



# **Field Service Report For**

**LM 2500 Repair**

**Facility: WG-Pratt & Whitney  
Unit: 481-642**

**ProEnergy Services**

## REPAIR SUMMARY LM2500 481-642

The GE boroscope inspection to LM2500 481-642 revealed two areas of concern which required the unit to be inducted into a depot level facility in order for those items to be addressed. The gas turbine was sent to Wood Group Pratt&Whitney (WGPW) a fully certified LM2500 repair facility located in Jacksonville, Florida.

The first area of concern was indication of compressor rub. The compressor was disassembled, cleaned and inspected. All of the 1<sup>st</sup> stage compressor blades were replaced to address this issue.

The second area of concern was High Pressure Turbine (HPT) stage 1 turbine blades and shrouds. The HPT was disassembled, cleaned and inspected. The blades and shrouds were found to be in serviceable condition, but ProEnergy elected to go ahead and replace all of the 1<sup>st</sup> stage blades with Overhauled OEM blades and all of the 1<sup>st</sup> stage shrouds with Overhauled OEM shrouds.

Additional inspections were carried out the all major components of the gas turbine. During the inspections there were several discoveries which were found and corrected. One of those was evidence of an oil leak in the Turbine Mid-Frame (TMF). The TMF was sent to Chromalloy in San Antonio Texas for in-depth inspection and repair. The leak turned out to be a very minor issue with a supply line gasket. The gasket was replaced, the TMF pressure checked and returned in serviceable condition.

In addition to the TMF repair WGPW found and repaired or replaced numerous small components. The details of those are contained in the WGPW report contained here.

Upon completion of the repairs the gas turbine was reassembled and ran in the WGPW test cell to verify performance. The gas turbine met all requirements and passed the performance run. The engine was then water washed and boroscoped before being placed in the shipping container.

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### Daily Field Report

Day: <u>MONDAY</u>	Weather: <u>Overcast/Rain</u>	Temperature: <u>70Deg F</u>
Date: <u>05/18/09</u>		
Project: <u>EQU08-1449 JT</u>		

**MANPOWER:**

	ABSENT	WORKING	TOTAL
TA/		1	
Proj. Manager			
Site Manager			
Superintendent			
Foremen			
Safety			
Tool Room			
Operators			
Totals			

	ABSENT	WORKING	TOTAL
Civil			
Welders			
Iron Workers			
Helpers			
Millwrights			
Pipe Fitters			
Electricians			
Totals			

**WORK PERFORMED TODAY:**

Meeting in the morning with Brian and Don. Determined work scope for unit 481-642. Removal of GG began at 9am. The GG was placed in stands. Pre run out on the rotor was 0.0035". Removal of # 5 bearing nut and the oil tube. Removal of the HPT rotor. At first inspection the stage 2 shrouds are showing very hard rub 180deg on the left side ALF. Worst at 9 o'clock. Tomorrows inspection will determine the condition of blades and shrouds after the stage 2 nozzle is removed.

**PROBLEMS & DELAYS:**

N/A

**DISCUSSIONS / INSTRUCTIONS FROM OWNER / ENGINEER / COMMENTS OR CONCERNS:**
**MATERIAL & EQUIPMENT NEEDED:**
**MAJOR MATERIAL RECEIVED & CONDITION:**

N/A

**SAFETY ISSUES / COMMENTS:**

Safety Topic:

**\*\*Attach Progress Photos\*\***

TA / Project Manager: Robert Birsic

Date: 05/18/09

PAGE 1

### Daily Field Report

Day: <u>TUESDAY</u>	Weather: <u>Overcast/Rain</u>	Temperature: <u>70Deg F</u>
Date: <u>05/19/09</u>		
Project: <u>EQU08-1449 01</u>		

**MANPOWER:**

	ABSENT	WORKING	TOTAL
TA/ Proj. Manager		1	
Site Manager			
Superintendent			
Foremen			
Safety			
Tool Room			
Operators			
Totals			

	ABSENT	WORKING	TOTAL
Civil			
Welders			
Iron Workers			
Helpers			
Millwrights			
Pipe Fitters			
Electricians			
Totals			

**WORK PERFORMED TODAY:**

Stage 2 blades were removed and stage 2 nozzle assembly to gain access to the stage 1 blades and shrouds. Blades and shrouds were inspected and the findings show that all the hard wear is in serviceable condition. Pending is a second opinion from an outside source If the customer requests that service. The HPC case was removed and the compressor inspected. The findings showed minor rub(typical) Some wear on the Stage 1 midspan damper pads and some dirt build up. Overall condition is serviceable.

**ROBLEMS & DELAYS:**

N/A

**DISCUSSIONS / INSTRUCTIONS FROM OWNER / ENGINEER / COMMENTS OR CONCERNS:**

	<b>MATERIAL &amp; EQUIPMENT NEEDED:</b>
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**MAJOR MATERIAL RECEIVED & CONDITION:**

N/A

**SAFETY ISSUES / COMMENTS:**

Safety Topic:

### Daily Field Report

Day: WENDSDAY      Weather: Overcast/Rain      Temperature: 70Deg F  
 Date: 05/20/09  
 Project: EQU08-1449 01

**MANPOWER:**

	ABSENT	WORKING	TOTAL
TA/		1	
Proj. Manager			
Site Manager			
Superintendent			
Foremen			
Safety			
Tool Room			
Operators			
Totals			

	ABSENT	WORKING	TOTAL
Civil			
Welders			
Iron Workers			
Helpers			
Millwrights			
Pipe Fitters			
Electricians			
Totals			

**WORK PERFORMED TODAY:**

Pending on decision for unit 481-642 I got the shop to start tear down on the twin shank unit. The air and oil lines were removed and some Gearbox accessories. The external linkage for VSV system was removed and cataloged. All parts removed are being cataloged and will be Inspected, checked for serviceability and or if they are superseded. The unit when ready will be taken vertical for module disassembly.

**ROBLEMS & DELAYS:**

N/A

**DISCUSSIONS / INSTRUCTIONS FROM OWNER / ENGINEER / COMMENTS OR CONCERNS:**
**MATERIAL & EQUIPMENT NEEDED:**

N/A

**MAJOR MATERIAL RECEIVED & CONDITION:**

N/A

**SAFETY ISSUES / COMMENTS:**

Safety Topic:

**\*\*Attach Progress Photos\*\***

TA / Project Manager: Robert Birsic

Date: 05/20/09 PAGE 3

### Daily Field Report

Day: WENDSDAY      Weather: Overcast/Rain      Temperature: 70Deg F  
 Date: 05/21/09  
 Project: EQU08-1449 01

**MANPOWER:**

	ABSENT	WORKING	TOTAL
TA/		1	
Proj. Manager			
Site Manager			
Superintendent			
Foremen			
Safety			
Tool Room			
Operators			
Totals			

	ABSENT	WORKING	TOTAL
Civil			
Welders			
Iron Workers			
Helpers			
Millwrights			
Pipe Fitters			
Electricians			
Totals			

**WORK PERFORMED TODAY:**

Continued disassembly of the twin shank unit. Removal of misc air oil lines. Removal of inlet gear box. The unit is seized up and the Compressor showing a lot of blade damage. The stage 2 HPT blades have touched the TMF indicating the hole rotating section at one point Has shifted aft.

**PROBLEMS & DELAYS:**

N/A

**DISCUSSIONS / INSTRUCTIONS FROM OWNER / ENGINEER / COMMENTS OR CONCERNS:**
**MATERIAL & EQUIPMENT NEEDED:**

N/A

**MAJOR MATERIAL RECEIVED & CONDITION:**

N/A

**SAFETY ISSUES / COMMENTS:**

Safety Topic:

**\*\*Attach Progress Photos\*\***

TA / Project Manager: Robert Birsic

Date: 05/20/09 PAGE 4

### Daily Field Report

Day: <u>Friday</u>	Weather: <u>Overcast/Rain</u>	Temperature: <u>70Deg F</u>
Date: <u>05/22/09</u>		
Project: <u>EQU08-1449 01</u>		

**MANPOWER:**

	ABSENT	WORKING	TOTAL		ABSENT	WORKING	TOTAL
TA/		1		Civil			
Proj. Manager							
Site Manager				Welders			
Superintendent				Iron Workers			
Foremen				Helpers			
Safety				Millwrights			
Tool Room				Pipe Fitters			
Operators				Electricians			
Totals				Totals			

**WORK PERFORMED TODAY:**

481-642: The stage 1 HPT blades were removed without incident then packed and shipped to Chromalloy. The stage 2 nozzle assemble was Also shipped to Chromalloy for inspection and will later be determined for serviceability. The HPC work began for cleaning and blending Of blades/vanes. The stage 1 HPC blades have worn midspan dampers beyond serviceable limits. JTS has 2 sets of blades and are willing To do a rotatable exchange. Waiting for Quote. Twin shank unit has the stage 2 HPT disc ruined due to contact with TMF liner.

**ROBLEMS & DELAYS:**

N/A

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**DISCUSSIONS / INSTRUCTIONS FROM OWNER / ENGINEER / COMMENTS OR CONCERNS:**


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**MATERIAL & EQUIPMENT NEEDED:**

N/A

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**MAJOR MATERIAL RECEIVED & CONDITION:**

N/A

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**SAFETY ISSUES / COMMENTS:**

Safety Topic:

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**\*\*Attach Progress Photos\*\***

TA / Project Manager: Robert Birsic

Date: 05/22/09 PAGE 5

## **STATUS UPDATE**

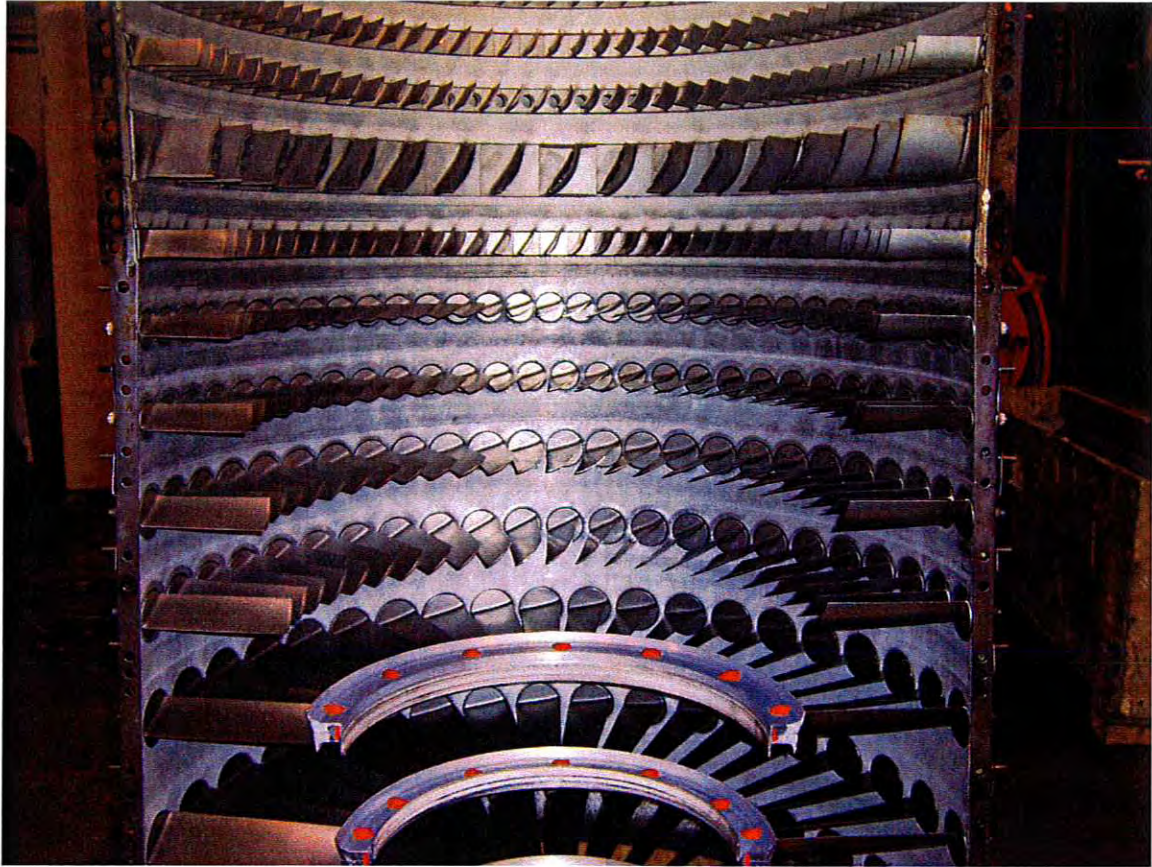
**481-642**

**06/02/09**

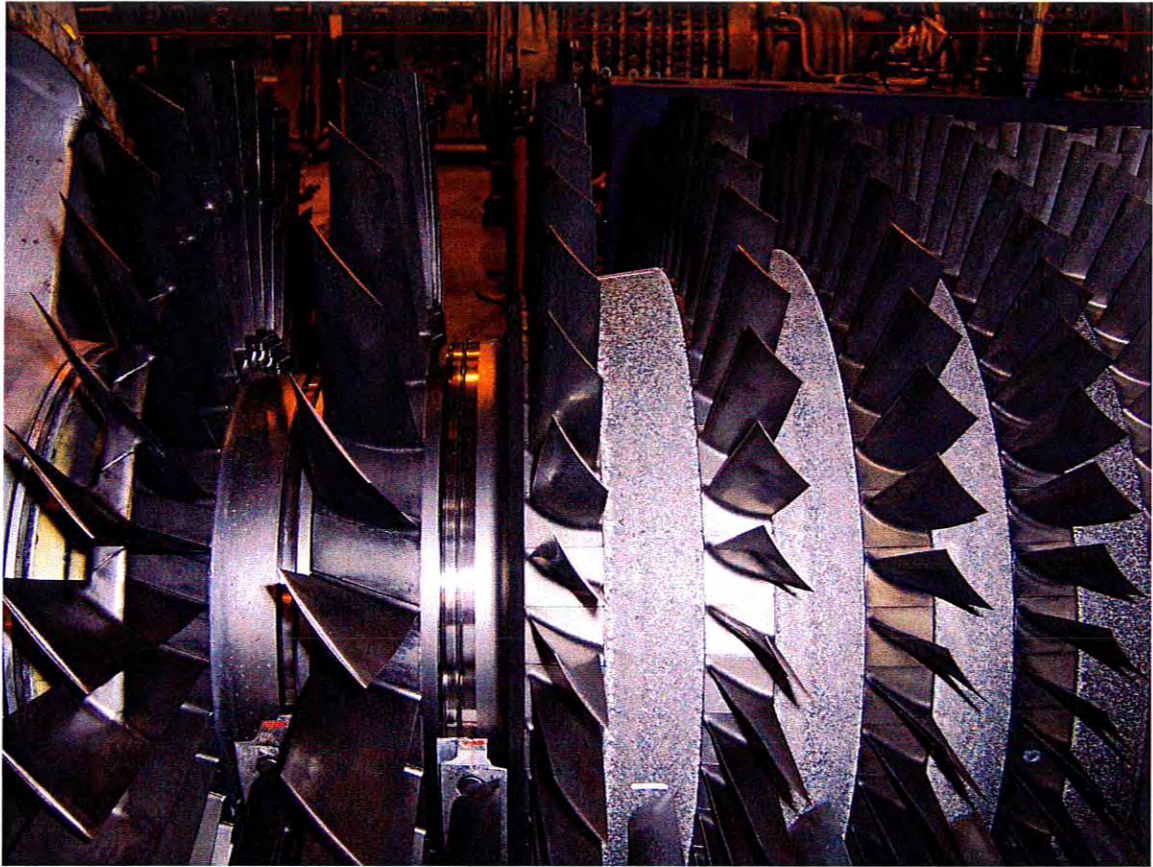
**Starting with the high pressure compressor section of the unit. It has been opened and the following work performed: The rotor and all 16 stages of blades were inspected. The rotor and blades were then hand cleaned. Some repairs were performed such as blending of blades. The vanes were inspected and cleaned with no discrepancies noted; the variable stator vanes were inspected for integrity and were in good condition with no damage. Overall condition of the high pressure compressor is very good and as per the GE manual GEK 97310 inspection section all is in serviceable condition. Currently the compressor is being reassembled and should be completed by 06/03/09.**

**The high pressure turbine section has been removed and disassembled. The stage 1 nozzle is still in the unit and has been inspected with no damage noted. In order to inspect the shrouds stage 2 nozzle assembly was removed. The stage 1 blades were removed and inspected. The stage 1 blades are currently sent out for repair. Status of the repair is pending and we are trying to get it done as fast as we can. The stage 2 nozzle assembly has also been sent out for inspection and we are currently waiting for a report on its status. The stage 2 blades were removed and inspected and are in good serviceable condition as per the GE manual. The stage 2 blade shrouds were inspected and are in good condition. As soon as we get the Parts back from repair the unit will be reassembled and moved to a different area for proper external cleaning due to the facility set up. Please see pictures below.**

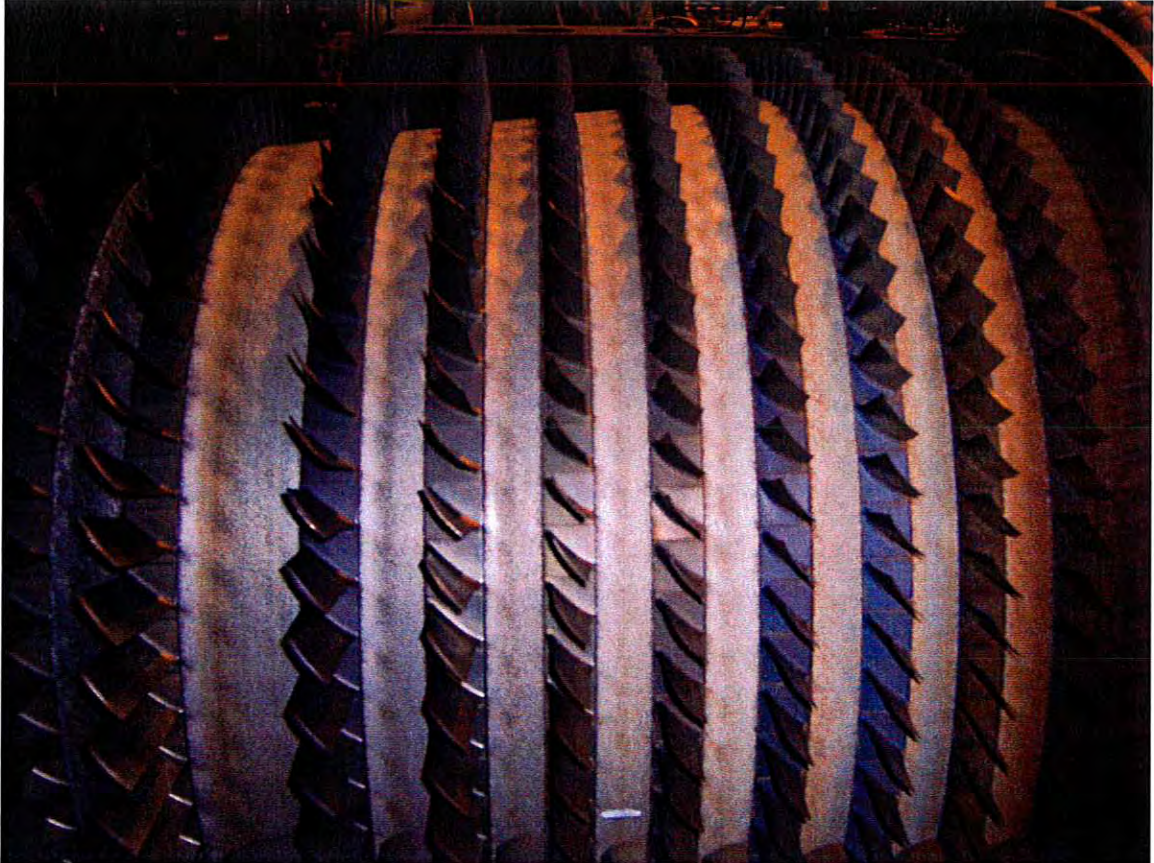
## HIGH PRESSURE COMPRESSOR CASE PRIOR TO CLEANING



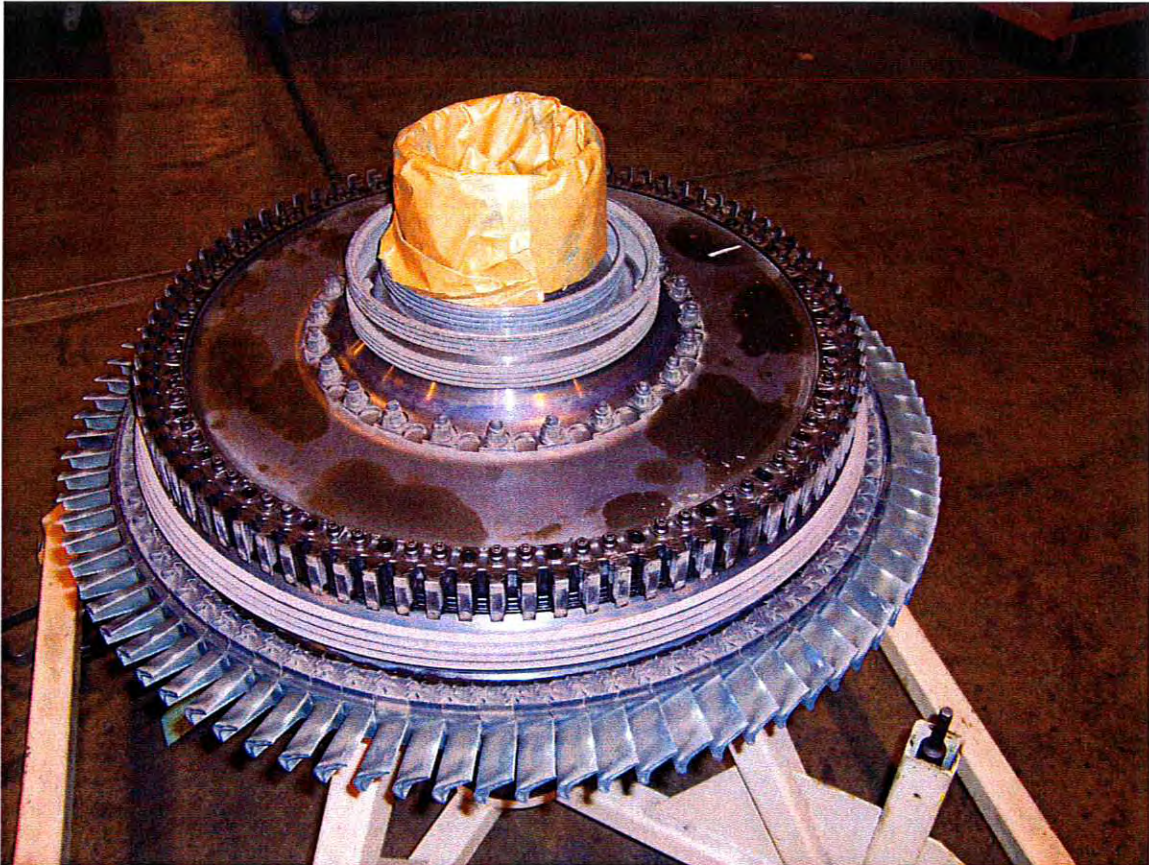
## FORWARD COMPRESSOR BLADES PRIOR TO CLEANING



## **AFT COMPRESSOR STAGES PRIOR TO CLEANING**



## HPT ROTOR PRIOR TO CLEANING AND REPAIR



## HPT ROTOR STAGE 1 BLADES



## **STATUS UPDATE FOR UNIT**

**481-642**

**481-642: HPT blades and stage 2 nozzle has been sent of to Chromalloy. They will recoat the blades and inspect the stage 1 blade shrouds which according to GEK 93710 chapter 5 gives you the limit and as inspected are in serviceable condition. To make the shroud look better there is a possibility of recoating which will be determined upon price and time. HPC is being hand cleaned since the top case removal. Minor dents will be blended if necessary. The stage 1 HPC blade dampers show wear and missing material. This is not uncommon on units that operate at low and fluctuating loads. The condition was not mentioned in the second party inspection. Will determine the outcome after reviewing the BSI report. JTS has blades if necessary. FYI they will give us a quote for overhauled and one set that is serviceable. If the blades were not mentioned in the inspection report I would not replace them. Attached are some of the pictures from the JTS shop with recommendations. As we all know these are their recommendations and to benefit their profit. This unit will only need minor work since the inspection after tear down.**

## STAGE 2 NOZZLE ASSEMBLY PRIOR TO CLEAN UP AND REPAIR



### Daily Field Report

Day: <u>Monday</u>	Weather: <u>Sunny</u>	Temperature: <u>80Deg F</u>
Date: <u>06/04/09</u>		
Project: <u>EQU08-1449 01</u>		

**MANPOWER:**

	ABSENT	WORKING	TOTAL		ABSENT	WORKING	TOTAL
TA/		1		Civil			
Proj. Manager							
Site Manager				Welders			
Superintendent				Iron Workers			
Foremen				Helpers			
Safety				Millwrights			
Tool Room				Pipe Fitters			
Operators				Electricians			
Totals				Totals			

**WORK PERFORMED TODAY:**

Meeting with Rolando Pestana in regards to 481-642. Rolando came to the JTS facility to look at the unit and discuss the main concerns of The unit passing the upcoming inspection. It was discussed that we will inspect the unit prior to test. Also the customer will come to Jacksonville to witness the test as per Rolando. There was also some concern about the rub on the compressor cases. The rub is well within Limits but as per Rolando they might not like it and see it as a cosmetic flaw. Will discuss this in upcoming meeting on Monday. Will schedule. Rolando wants to get together with Jeff, Pete, Neil, myself.

**PROBLEMS & DELAYS:**

N/A

**DISCUSSIONS / INSTRUCTIONS FROM OWNER / ENGINEER / COMMENTS OR CONCERNS:**

	<b>MATERIAL &amp; EQUIPMENT NEEDED:</b>
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**MAJOR MATERIAL RECEIVED & CONDITION:**

N/A

**SAFETY ISSUES / COMMENTS:**

Safety Topic:

### Daily Field Report

Day: <u>Monday</u>	Weather: <u>RAIN</u>	Temperature: <u>80Deg F</u>
Date: <u>06/05/09</u>		
Project: <u>EQU08-1449 01</u>		

**MANPOWER:**

	ABSENT	WORKING	TOTAL
TA/ Proj. Manager		1	
Site Manager			
Superintendent			
Foremen			
Safety			
Tool Room			
Operators			
Totals			

	ABSENT	WORKING	TOTAL
Civil			
Welders			
Iron Workers			
Helpers			
Millwrights			
Pipe Fitters			
Electricians			
Totals			

**WORK PERFORMED TODAY:**

Continued disassembly of the 481-461. Parts are being cataloged and inspected for serviceability, repairable or good parts packed.  
 Unit: 481-642. The HPT blades have been striped of the coating and as per Chromalloy showed no fall-out. They will be coated with Pt-Al Coating. The stage 1 shroud work will begin Monday or Tuesday which requires complete disassembly of the stage 2 nozzle assembly. Once the blades return will need to measure radius before the shroud is sent to grind. Meeting on Monday in regards to HPC case rub.

**'ROBLEMS & DELAYS:**

N/A

**DISCUSSIONS / INSTRUCTIONS FROM OWNER / ENGINEER / COMMENTS OR CONCERNS:****MATERIAL & EQUIPMENT NEEDED:**

N/A

**MAJOR MATERIAL RECEIVED & CONDITION:**

N/A

**SAFETY ISSUES / COMMENTS:**

Safety Topic:

Gentlemen

Here is the latest plan for unit 481-642.

1. The stage 1 blades are being recoated as we speak. The word from Chromalloy is that they will be done in 15 days then shipped back to the facility. The blades will then be installed and shimmed for measurement to make sure that the shroud grind will have proper tolerance.
2. The stage 2 nozzle assembly is being disassembled today since it arrived from Chromalloy. It was shipped back due to no facility in the US. The damaged shrouds will be removed and replaced. This will take a few days. When finished the nozzle will need to ship out for grind. I forwarded Cost for this earlier but will attach it again. We have a few options on what shrouds to use and we should try and keep the cost down by using their Pratt parts. When the nozzle returns it will be reassembled and installed.
3. The compressor cases are being removed due to the case rub which is in serviceable limits. The reason for this is that Rolando and Neill brought this issue to attention for the customer. The plan for the cases is that we are going to try and clean it up. The risk of doing that is possible loss of performance due to opening the blade to case clearances. The only other option would be to rework the cases which is very costly and time consuming. We will measure before and after clearances to have an idea where we will be at after repair.
4. Stage 1 HPC blade mid span dampers are worn or missing. This was overlooked by the individual from GE that did the inspection. They were deemed serviceable. The only concern with this is that if a different individual does the inspection they might call the blades unserviceable. Our options are as follows we could use the blades from the twin shank unit since they are in better condition. Option 2 is to purchase a used set from WGPW which is in serviceable condition. Option 3 buy an overhauled set from WGPW which is available and sitting on their shelf. If the part numbers are good on the twin shank blades it would be a possibility I will find out today.
5. Insulation blankets on the turbine rear frame was criticized by the customer and was brought to my attention by Rolando because of missing outer foil coating. If we decide to replace it the cost would be \$5350.00 and can be done locally in Jacksonville.

Rest of the game plan is to do inspection of the unit prior to test after the repairs are finished. The unit will be operated and tested prior to customer visit for test. The unit should at that time be ready to run without incidents in front of the customer. An estimate for time is total of 4 weeks until all is done. I will be doing daily progress reports and keep everybody involved informed. Also attached is all the documentation for this project.

Best Regards Robert

### Daily Field Report

Day: <u>Monday</u>	Weather: <u>SUNNY</u>	Temperature: <u>95Deg F</u>
Date: <u>06/09/09</u>		
Project: <u>EQU08-1449 01</u>		

**MANPOWER:**

	ABSENT	WORKING	TOTAL		ABSENT	WORKING	TOTAL
TA/		1		Civil			
Proj. Manager							
Site Manager				Welders			
Superintendent				Iron Workers			
Foremen				Helpers			
Safety				Millwrights			
Tool Room				Pipe Fitters			
Operators				Electricians			
Totals				Totals			

**WORK PERFORMED TODAY:**

481-642: Unit went vertical and gearbox was removed. The compressor cases are to be removed and cleaned up due to the rub which According to Rolando the customer will not accept. Got quote from Chromalloy for the shroud repair on stage 1 HPT. Will forward. The Cases should be removed by 06/10/09 in the afternoon. Clean up work to start 06/11/09. The stage 1 shrouds have been removed and are Ready for shipping pending decision. 481-461(twin shank) Only the compressor spools need to be broke down the rest is ready for crating id shipping. Will forward quote for crating.

**PROBLEMS & DELAYS:**

N/A

**DISCUSSIONS / INSTRUCTIONS FROM OWNER / ENGINEER / COMMENTS OR CONCERNS:**

	<b>MATERIAL &amp; EQUIPMENT NEEDED:</b>
--	---

N/A

**MAJOR MATERIAL RECEIVED & CONDITION:**

N/A

**SAFETY ISSUES / COMMENTS:**

Safety Topic:

### Daily Field Report

Day: Monday      Weather: SUNNY      Temperature: 95Deg F  
 Date: 06/10/09  
 Project: EQU08-1449 01

**MANPOWER:**

	ABSENT	WORKING	TOTAL
TA/		1	
Proj. Manager			
Site Manager			
Superintendent			
Foremen			
Safety			
Tool Room			
Operators			
Totals			

	ABSENT	WORKING	TOTAL
Civil			
Welders			
Iron Workers			
Helpers			
Millwrights			
Pipe Fitters			
Electricians			
Totals			

**WORK PERFORMED TODAY:**

481-642: high pressure cases were removed and dummy cases were installed. The cases were inspected and will try to clean up the rub on  
 On the lands. Unit 461 is disassembled only the compressor rotor is intact and should be done by tomorw. The rest is ready to be crated and  
 Is being catalogd for shipping. Crate companys qoute is aprox \$2600.

**ROBLEMS & DELAYS:**

N/A

**DISCUSSIONS / INSTRUCTIONS FROM OWNER / ENGINEER / COMMENTS OR CONCERNS:**

(Empty lines for discussion)

**MATERIAL & EQUIPMENT NEEDED:**

N/A

**MAJOR MATERIAL RECEIVED & CONDITION:**

N/A

**SAFETY ISSUES / COMMENTS:**

Safety Topic:

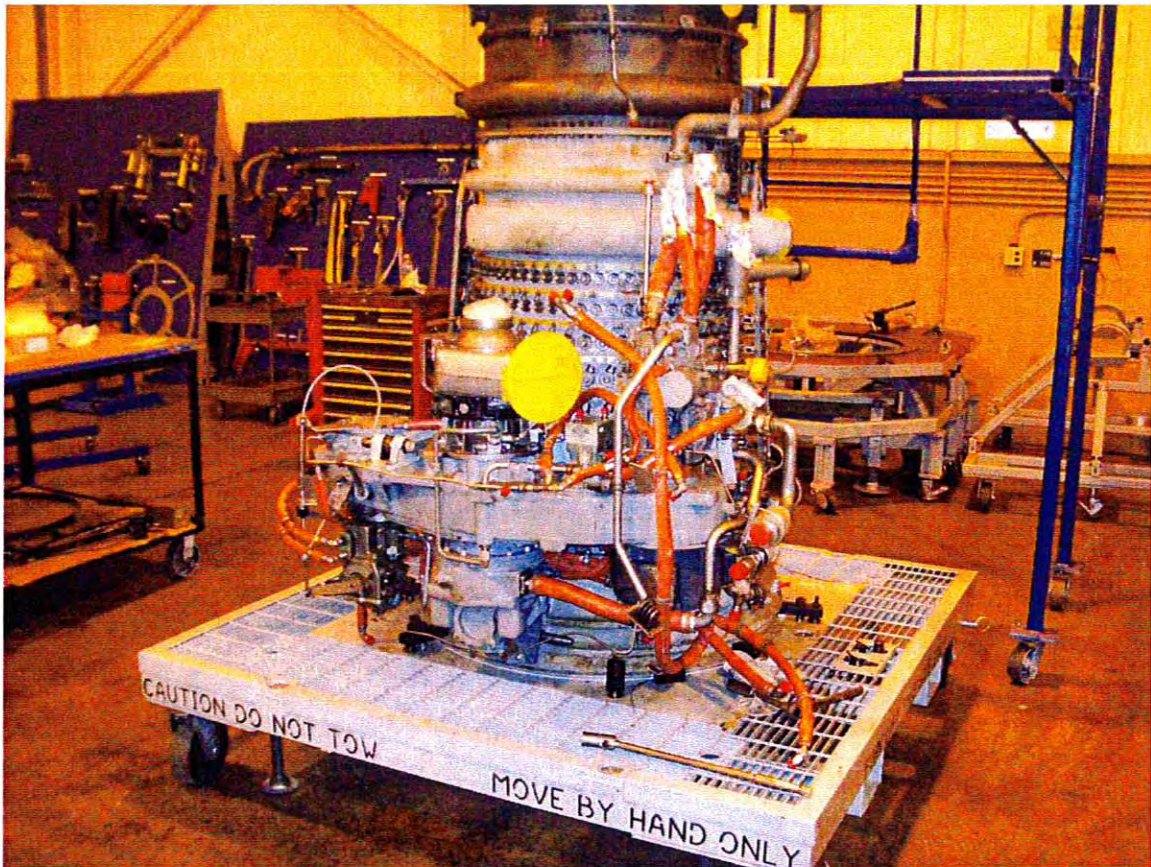
## **STATUS UPDATE PICTURES**

**481-642**

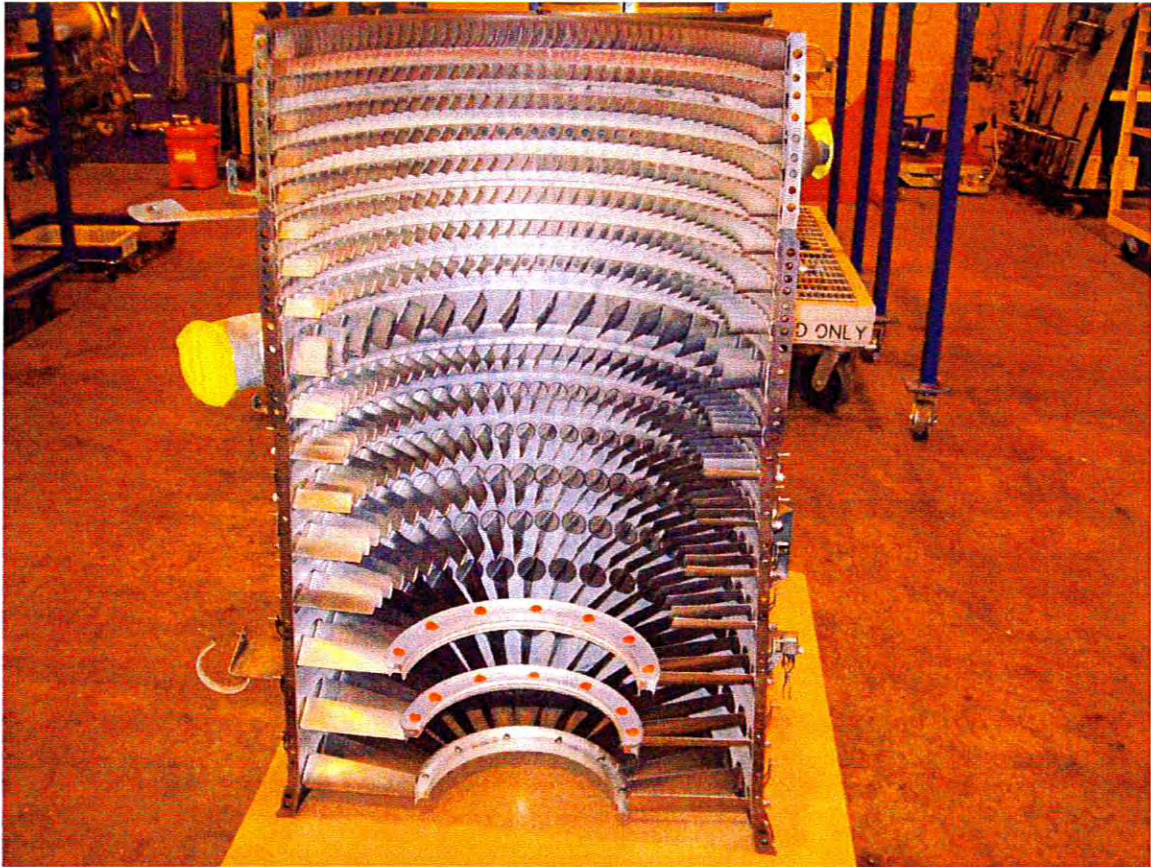
**06/11/09**



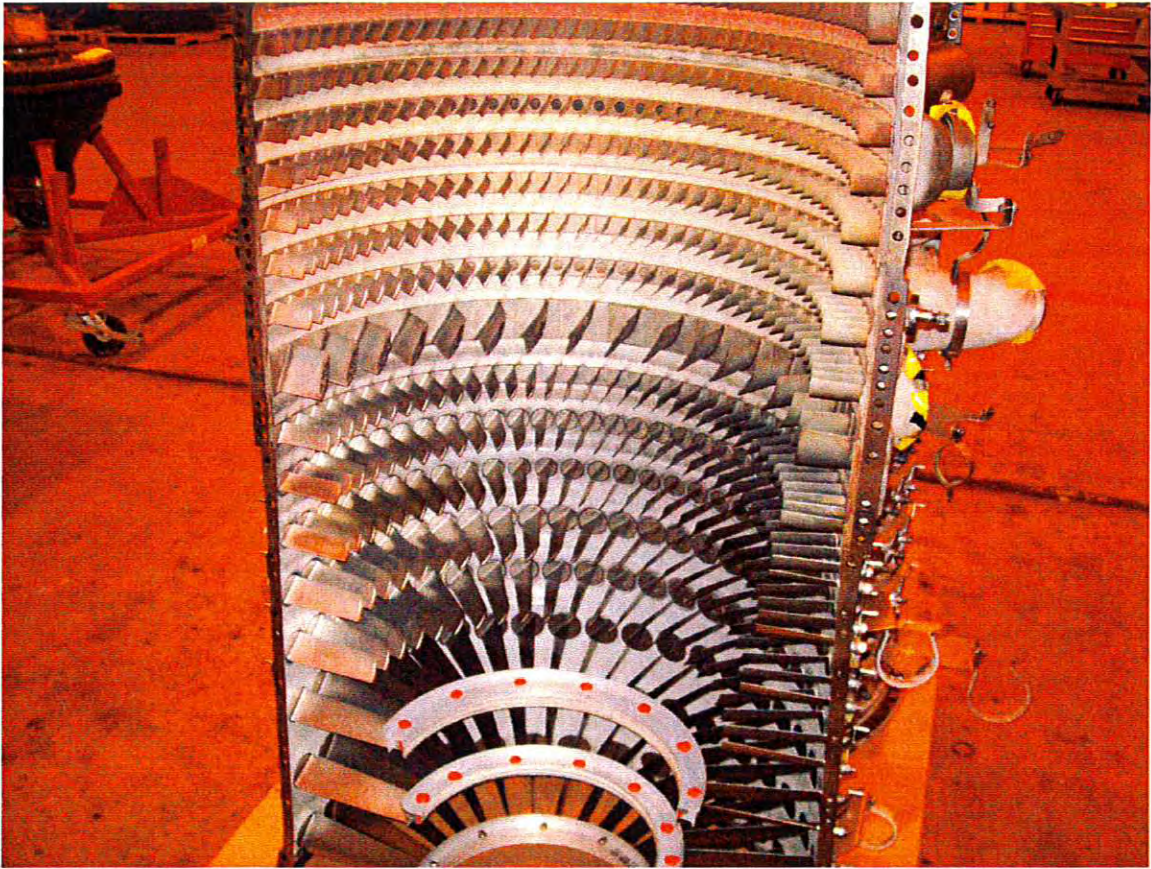
**UNIT VERTICAL READY FOR GEARBOX REMOVAL  
AND STATOR CASES**



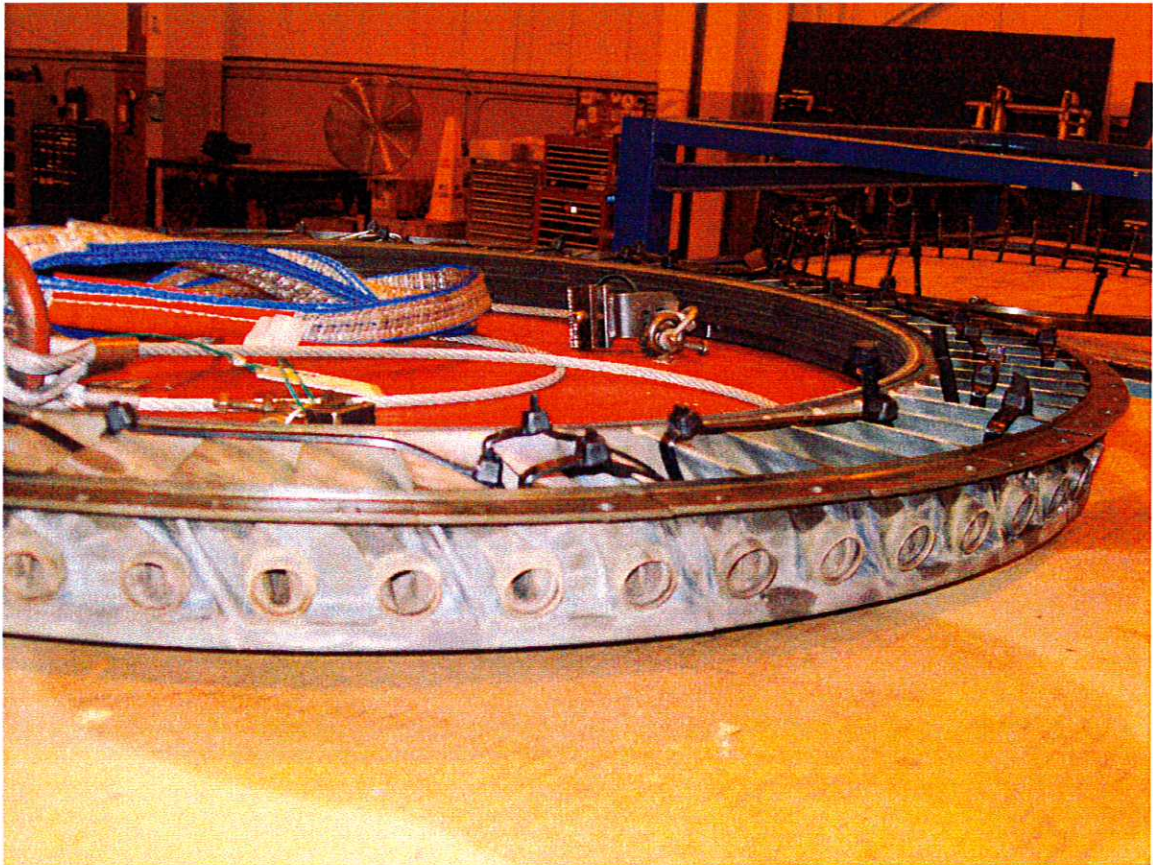
**UNIT PRIOR TO GEARBOX REMOVAL**



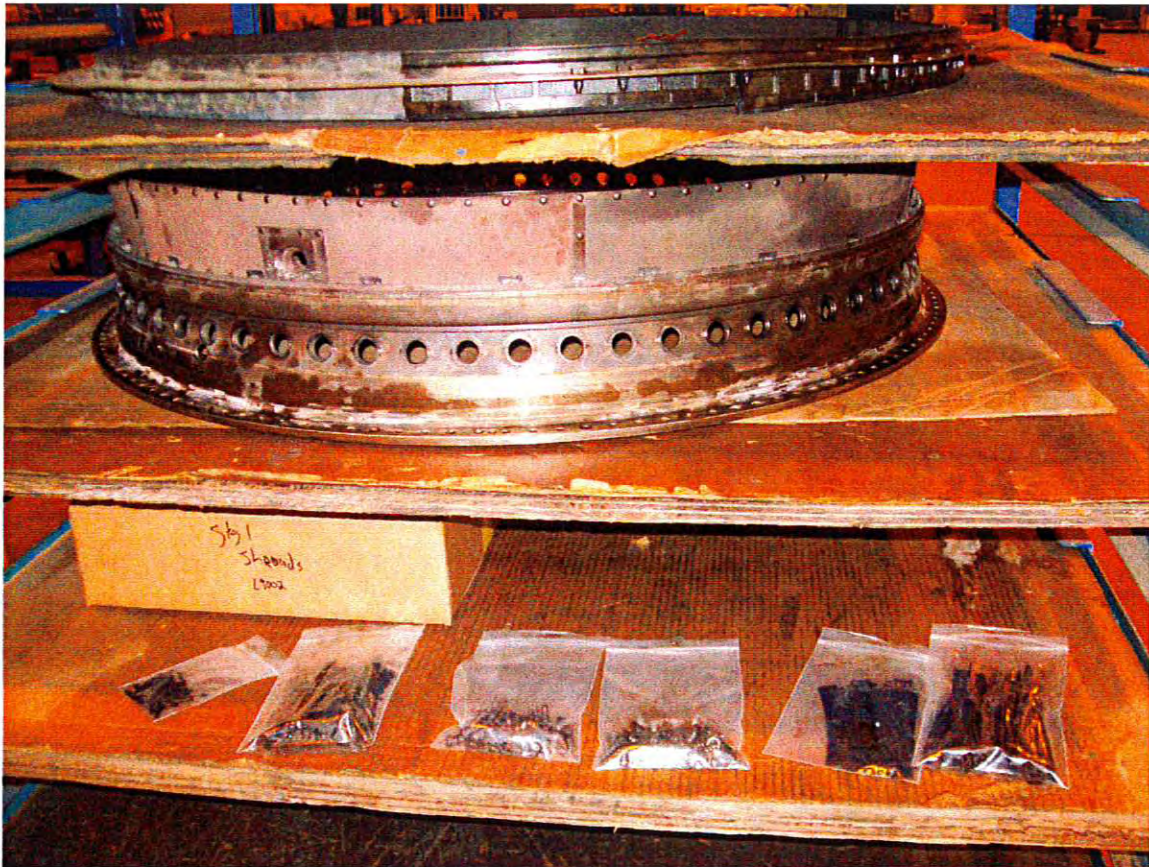
**UPPER COMPRESSOR CASE AFTER REMOVAL**



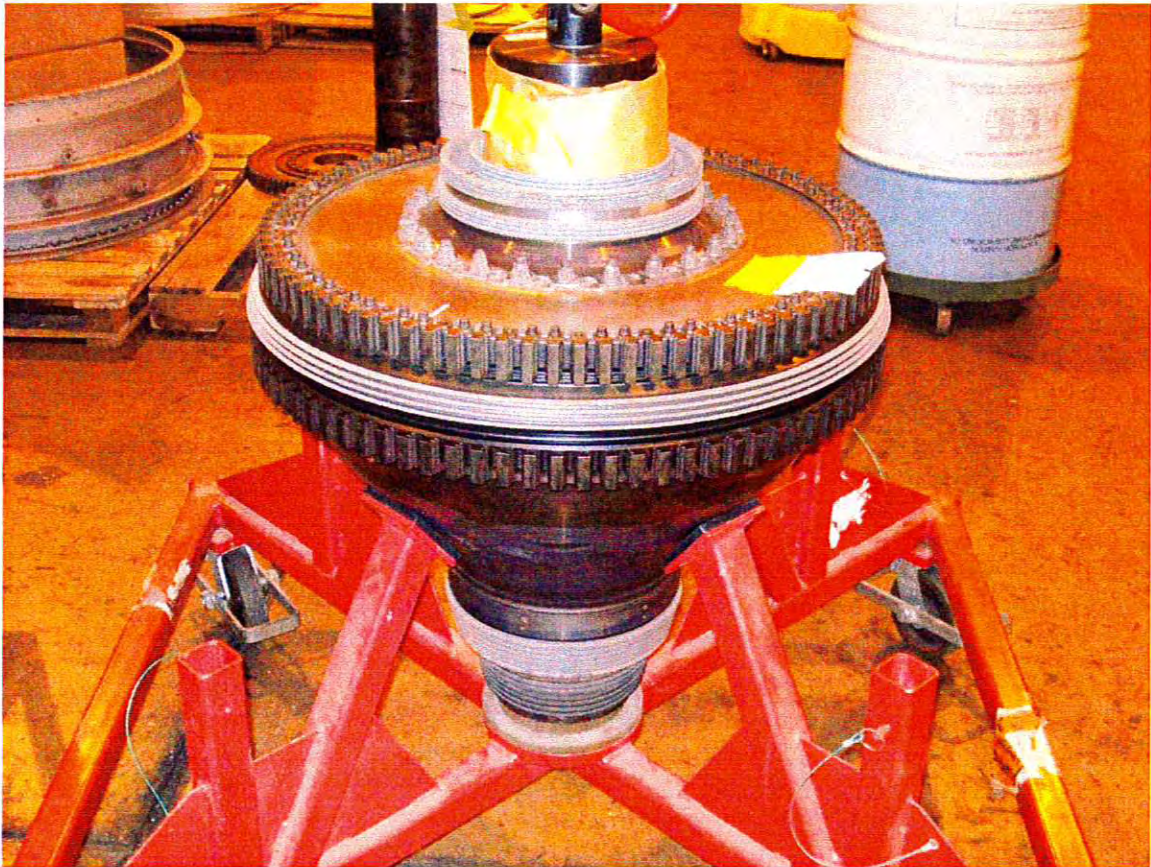
**LOWER COMPRESSOR CASE AFTER REMOVAL**



**STAGE 2 NOZZLE ASSEMBLY DISSASSEMBLED**



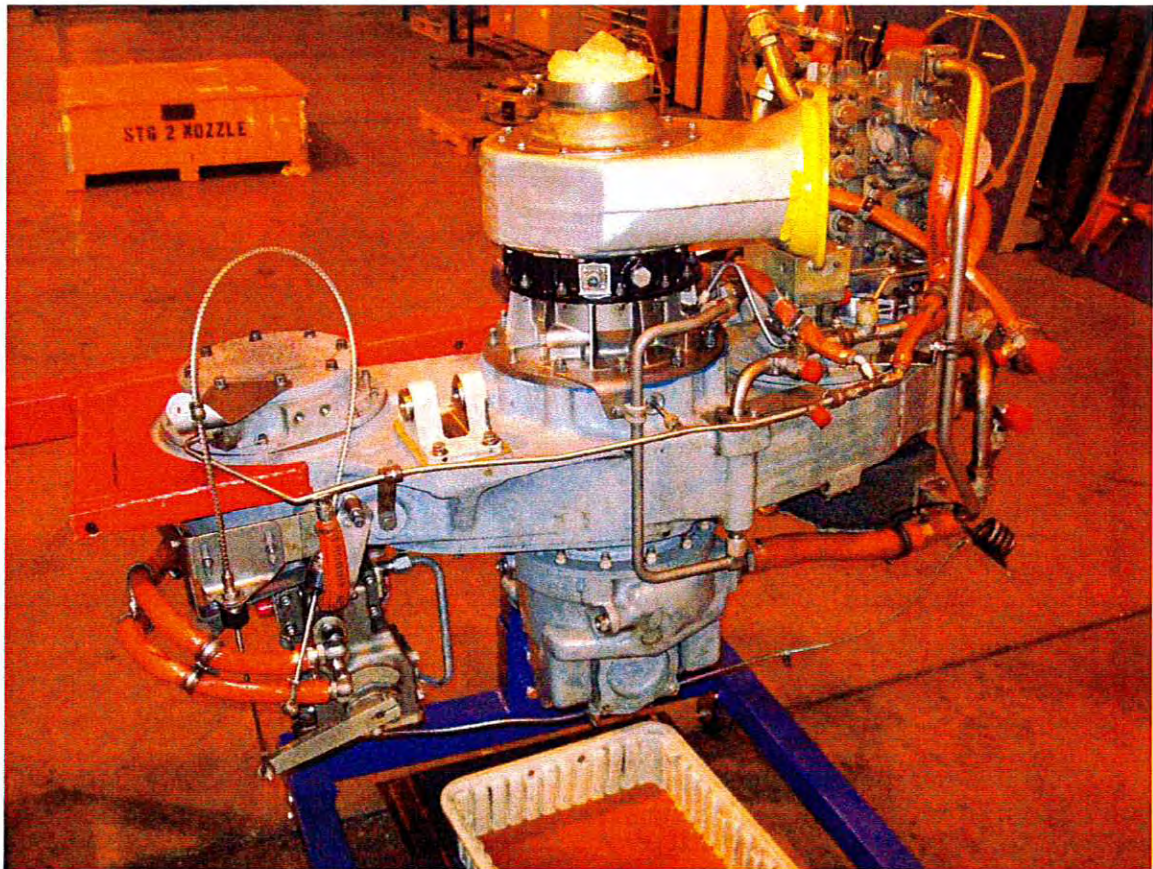
**STAGE 2 NOZZLE ASEMBLY SUPORT**



**DEBLADED HPT ROTOR WAITING FOR BLADES TO  
COME BACK FROM REPAIR**



**ENGINE VERTICAL WITH STABILIZER CASES FOR PROTECTION**



**THE REMOVED GEARBOX**



**ENGINE VERTICAL**

**Wood Group Pratt & Whitney  
Industrial Turbine Services, LLC.**

6101 Flightline Road  
Jacksonville, FL 32221  
(904) 779-6881



**Pratt & Whitney**  
A United Technologies Company

**Pro Energy LM2500**  
**Final Customer Report**  
**Equipment S/N: 481-642**

WGPW Work Order #: L9002

Date: **07/31/09**



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## SECTION 1.0 PROPRIETARY INFORMATION NOTICE

Equipment S/N: 481-642  
Work Order NO: L9002

### Notice

The information contained herein represents confidential and proprietary information owned or controlled by Wood Group Pratt & Whitney Industrial Turbine Services, LLC (hereinafter "Wood Group Pratt & Whitney") and is being supplied to RECIPIENT solely for the RECIPIENT's information and evaluation of Wood Group Pratt & Whitney's quotation to the RECIPIENT for services and/or parts as called for in this PROPOSAL and subsequent modifications thereto.

By acceptance of this PROPOSAL, RECIPIENT expressly agrees to maintain in confidence all such information made available by Wood Group Pratt & Whitney and further agrees not to disclose such to others outside of RECIPIENT organization, either during the course of the RECIPIENT's evaluation or subsequent thereto, with out the prior written consent of Wood Group Pratt & Whitney.

Nothing contained herein shall be construed as implying that Wood Group Pratt & Whitney has granted, or that the RECIPIENT has accepted any rights or license to any Wood Group Pratt & Whitney information other than specifically set forth above.

RECIPIENT shall, at any time and at Wood Group Pratt & Whitney's request, return all Wood Group Pratt & Whitney proprietary information (including copies thereof).

In the event that this PROPOSAL shall result in the award of an order to Wood Group Pratt & Whitney, RECIPIENT expressly agrees to accept the inclusion of the following provision as a condition of award:

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**Wood Group Pratt & Whitney  
Industrial Turbine Services, LLC.**

6101 Flightline Road  
Jacksonville, FL 32221  
(904) 779-6881



**Pratt & Whitney**  
A United Technologies Company

## SECTION 2.0 DESCRIPTION OF EQUIPMENT

ENGINE MODEL: LM2500		DATE RECEIVED: 05/18/2009
EQUIPMENT SERIAL NUMBER: 481-642		DATE SHIPPED: 8/10/09
		UNIT PACKAGER: Not Applicable

## SECTION 3.0 ENGINE SHOP VISIT/OPERATIONAL DATA

REASON FOR ENGINE SHOP VISIT: (1) Customer addressing issues in General Electric Boroscope Report. Initial areas of concern were the Stg 1 HPT Blades, rub on the STG 1 Shrouds, and Compressor Rub.

TIME SINCE NW (HRS): Unknown		CUSTOMER P.O: 106641
TIME SINCE OH (HRS): Unknown		WGPW WORK ORDER NO: L9002
TIME SINCE HS (HRS): Unknown		PREVIOUS POSITION: Unkwon
OPERATIONAL DATA SUPPLIED BY CUSTOMER		INSTALL POSITION: Unknown

## SECTION 4.0 ENGINE SHOP VISIT SUMMARY

CAUSE FOR REMOVAL: Addressing issues indicated in the General Electric boroscope report as directed by Customer.

SUMMARY OF WORK: STG 1 HPT Blade set replaced with Overhauled OEM Blades (CFM), 24 STG 1 Shrouds replaced with Overhauled OEM Parts, STG 1 HPCR Blade set replaced with Serviceable parts, assorted HPC blades blended to remove minor nicks and impact damage, three HPC stator lands stoned to remove high metal as needed, # 5R Bearing replaced Serviceable part, # 6 Bearing Vent Seal replaced with Overhauled part. Perform functional engine test.

## SECTION 5.0 INSPECTION LOG

Initiated By: J.Bowman	P/N:	Nomenclature:	Date: 5/19/09
Discrepancy: VSV protractor is at 38°15'.			
Corrective Action: Checked VSV rigging adjusted as necessary			
		Completed By: RM	Date:



SECTION 5.0 INSPECTION LOG			
Initiated By: J. Bowman	P/N:	Nomenclature:	Date: 5/19/09
Discrepancy: VSV bellcrank is older config. (GREY). Control is a one piece.			
Picture in Folder			
Corrective Action: Cont. Time			
		Completed By: RM	Date:
Initiated By: J. Bowman	P/N:	Nomenclature:	Date: 5/19/09
Discrepancy: VSV Actuators are 9691M29P17, older configuration.			
Picture in Folder			
Corrective Action: Cont. Time			
		Completed By: RM	Date:
Initiated By: J. Bowman	P/N:	Nomenclature:	Date: 5/19/09
Discrepancy: S2N screen has metal rolled, by the borescope plug hole.			
Picture in Folder			
Corrective Action: Removed metal and blended			
		Completed By: RM	Date:
Initiated By: J. Bowman	P/N:	Nomenclature:	Date: 5/19/09
Discrepancy: Significant rub on Stage 1 HPT Shrouds.			
Picture in Folder			
Corrective Action: 24 ea. Shroud replaced			
		Completed By: RM	Date:
Initiated By: J. Bowman	P/N:	Nomenclature:	Date: 5/19/09
Discrepancy: Significant wear on Stage 1 HPT blade tips.			
Picture in Folder			
Corrective Action: Replaced stg 1 blades with 48 ea. From WGPW stock and 40 ea. CFM			
		Completed By: RM	Date:



SECTION 5.0 INSPECTION LOG			
Initiated By: J. Bowman	P/N:	Nomenclature:	Date: 5/19/09
Discrepancy: Upper right elbow on CRF has dent.			
Picture in Folder			
Corrective Action: Cont. Time			
		Completed By: RM	Date:
Initiated By: J. Bowman	P/N:	Nomenclature:	Date: 5/19/09
Discrepancy: 8th Stage cooling tube has tape wrapped around tube, where clamp is installed.			
Picture in Folder			
Corrective Action: Tape removed and clamp replaced			
		Completed By: RM	Date:
Initiated By: J. Bowman	P/N:	Nomenclature:	Date: 5/19/09
Discrepancy: Some of the HPCR Stg.1 midspans have extreme wear.			
Picture in Folder			
Corrective Action: Replaced stg 1 HPCR Blades with SV WGPW stock			
		Completed By: RM	Date:
Initiated By: 042	P/N: L28339P01	Nomenclature: T3 Sensor	Date: 5/20/09
Discrepancy: Wear on tubing under clamp.			
Picture in Folder			
Corrective Action: Continue Time per Customer Request.			
		Completed By: RM	Date:
Initiated By: J.Bowman	P/N:	Nomenclature:	Date: 5/21/09
Discrepancy: Stage 2 shroud diameter 34.6191			
Picture in folder.			
Corrective Action: Noted			
		Completed By: RM	Date:



SECTION 5.0 INSPECTION LOG			
Initiated By: 042	P/N: 9051M55G03	Nomenclature: Connector	Date: 5/20/09
Discrepancy: Stg. 5 pin hole and end worn 2 ea.			
Picture in folder.			
Corrective Action: Replaced with Serviceable			
		Completed By: RM	Date:
Initiated By: 042	P/N: 9051M54G03	Nomenclature: Connector	Date: 5/20/09
Discrepancy: Stg. 4 pin holes worn 2 ea.			
Picture in folder.			
Corrective Action: Replaced with Serviceable.			
		Completed By: RM	Date:
Initiated By: 042	P/N: 9051M56G03	Nomenclature: Connector	Date: 5/20/09
Discrepancy: Stg. 6 worn pin hole			
Picture in folder.			
Corrective Action: Replaced with Serviceable.			
		Completed By: RM	Date:
Initiated By: 042	P/N: 9051M52G03	Nomenclature: Connector	Date: 5/20/09
Discrepancy: Stg. 2 worn pin hole			
Picture in folder.			
Corrective Action: Replaced with Serviceable.			
		Completed By: RM	Date:
Initiated By: 042	P/N: L21445G01	Nomenclature: Tube	Date: 5/20/09
Discrepancy: Wear sleeve worn and tube is cracked through			
Picture in folder.			
Corrective Action: Replaced with Serviceable.			
		Completed By: RM	Date:



SECTION 5.0 INSPECTION LOG			
Initiated By: J.Bowman	P/N:	Nomenclature:	Date: 5/21/09
Discrepancy: Bellcrank bushing worn			
Picture in folder.			
Corrective Action: Cont Time			
		Completed By: RM	Date:
Initiated By: J.Bowman	P/N: 9687M23P03	Nomenclature: Spring Washer	Date: 5/21/09
Picture in folder.			
Corrective Action: Replaced with new 66 ea.			
		Completed By: RM	Date:
Initiated By: J.Bowman	P/N:	Nomenclature:	Date: 5/21/09
Discrepancy: Over half of fuel nozzles missing safety wire			
Corrective Action: Fuel nozzles shipped to customer			
		Completed By: RM	Date:
Initiated By: J.Bowman	P/N:	Nomenclature:	Date: 5/21/09
Discrepancy: Negative safety on bellcrank Core bracket			
Corrective Action: Safetywire corrected			
		Completed By: RM	Date:
Initiated By: J.Bowman	P/N:	Nomenclature:	Date: 5/21/09
Discrepancy: Stage 2 shroud diameter 34.6191			
Picture in folder.			
Corrective Action: Noted			
		Completed By: RM	Date:



SECTION 6.0 STATEMENT OF WORK					
HPC ROTOR					
EMU	PART NUMBER	SERIAL NUMBER	NOMENCLATURE	QTY	SCOPE OF WORK
HPCR	K157G02	N/A	STG 1 HPC Blades	36	NE
HPCR	JA1854M45G02	N/A	RETAINER	36	NE
COMPRESSOR REAR FRAME					
EMU	PART NUMBER	SERIAL NUMBER	NOMENCLATURE	QTY	SCOPE OF WORK
CRF	9631M84P02	N/A	RING	66	NE
EXTERNAL PIPING					
EMU	PART NUMBER	SERIAL NUMBER	NOMENCLATURE	QTY	SCOPE OF WORK
EXP	J221P228	N/A	PACKING	2	NE
HPT					
HPT	J221P225	N/A	PACKING	1	NE
HPT	J221P225	N/A	PACKING	1	NE
HPT	J221P161	N/A	PACKING	1	NE
INLET GEARBOX					
EMU	PART NUMBER	SERIAL NUMBER	NOMENCLATURE	QTY	SCOPE OF WORK
IGB	J221P028	N/A	PACKING	1	NE



SECTION 6.0 STATEMENT OF WORK					
HPT ROTOR					
EMU	PART NUMBER	SERIAL NUMBER	NOMENCLATURE	QTY	SCOPE OF WORK
HPTR	L31424G24	N/A	STAGE 1 BLADES	88	OH
HPTR	L31424G34	N/A	BLADE	40	CM
HPTR	L31424G34	N/A	BLADE	37	OH
HPTR	L31424G34	N/A	BLADE	11	OH
HPTR	L31424G34	N/A	BLADE	11	CM
HPTR	L31424G34	N/A	BLADE	12	CM
HPTR	L31424G34	N/A	BLADE	11	CM
HPTR	L31424G34	N/A	MATERIAL HANDLING	34	NE
HPTR	L31424G02	N/A	MATERIAL HANDLING	34	NE
HPTR	4058T39P01	N/A	SEAL	30	NE
HPTR	9686M18P24	N/A	SEAL	48	NE
TURBINE MID FRAME					
EMU	PART NUMBER	SERIAL NUMBER	NOMENCLATURE	QTY	SCOPE OF WORK
TMF	9127M42G05	N/A	# 6 Bearing Vent Seal	1	NE
TMF	L31720P01	N/A	#5R Bearing	1	NE
TMF	9146M63P02	N/A	BOLT	5	NE

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SECTION 6.0 STATEMENT OF WORK					
TURBINE MID FRAME					
EMU	PART NUMBER	SERIAL NUMBER	NOMENCLATURE	QTY	SCOPE OF WORK
TMF	9687M23P03	N/A	WASHER	66	NE
TMF	9608M08G45	N/A	GASKET	5	NE
TMF	L44655P01	N/A	PACKING	2	NE
TMF	L24288G24	N/A	TMF	1	RP
TGB/AGB & ACCESSORIES					
EMU	PART NUMBER	SERIAL NUMBER	NOMENCLATURE	QTY	SCOPE OF WORK
ACCY	J221P240	N/A	PACKING	1	NE
ACCY	9665M71P01	N/A	GASKET	1	NE
ACCY	C10-218	N/A	SAFE-T-CABLE KIT .0	50	NE
ACCY	C10-218	N/A	SAFE-T-CABLE KIT .0	50	NE
ACCY	C10-218	N/A	SAFE-T-CABLE KIT .0	50	NE
ACCY	C10-218	N/A	SAFE-T-CABLE KIT .0	50	NE
ACCY	J219P06B	N/A	GASKET	1	NE
EXTERNAL PIPING					
EMU	PART NUMBER	SERIAL NUMBER	NOMENCLATURE	QTY	SCOPE OF WORK
EXP	1554M38P01	N/A	GASKET	1	NE



## SECTION 6.0 STATEMENT OF WORK

### EXTERNAL PIPING

EMU	PART NUMBER	SERIAL NUMBER	NOMENCLATURE	QTY	SCOPE OF WORK
EXP	9608M08G44	N/A	GASKET	1	NE
EXP	9608M08G47	N/A	GASKET	3	NE
EXP	9627M01P01	N/A	GASKET	1	NE
EXP	9629M79P16	N/A	GASKET	1	NE
EXP	9629M83G01	N/A	GASKET	3	NE
EXP	J219P06B	N/A	GASKET	1	NE
EXP	J219P09WE	N/A	GASKET	1	NE
EXP	J221P008WE	N/A	PACKING	1	NE
EXP	J221P228	N/A	PACKING	2	NE

### HPT Stage #2 Nozzle

EMU	PART NUMBER	SERIAL NUMBER	NOMENCLATURE	QTY	SCOPE OF WORK
S2NA	1347M95G05	N/A	HPTS2NA	1	RP
S2NA	1347M95G05	N/A	SHROUDS	24	NE
S2NA	9138M30P01	N/A	BOLT	1	NE
S2NA	E5505-25-5-RH	N/A	NUT, PUSH-ON	54	NE
S2NA	L31413P01	N/A	TUBE	21	NE



SECTION 6.0 STATEMENT OF WORK					
HPT Stage #2 Nozzle					
EMU	PART NUMBER	SERIAL NUMBER	NOMENCLATURE	QTY	SCOPE OF WORK
S2NA	PH49987-4	N/A	NUT SELF LOCKING	28	NE
S2NA	PH49987-4	N/A	NUT SELF LOCKING	39	NE
COMPRESSOR FRONT FRAME					
EMU	PART NUMBER	SERIAL NUMBER	NOMENCLATURE	QTY	SCOPE OF WORK
CFF	9643M56P02	N/A	GASKET	1	NE
CFF	J221P015	N/A	PACKING	1	NE
CFF	J221P019	N/A	PACKING	30	NE
CFF	J221P975	N/A	PACKING	1	NE
HPC STATOR ASSMEBLY					
EMU	PART NUMBER	SERIAL NUMBER	NOMENCLATURE	QTY	SCOPE OF WORK
HPCS	9658M93P02	N/A	SEAL	1	NE
ELECTRICAL SYSTEM					
EMU	PART NUMBER	SERIAL NUMBER	NOMENCLATURE	QTY	SCOPE OF WORK
ELS	J1220G20	N/A	CLAMP	1	NE

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SECTION 7.0 SHORTAGE LOG				
Part Number	Serial Number	Nomenclature	QTY	Comments
L24304G01	N/A	MANIFOLD (9TH STG LPT COOLING AIR)	1	Pulled from L9001
9636M51P03	N/A	CRF COVERS	4	

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SECTION 8.0 HPTS1N BLADE RECORD							
WORK ORDER		L9002		ASSY P/N:		L31397G	
						<input checked="" type="checkbox"/>	REMOVED
CUSTOMER		Pro-Energy		ASSY S/N:		<input type="checkbox"/> INSTALLED	
BLADE P/N		L31424G24		BLADE S/N PREFIX:		2AF	
Went to OSV then returned to Customer as removed							
POS	SERIAL NUMBER	POS	SERIAL NUMBER	POS	SERIAL NUMBER	POS	SERIAL NUMBER
1	2AFF9027	2	2AFJ3219	3	2AFF0090	4	2AFH1080
5	2AFH3025	6	2AFH0305	7	2AFH0305	8	2AFD7648
9	2AFF6194	10	2AFF2874	11	2AFF4021	12	2AFF3971
13	2AFF3456	14	2AFF2849	15	2AFL7677	16	2AFE9024
17	2AFF8768	18	2AFE9492	19	2AFMO169	20	2AFE9756
21	2AFF8740	22	2AFF2168	23	2AFL5587	24	2AFE9549
25	2AFH6571	26	2AFL7842	27	2AFJ9157	28	2AFC9208
29	2AFL8588	30	2AFH1526	31	2AFH2956	32	2AFH0868
33	2AFF6205	34	2AFF9321	35	2AFE8116	36	2AFC8199
37	2AFF9015	38	2AFF3170	39	2AFF9425	40	2AFF3446
41	2AFL7948	42	2AFH3568	43	2AFF8763	44	2AFF1858
45	2AFE9528	46	2AFL8604	47	2AFJ9122	48	2AFF3975
49	2AEU1157	50	2AFE9758	51	2AFE9524	52	2AFF9312
53	2AFF1893	54	2AFF1879	55	2AFF9266	56	2AFF9318
57	2AFF9075	58	2AFF9174	59	2AFE9487	60	2AE5079
61	2AFF3602	62	2AFF9785	63	2AFF1602	64	2AFF9118
65	2AFM0276	66	2AFH2946	67	2AFE9347	68	2AFE8570
69	2AFL5615	70	2AFF9081	71	2AFL5680	72	2AFH3284
73	2AFD1006	74	2AFF1857	75	2AFE9770	76	2AFE1945
77	2AFC8160	78	2AFC8160	79	2AFF9454	80	2AFH0217
81	2AFH3574	82	2AFL7683	83	2AFF3994	84	2AFM0210
85	2AFC8446	86	2AFF2868	87	2AFH0228	88	2AFE9861

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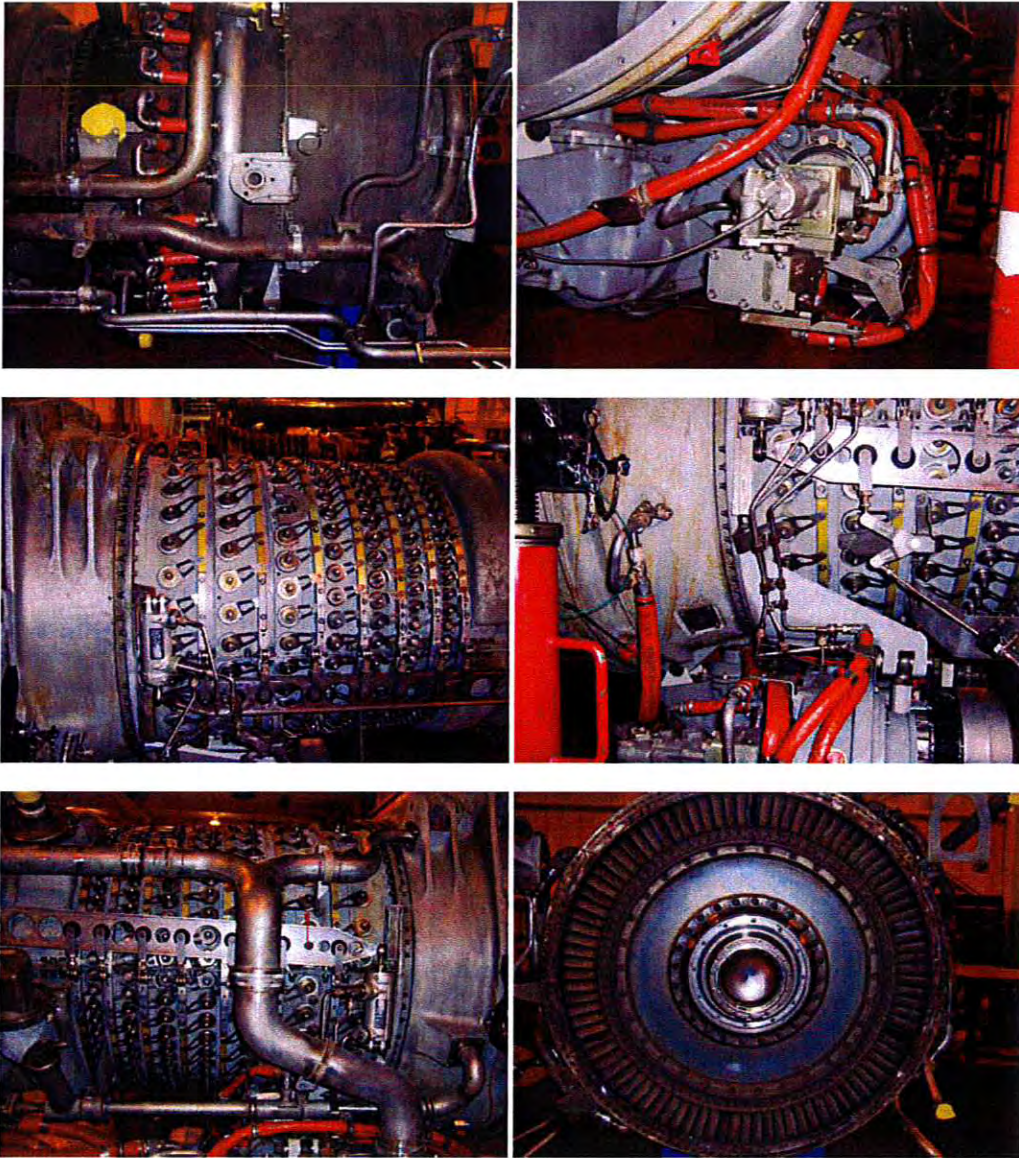


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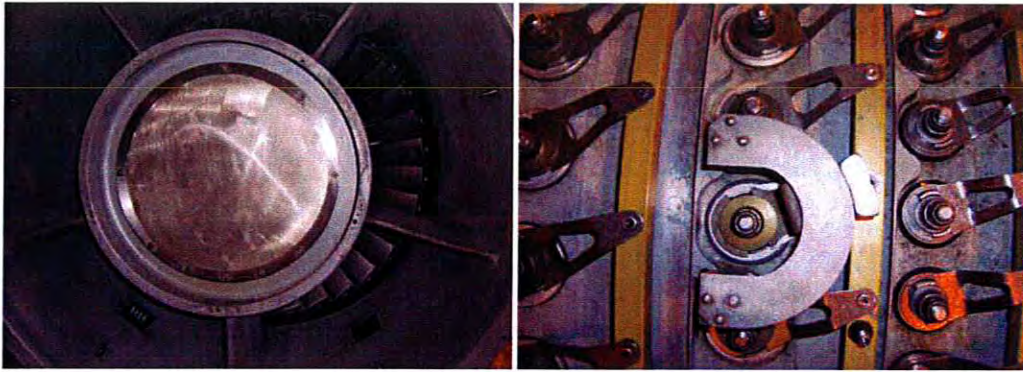
SECTION 9.0 HPTS1N BLADE RECORD							
WORK ORDER		L9002		ASSY P/N:		L31397G	
						REMOVED	
CUSTOMER		Pro-Energy		ASSY S/N:		INSTALLED	
BLADE P/N		L31424G34		BLADE S/N PREFIX			
POS	SERIAL NUMBER	POS	SERIAL NUMBER	POS	SERIAL NUMBER	POS	SERIAL NUMBER
1	BWMB5871	2	BWMP4633	3	BWMB5587	4	BWMB6972
5	BWMB4493	6	BWMB5581	7	BWMW5631	8	BWMKR465
9	BWHMN404	10	BWMB5308	11	BWMB5599	12	BWMB5589
13	BWMB4473	14	BWMB5296	15	BWMB5566	16	BWMB5545
17	BWMB5813	18	BWMB5294	19	BWMB5282	20	BWMB4411
21	BWMB5579	22	BWMB5464	23	BWMB7446	24	BWMB7024
25	BWMB5471	26	BWMB5290	27	BWMB5551	28	BWMB4530
29	BWMB5841	30	BWMJH590	31	BWMB7002	32	BWMB4439
33	BWMB4444	34	BWMB5849	35	BWMB5865	36	BWMWS669
37	BWMHR427	38	BWMJF533	39	BWMHJ788	40	BWMP2113
41	BWMHR381	42	BWMHP903	43	BWMB6984	44	BWMB5578
45	BWMB4518	46	BWMB5610	47	BWMB6991	48	BWMB6942
49	BWHNP089	50	BWHNP781	51	BWM80977	52	BWM74218
53	BWM54192	54	BWME7630	55	BWM61903	56	BWM54708
57	BWMC9947	58	BWM56541	59	2AHF4068	60	BWM54946
61	BWM52513	62	BWM53507	63	BWM73112	64	BWM70271
65	BWM82538	66	BWM52545	67	BWM52621	68	BWM52503
69	BWHNN516	70	BWHNN819	71	BWM55695	72	BWM29420
73	BWM53966	74	BWM53419	75	BWM73118	76	2AEF1730
77	BWM80809	78	WFTDU820	79	WFTDW696	80	WFTDY831
81	WFTDY834	82	WFTDU282	83	BWH048WC	84	WFTDW657
85	WFTDE307	86	WFTDU305	87	WFTDW719	88	WFTDW668



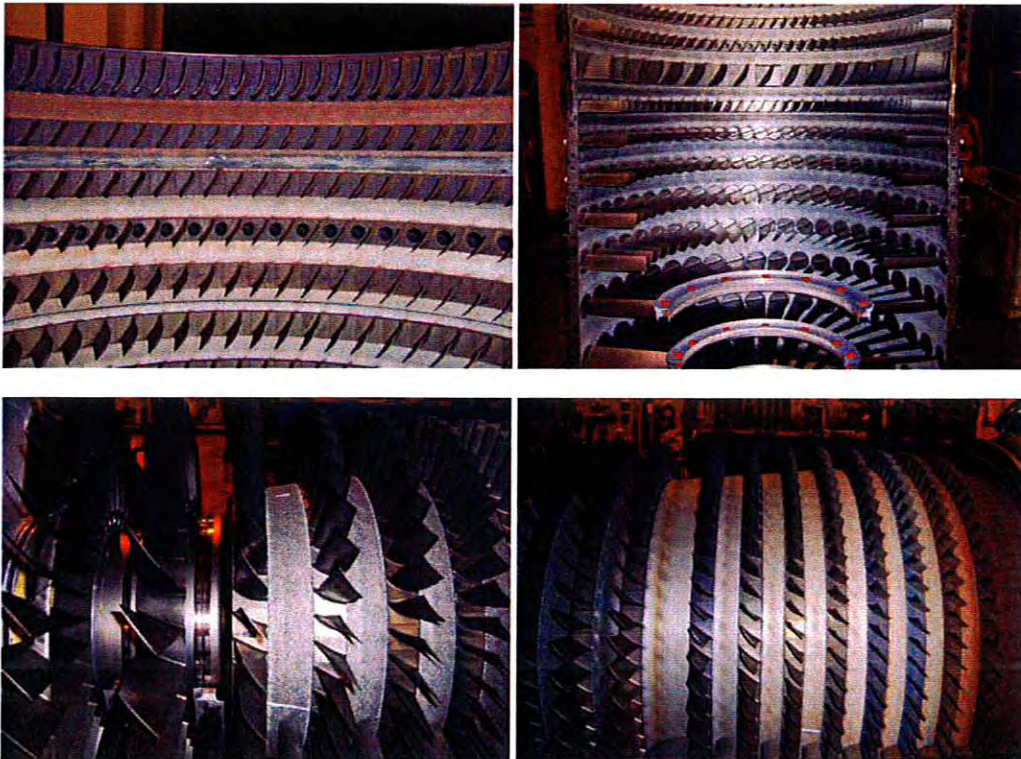
## SECTION 10.0 INCOMING PHOTOS



## SECTION 10.0 INCOMING PHOTOS

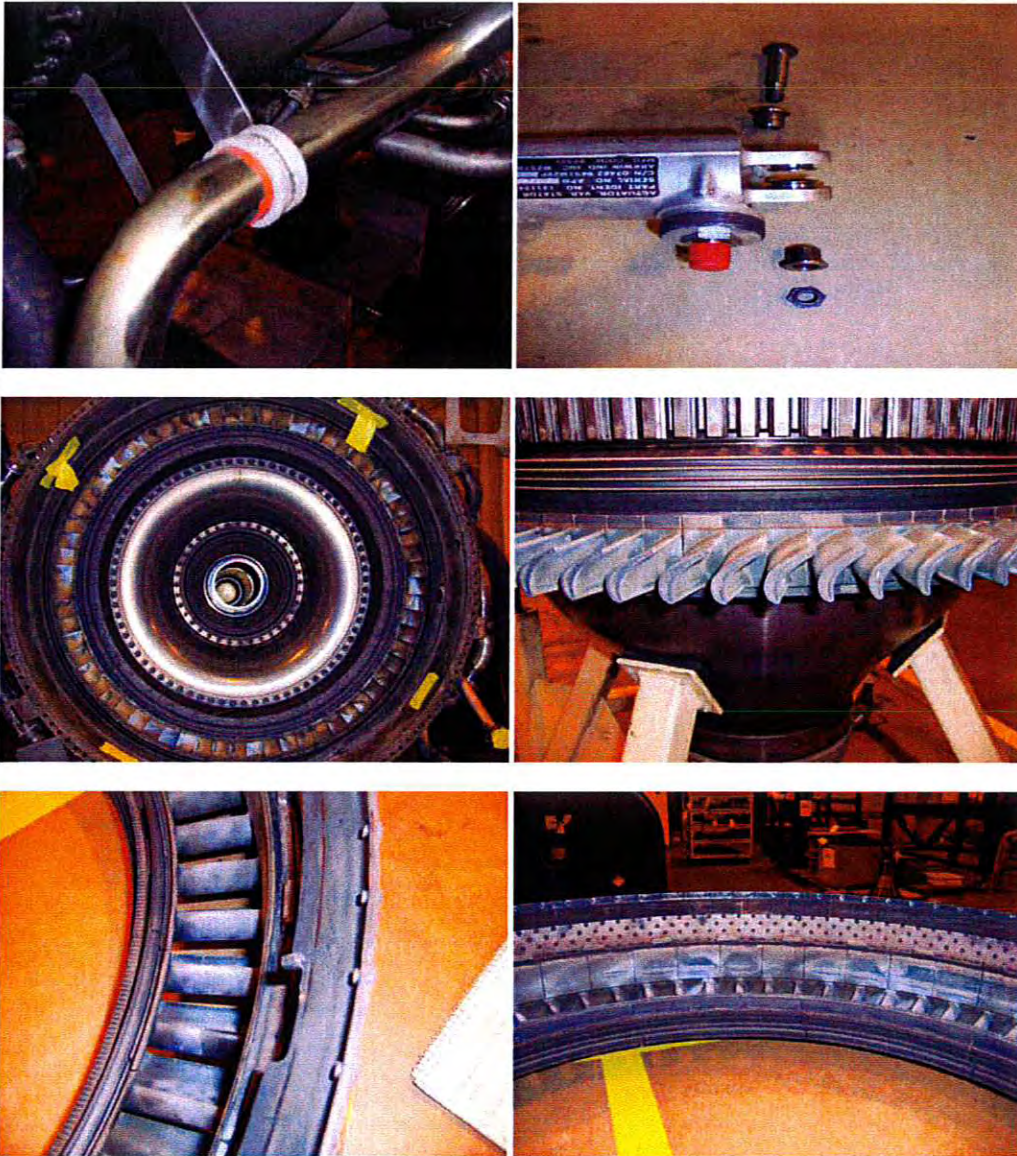


## SECTION 11.0 DISASSEMBLY PHOTOS



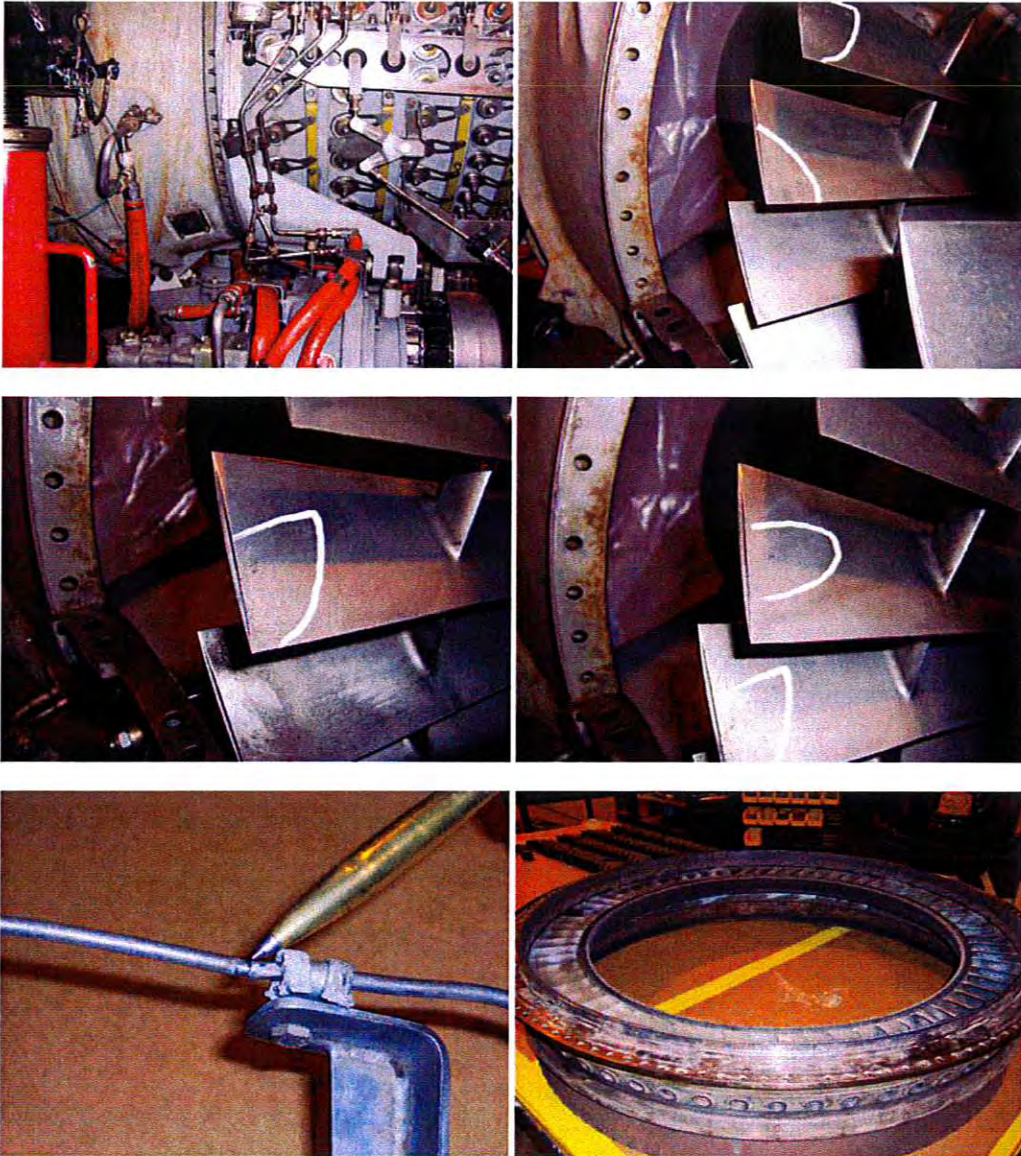


## SECTION 11.0 DISASSEMBLY PHOTOS





**SECTION 11.0 DISASSEMBLY PHOTOS**



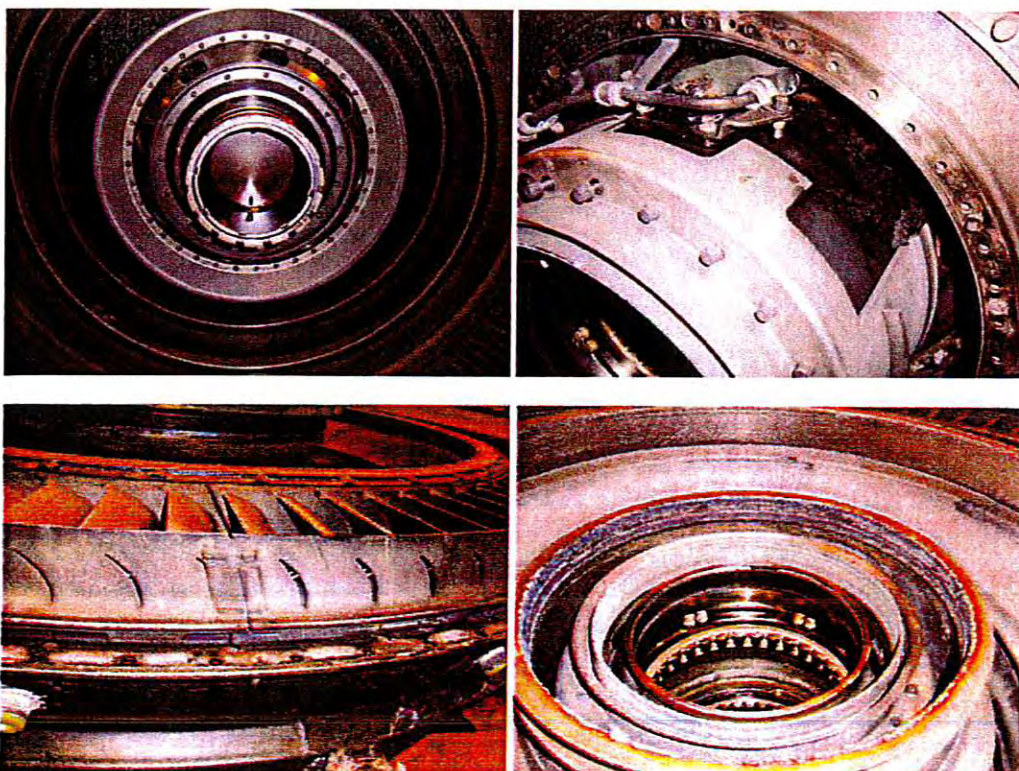


## SECTION 11.0 DISASSEMBLY PHOTOS



Stage 1 Blades

## SECTION 12.0 TMF PHOTOS



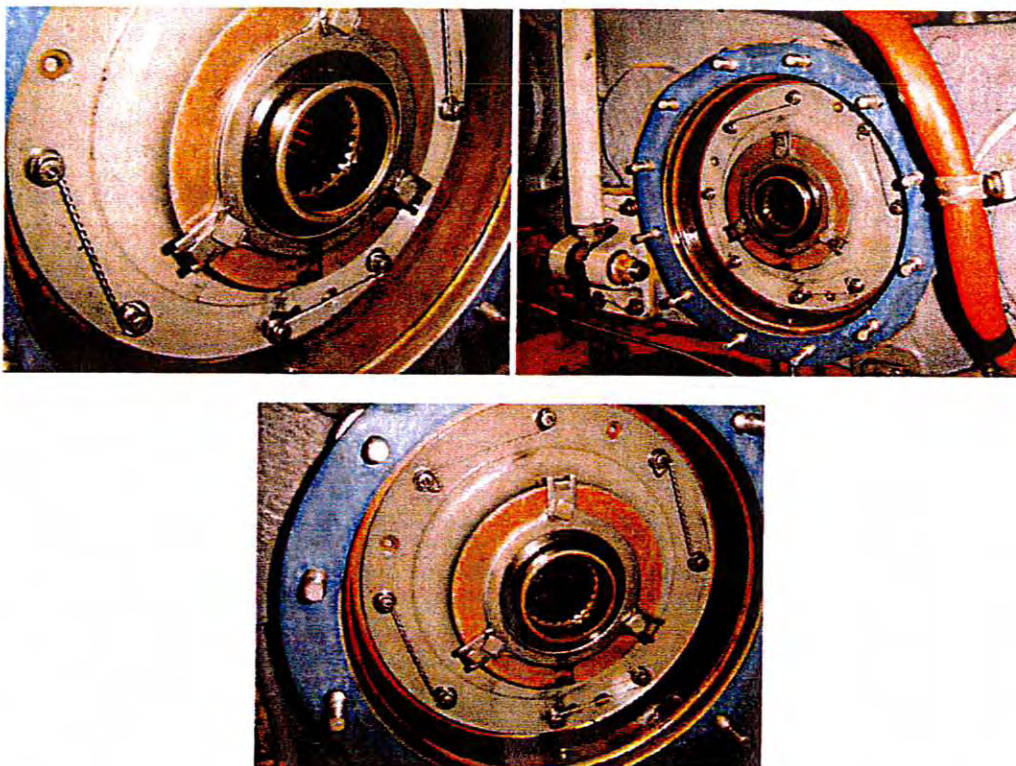
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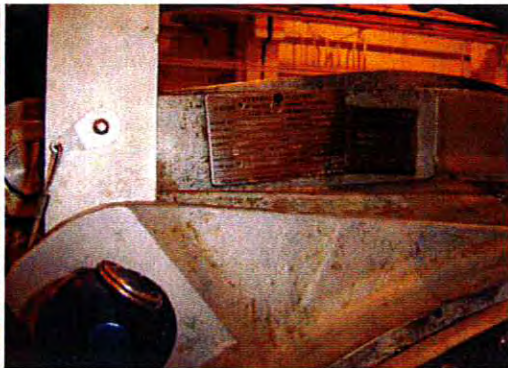
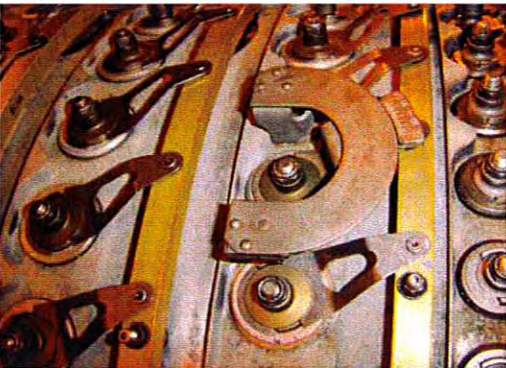
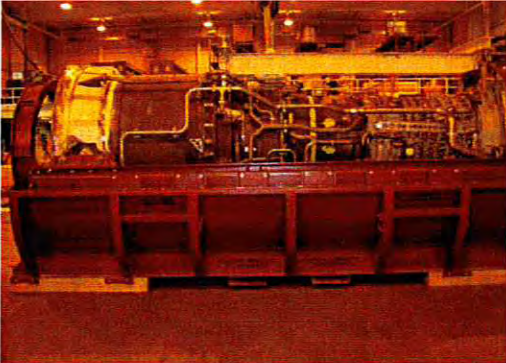
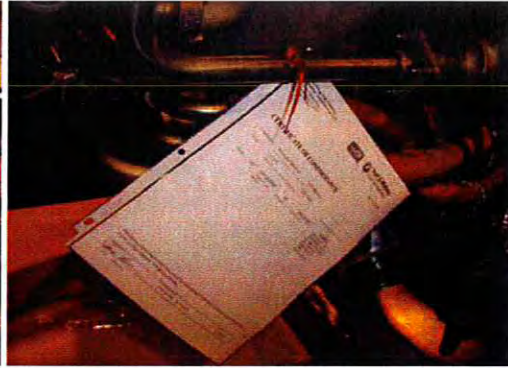
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## SECTION 13.0 CARBON SEAL PHOTOS



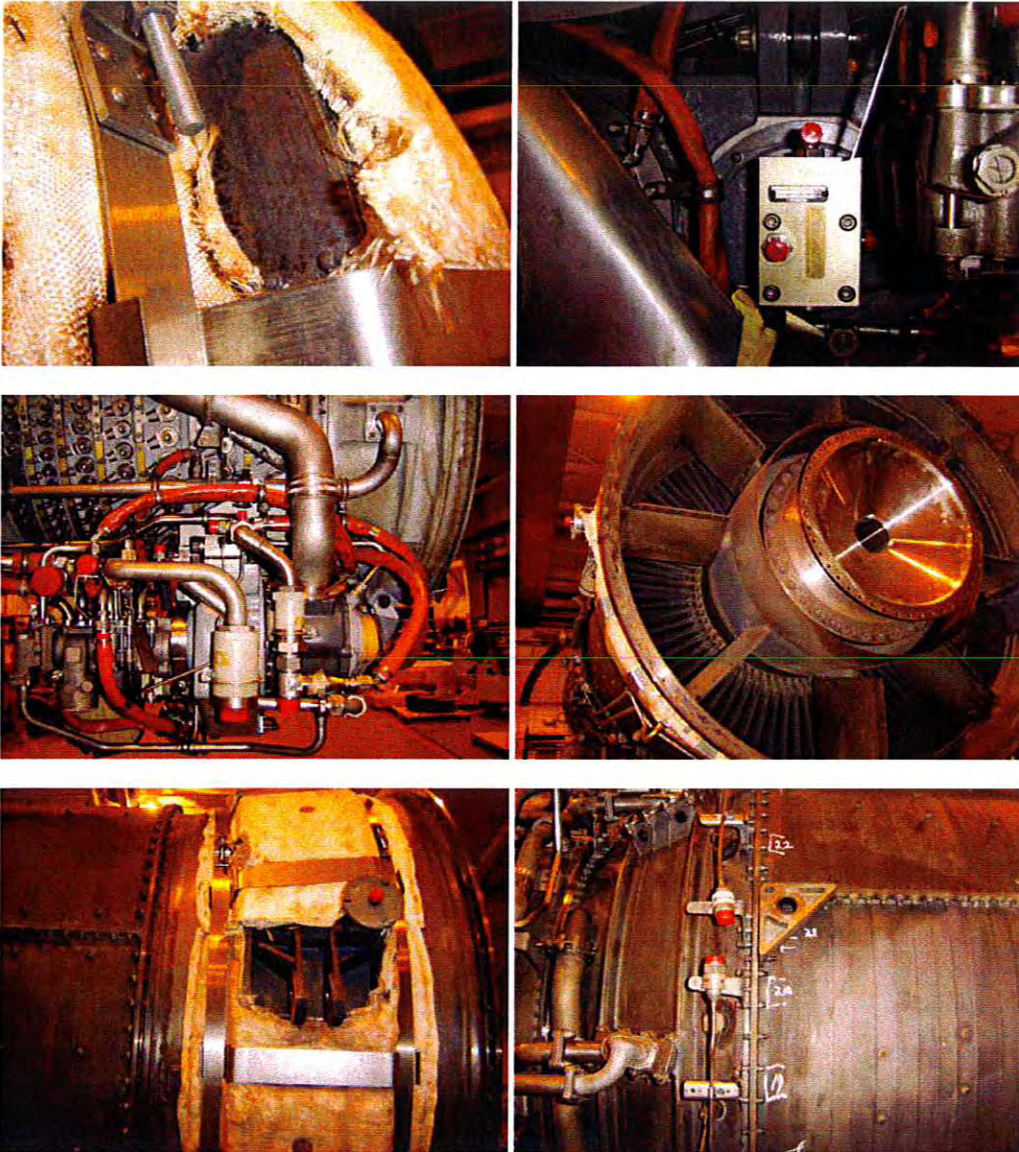


**SECTION 14.0 OUTGOING PHOTOS**

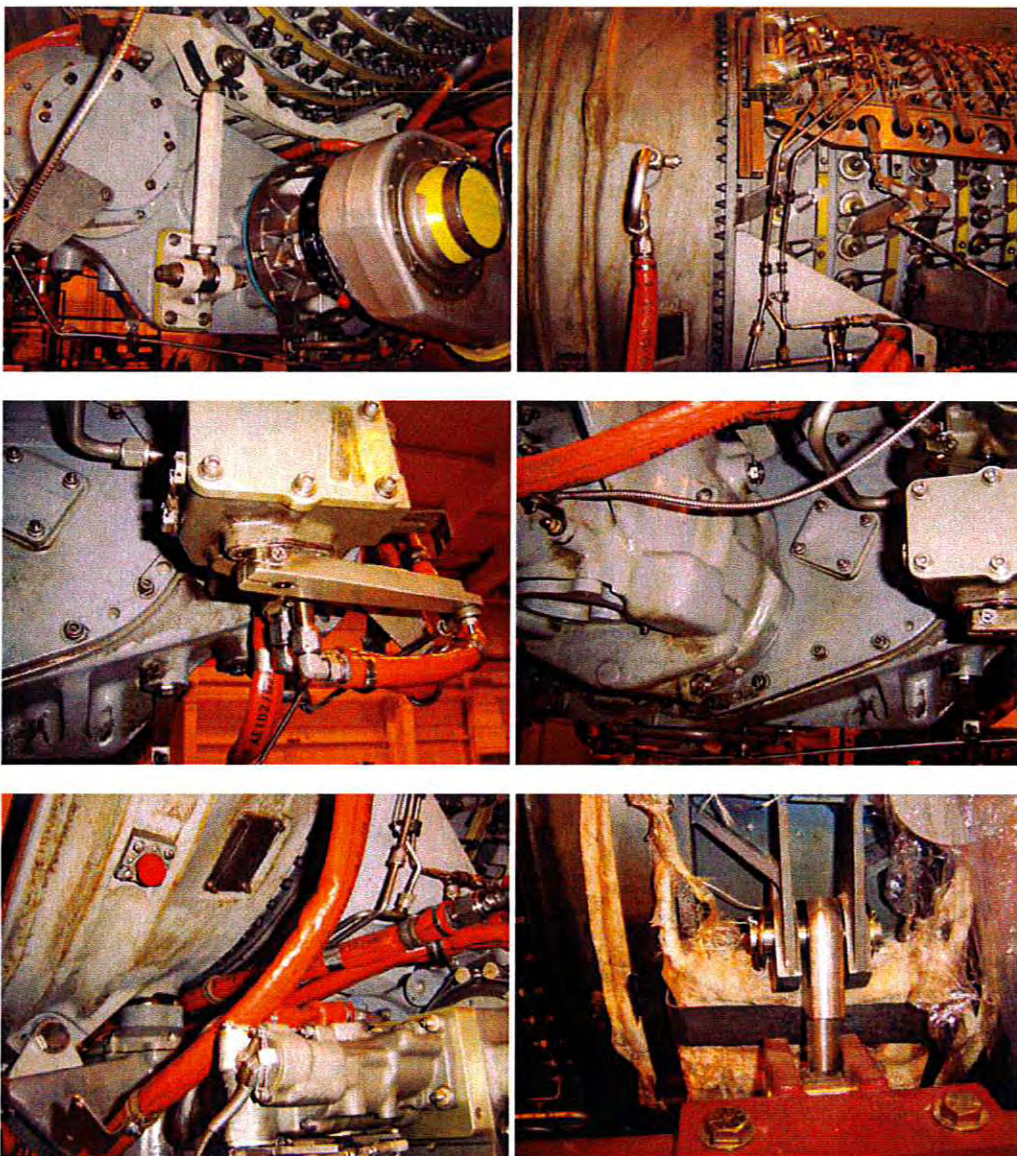




## SECTION 14.0 OUTGOING PHOTOS



**SECTION 14.0 OUTGOING PHOTOS**



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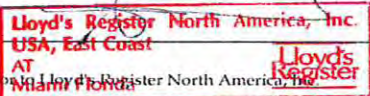
Page 1 of 1



**Inspection Release Note**

IRN number	Date	Office	Control number
NA	04 August 2009	Miami	MM10903039
Client	Project		
Wood Group Pratt & Whitney LLC	LM2500 SAC - ESN 481-642		
Client reference	Co-ordinated contract reference		
GE Oracle Project 7226852	ProEnergy Purchase Order - 106641		
Supplier	Main order number		
ProEnergy	NA		
Sub-supplier	Sub-order number		
NA	NA		
Period covered by this inspection release note	Order status		
4 August 2009	Complete		

The following was finally accepted:

Item number	Description	Quantity passed	Is item complete?
ESN: 481-642	LM2500 SAC Gas Turbine. Model 7LM2500 PE-MG G10	1	Yes
Distribution: original	1 <sup>st</sup> copy	2 <sup>nd</sup> copy	3 <sup>rd</sup> copy
WGPWLLC	Engine Documents	ASINCRO INC	
NAN number	Issuing office and control number	Signature	
NA	MM10903039		
Dated	Is now		
06 August 2009	NA		
		Surveyed by Lloyd's Register North America, Inc.	
A member of the Lloyd's Register Group			

The issue of this document does not relieve the supplier/manufacturer from its responsibility to its client to supply the item(s) concerned in full compliance with the requirements of its order/specification.

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 	LM2500 TEST REPORT
------	--------------------

CUSTOMER / GAS GENERATOR DATA			
Customer Name:	ProEnergy	Fuel Used:	NATO F76
ESN:	481-642	M/H's Expended:	
Model:	7LM2500PE-MG G10	Reason for Removal:	UNK
TSN:	UNK	Shop Work Scope:	Limited repair
WGPW W/O #:	L9002	Cell Work Scope:	Functional test
A4 Open Area:	53.6	HPTNAS1 S/N:	UNK
Date In:	8/4/2009	Date Out:	8/6/2009

TEST CELL DATA			
Operator:	KS	Fuel Type:	NATO Code F-76
Stand Serial #:	001	Fuel LHV Btu/Lb:	18641
Exh. Noz. S/N:	JTS-001	Fuel SG @ 60F:	0.855
Lube Oil Type:	Mobil Jet II	Fuel Sample Date:	5/14/2009

TEST RESULTS			
PARAMETER	RECORDED	TARGET	E/U
T54 @ Base Load	1460.2	1461	Deg F
T54 Margin vs. Deck (DEL T54)	64.177	-35 to +10	Deg F
T54 Spread @ Base Load	246	<200	Deg F
HPC Efficiency (ETAC)	83.39	100	%
Spec. Fuel Consumption (SFCK)	7615	<6908	Btu/Hp-Hr
Isent. Gas Horsepower (IGHPK)	33339	32745	Hp
Shaft Horsepower (calculated)	30035	29500	Hp
Vib Peak @ CFF - Base	0.16	<4	Mils DA
Vib Peak @ CRF - Base	0.16	<4	Mils DA
Vib Peak @ TMF - Base	0.29	<4	Mils DA
Vib Peak @ CFF - Trans	N/A	N/A	Mils DA
Vib Peak @ CRF - Trans	N/A	N/A	Mils DA
Vib Peak @ TMF - Trans	N/A	N/A	Mils DA
Oil Consumption - Tank	Trace	<1 pph	Lbs/Hr
Oil Consumption - O/B Drains	Trace	<33cc/Hr	cc/Hr

POST TEST INSPECTIONS		
PROCEDURE	PASS	FAIL
Bore Scope Inspection	X	
L/S Pump Finger Screen Inspection	X	
External Visual Inspection	X	

**TEST STATUS:** PASS