokker's position as a strategic supplier in the F-35 program and helps secure skilled specialist work at Fokker Technologies in Hoogeveen and Papendrecht (Netherlands) and its supply base over the coming years.

"We are very pleased with the success of our long-term relationship with Northrop Grumman. We are especially proud that our successful co-operation in the F-35 program was recognized by awarding contracts for the next F-35 production batches. This also emphasizes the success of the F-35 JSF industrial participation in the Netherlands", said Hans Büthker, CEO of Fokker Technologies. "The enthusiasm of Fokker Technologies employees about our contribution to the F-35 and the teamwork with Northrop Grumman and Lockheed Martin is enormous. The agreements demonstrate the willingness, trust and commitment of our partners to use our unique capabilities and services."

"Fokker has been an outstanding supplier to Northrop Grumman's F-35 program for many years," said Brian Chappel, vice president and F-35 program manager, Northrop Grumman Aerospace Systems. "They have consistently responded rapidly to design changes, provided the tools and people needed to support program growth, and delivered their products on time."

Fokker Technologies has been a part of the F-35 program since 2002 and has produced and delivered electrical wiring interconnection systems, flaperons, in-flight opening doors, engine parts, arresting gear for F-35 aircraft that are currently flying and in production. Fokker Technologies also announced today the follow-on development contract for the composite drag brace of the F-35 landing Gear.

# Selex ES Awarded a Contract in to Upgrade Six Royal Bahrain Naval Force Vessels

Selex ES will upgrade six vessels of the Royal Bahrain Naval Force and provide the relevant training services. The contract reflects Selex ES's excellence in the naval domain and its successful commercial positioning in the strategic Gulf region

Selex ES has signed a contract worth in excess of € 50 million with the Royal Bahrain Naval Force to upgrade six naval vessels.

The upgrades will be completed in less than five years' time. Training services and logistics will also be provided in line with the company's commercial strategy.

Selex ES has developed a leading role in the naval systems market by providing highly capable systems that are modular and scalable, allowing them to be effectively adapted to meet varying customer requirements. This contract is the latest in a string of successes for the company in the Gulf region; in Bahrain specifically the company has already signed contracts with the Bahrain Civil Aviation (BCA) organisation and the Bahrain Air Force (BAF) to provide primary and secondary surveillance radar systems.

# Royal Danish Navy Orders Rheinmetall's Millennium Gun

The Danish procurement authorities have contracted with the Dusseldorf-based Rheinmetall Group to supply additional 35mm Oerlikon Millennium guns for ships of the Royal Danish Navy. The order, which also includes spare parts and technical services, is worth around € 20 million. The guns will be shipped in 2016.

The Rheinmetall Group won an initial order from Denmark for the Oerlikon Millennium gun back in 2005. Now official, this follow up order is of great importance with regard to international sales, reflecting strong customer satisfaction with existing systems and their performance over the past decade.

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Two types of Danish ships will therefore soon be equipped with the Millennium gun, one of the most effective and versatile naval weapon systems anywhere.


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Thanks to the flexible ISO Mount installation concept, the guns can be installed on any of the Absalon class or the new IverHuitfeldt-class frigate. The guns will be managed by SaabTech CEROS fire control systems and Terma command and control technology.

Teamed with Rheinmetall's high-performance 35mm Ahead airburst ammunition, the Millennium gun gives the Danish Navy a close-range self-defence capability for protecting high-value assets that is second to none. A multipurpose weapon system, it is also capable of neutralizing asymmetric and symmetric threats alike, whether on the surface or in the air.

Besides Denmark, five other NATO nations use Rheinmetall's programmable 35mm Ahead airburst ammunition which, when combined with the Millennium Revolver Gun 35/1000, results in massive yet flexible firepower that can be scaled to match a wide variety of operational scenarios.

# Cubic Achieves Top Ranking as Leading Technology Export in New Zealand

Cubic Defence New Zealand ranked 23rd out of top 200 in Technology Investment Network annual report

Cubic Global Defense (CGD), a business unit of Cubic Corporation announced that Cubic Defence New Zealand (CDNZ) ranks 23rd among New Zealand's top technology companies in Technology Investment Network's (TIN) eleventh edition of the 2015 TIN100 Report. The TIN100 Report provides an annual analysis of New Zealand's largest globally focused companies in the fields of high-tech manufacturing, Information and Communication Technology (ICT) and biotechnology.

"Cubic Global Defense is a technology-led company with strong international operations including Cubic Defence New Zealand (CDNZ). CDNZ is an innovation-driven engineering company developing live ground training solutions for local and global customers," said Eric Stierna, general manager of Cubic Defence New Zealand. "As we near our 30th anniversary in the region, we are pleased to be recognized as a fast growing, top-tier technology company and look forward to delivering innovative training solutions for years to come."

CDNZ designs, develops and delivers training systems to military and security forces worldwide using advanced technologies. In the 1990s, CDNZ developed their first mobile Combat Training Centre, using GPS and radio to monitor training activity in real time and provide aggregated map views at a remote exercise control center. A decade later, recognizing that many operational deployments were in built-up areas, CDNZ introduced a world-class urban training capability. Recently, CDNZ began developing new systems to enhance safety in high-risk transportation and forestry sites where an absence of infrastructure precludes standard solutions.

TIN researchers collate information from approximately 300 companies and report on the largest 200 for the annual report. Key sections of the TIN100 Report include an analysis and review of ownership structures, market sectors, company profiles, economic impact studies, analysis of research and development; and the regional technology growth areas in New Zealand. The TIN100 report is sponsored by Callaghan Innovation and New Zealand Trade and Enterprise with the purpose to promote high-tech company development in New Zealand.

# Volker Paltzo Appointed as New CEO for Eurofighter Jagdflugzeug GmbH

The Shareholders of the Eurofighter consortium have appointed Volker Paltzo as the new Chief Executive Officer (CEO) of Eurofighter Jagdflugzeug GmbH as of 1 January 2016. This was announced by the company in Hallbergmoos on Thursday.

Volker Paltzo is currently the CEO of Atlas Elektronik GmbH in Bremen. The 51-year-old manager will succeed Alberto Gutierrez who has been the Eurofighter CEO since June 2013. As part of Eurofighter's rotation policy, Gutierrez will become the new Head of Eurofighter Programme at Airbus Defence and Space in Manching as of 1 January 2016.

Commenting on his appointment, the newly appointed Eurofighter CEO Volker Paltzo said: "I am looking forward to my new role in the Eurofighter programme and I am very keen to meet the expectations of our customers. With Eurofighter Typhoon we have a world class combat aircraft on offer and I am absolutely convinced that we will continue to win new customers."

The incoming CEO added that the Eurofighter community is very grateful for the commitment and performance of his predecessor Alberto Gutierrez. Volker Paltzo said: "Alberto has done a great job in moving the company forward. The company achieved contract signatures for the Meteor and Storm Shadow integration, for the future E-Scan radar and the Phase 3 Enhancement. During his time, Eurofighter also managed to increase its customer base."

In response, Alberto said: "Volker joins us in the Eurofighter Programme at an exciting time in the platform's evolution and a time when the aircraft is seen to be actively delivering for its customers. I wish him well. I am looking forward to taking the knowledge I have gained as CEO of Eurofighter and using it for the benefit of the Programme within my parent company. The effective transfer of knowledge is what makes Eurofighter uniquely potent."


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Volker Paltzo has been the CEO of Atlas Elektronik since 2011. Before that he was Chief Operating Officer (COO) Capabilities at Eurofighter Jagdflugzeug GmbH from 2009 to 2011 and therefore has a comprehensive knowledge about the Eurofighter programme.

# 35th WISTA International Conference "Veins of Shipping" & Annual General Meeting

35th International Conference of Women's International Shipping and Trading Association: "Veins of Shipping" and Annual General Meeting have been held in Istanbul between 7-10th of October 2015 under the organization of WISTA Turkey. By the aim of the conference, many representatives of global maritime and shipping industry had become together within sharing big enthusiasm on development of global maritime sector.

On 6th of October, presidents, board of directors of all WISTAs and conference committee members were gathered under "President's Dinner" at Muzedechanga avenue and had time to meet each other. Ms. Tuğçe Çiftçigüzeli Boncuk, Business Development Executive of Istanbul Shipyard who is the member of WISTA, also presented in the event. On the second day 7th of October, WISTA International groups were assembled with annual general meeting and opened the conference period with near 200 participants. In the AGM, Mrs. Consuelo Rivero from WISTA Spain and Mrs. Oritsematosan Edodo-Emore from WISTA Nigeria handovered the mission of board of directory of WISTA International, to Mrs. Naa Densua Aryeetey from WISTA Ghana and Mrs.Despina Panayiotou Theodosiou from WISTA Cyprus.

The third day on 8th of October, "Veins of Shipping" conference was started with the opening speeches of Mrs. Halime Can who is the President of WISTA Turkey and Mrs. Karin Orsel as the President of WISTA International. The first key note speech after the opening ceremony was performed by Mrs. Sadan Kaptanoglu with her presentation of "Turkey as a shipping hub and maritime economy" and continued with first panel of "Turkey as a shipping hub" as the moderator of the panel with Mr. Deniz Eraydin, Mr. Recep Duzgit and Mr. Aret Tasciyan as speakers.

The second panel "Where shipping goes?" was moderated by Mrs. Dorothea Ioannou and speeches were performed by Mrs. Jasamin Fichte, Mrs. Katerina Stathopoulou, Mrs. Maria Borg Barthet, Mr. Alistair Johnson and Mr. Harun Duzgoren.

After lunch on the first day of the conference, "Istanbul &Canakkale Straits" panel was started. Moderator Prof. Dr. Samim Unan opened the panel and in order of Admiral Metin Atac from Turkish navy, Capt. Saim Oguzulgen from TURBAM, Prof. Dr. Sezer Ilgın from ITU and Commander Kerim Demirtas had performed their presentations on importance of Turkish Straits. The last panel "Veins of Shipping: Aegean, East Med, Corinth, Suez, Danube, Reine" was moderated Mrs. Andrea J Sterling as the President of WISTA Canada and Mr. Hakan Cendik, Mr. Alex Avramoglou and Mr. Nikos Marmatsouris performed their presentations regarding effects of channels, trade volume, difficulties and future.

The first day of "Veins of Shipping" conference was completed at Cahide Cumbus with great performances of "Dancing Queens"

The second day of "Veins of Shipping", Mr. Todor Vasisiliev, Mr. Eduard Machavariani, Mr. Bahadir Tonguc and Mr. Alexey Tarazinov had presentations on "Ukrainian/ Russian Rivers" panel where Mrs. Natilia Myroshnychenko moderated. In the second panel "Ship chartering & future", Mrs. Jeanne Grasso managed the panel as moderator, while Mr. Brian Malone, Mr. Darryl Kennard, Mrs.Müge Anber-Kontakis and Mr. Oliver Hutchings performed their speeches. The last panel of the conference "Why coasters are indispensible?" was moderated by Prof. Dr. Guldem Cerit with speakers; Mr. Joachim Van Grieken, Mr. Salih Zeki Cakir, Mr. Burak Akartas and Mr. Engin Kocak.

After closing notes of conference, WISTA members organized workshops regarding the effects of WISTA on Maritime sector, the role of women in Maritime industry, Africa as the new frontier, Shipping environment, new rules and regulations as generating a "Brain storming".

On the evening of 8th October, all WISTA members and speakers attended Gala dinner at Adile Sultan Palace and had great times on closing ceremonies, music and of course amazing dance show of WISTA Greece. Due to the fact that this year is the 41st Anniversary of establishment of WISTA International, a special celebration was carried out with "41st year's cake" which placed "Blue Bead" on it and which is also believed to protect someone from "Bad Luck".

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