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Selected Patents Related to Thermal Spraying

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Prepared by Jiří Matějíček, Institute of Plasma Physics, Za Slovankou 3, 18221 Praha 8, Czech Republic; tel: +420-266 053 907; e-mail: jmatejic@ipp.cas.cz. Adapted with permission from Delphion, http://www.delphion.com/.

US denotes U.S. patent, WO denotes World Intellectual Property Organization patent, EP denotes European patent, and CN denotes Chinese patent. Due to differences in databases, not all data are available for each patent.

The information has the following format: subject, full title, abstract, patent number, inventors, company, issued/filed dates.

Applications

Aluminide Sheets for Heating Elements

Method of Manufacturing Aluminide Sheet by Thermomechanical Processing of Aluminide Powders. A powder metallurgical process of preparing a sheet from a powder having an intermetallic alloy composition such as an iron, nickel, or titanium aluminide. The sheet can be manufactured into electrical resistance heating elements having improved room-temperature ductility, electrical resistivity, cyclic fatigue resistance, high-temperature oxidation resistance, low- and high-temperature strength, and/or resistance to high-temperature sagging. The iron aluminide has an entirely ferritic microstructure that is free of austenite and can include, in wt.%, 4-32% Al, and optional additions such as 1% Cr, 0.05% Zr, 2% Ti, 2% Mo, 1% Ni, 0.75% C, 0.1% B, 1% submicron oxide particles and/or electrically insulating or electrically conductive covalent ceramic particles, 1% rare earth metal, and/or 3% Cu. The process includes forming a nondensified metal sheet by consolidating a powder having an intermetallic alloy composition such as by roll compaction, tape casting, or plasma spraying, forming a cold rolled sheet by cold rolling the nondensified metal sheet so as to increase the density and reduce the thickness thereof and annealing the cold rolled sheet. The powder can be a water-, polymer-, or gas-atomized powder that is subjected to sieving and/or blending with a binder prior to the consolidation step. After the consolidation step, the sheet can be partially sintered. The cold rolling and/or annealing steps can be repeated to achieve the desired sheet thickness and properties. The annealing can be carried out in a vacuum furnace with a vacuum or inert atmosphere. During final annealing, the cold-rolled sheet recrystallizes to an average grain size of about 10-30 μm. Final stress relief annealing can be carried out in the *B*2 phase temperature range.

US6660109. M.R. Hajaligol, C. Scorey, V.K. Sikka, S.C. Deevi, G. Fleishhauer, A.C. Lilly Jr., and R.M. German. Company: Chrysalis Technologies Inc., Richmond, VA. Issued/Filed: 9 Dec 2003/31 Oct 2001.

Bond Coat for Rollers

Elastomer-Covered Roller Having a Thermally Sprayed Permeable Bonding Material. An elastomer-covered roller is provided with an improved bond coating for bonding the elastomeric cover to the core. At least one layer of material is thermally sprayed on the core to form a rough surface having a roughness from 400 to 2000 μin. R_a or greater. At least one layer is either sufficiently permeable to divert bond-degrading fluids away from the bond line or is impermeable to bond-degrading fluids.

US6666806. P.J. Kaprelian, G.S. Butters, and B.E. Hyllberg. Company: American Roller Co., Union Grove, WI. Issued/Filed: 23 Dec 2003/15 Jan 2003.

Catalytic Combustion Coatings

Catalytic Combustion Surfaces and Method for Creating Catalytic Combustion Surfaces. A coating and coating process to improve the efficiency of hydrocarbon-fueled engines, wherein the coating includes a high percentage of nickel to create a reaction that improves the combustion efficiency of the hydrocarbon fuel. The coating may also include chromium, iron, and other constituents and is applied to combustion surfaces with a sufficient bonding strength to allow the coating to function in the combustion chamber, while providing a surface having sufficient surface roughness to promote the chemical reaction underlying the combustion efficiency improvement. The nickel causes a catalytic cracking reaction to ease the combustibility of hydrocarbon molecules in the fuel.

US6655369. L.M. Gillston, R.P. Pacitti, and R.D. Pacitti. Company: Diesel Engine Transformations LLC, Philadelphia, PA. Issued/Filed: 2 Dec 2003/1 Aug 2001.

Coating for Printing Drums

Split Block Drum. A split block drum, wherein the outer diameter dimensions of a base part and a shaft end part are machined smaller by the amount of thickness of a thermally sprayed layer, molybdenum steel (JIS: YGTM) is thermally sprayed on the outer peripheral surfaces of these base metals to form thermally sprayed layers and sliding surfaces are formed on these thermally sprayed layers, whereby the split block drum capable of smoothly moving a cylindrical part in axial and circumferential directions even if the shaft part is closely fitted to the cylindrical part to assure a more excellent printing quality.

WO03106174. H. Suzuki. Company: Goss Graphic Systems Japan Corp., Tokyo, Japan. Issued/Filed: 24 Dec 2003/17 June 2003.

Refrigerating and Heating System

Thermal Spray Type Refrigerating and Heating System With Separated Heat Tubes. CN 1124456: Z. Ling, China. Issued/Filed: 15 Oct 2003/15 July 1999.

Repair Preforms

Method of Forming Metal Preforms by Metal Spraying. Preforms for use in base metal repair are formed by thermally spraying preferably a blend of a braze alloy and a high-temperature alloy onto a separation sheet, thereby forming a preform sheet. The separation sheet is removed from the preform sheet and the preform sheet is cut to form individual preforms that can be brazed directly onto a worn area of a high-temperature alloy part such as a jet engine part.

WO03097293. K. Rafferty. Company: C.A. Patents, LLC, Florence, KY. Issued/Filed: 27 Nov 2003/14 May 2002.

Thermally Sprayed Catalyst

Process for Manufacturing a Catalyst. A process is disclosed for manufacturing a catalytic converter with a catalytic mass thermally sprayed on a supporting body, as well as a thus produced catalytic converter. A material that contains a reactive precursor of at least one component of the

catalytic mass is thermally sprayed on the supporting body and the reactive precursor is reacted to form the component. A catalytic converter with a high BET-surface can thus be produced. At the same time, this avoids inactivating a heat-sensitive component during spraying.

EP0906155. E. Hums and A. Khinsky. Company: Siemens AG, Cluster Corporation Ltd. Issued/Filed: 22 Oct 2003/9 June 1997.

Turbine Seals

Gas Turbine Seal. The invention relates to a gas turbine seal, comprising a metallic component with a durable or erosion-resistant ceramic coating and an abradable ceramic layer that is arranged thereon in locally delimited fashion, a bond layer being arranged on the surface of the metallic component, to which bond layer the durable or erosion-resistant ceramic coating is applied as a covering layer. The invention is characterized in that the bond layer comprises separate, adjacent spherical rivets or mushroom-shaped rivets that have a web and a head. These rivets form individual metal islands with numerous undercuts, around which there is a continuous ceramic network. It is possible to produce very thick layers that have a good bond strength, the ceramic not being flaked away even in the event of introduction of radial/tangential forces, sickle-shaped contact or locally high overheating/frictional heat, and a good sealing action being achieved.

US6652227. R. Fried. Company: Alstom (Switzerland) Ltd., Baden, Switzerland. Issued/Filed: 25 Nov 2003/25 April 2002.

Wear-Resistant Clutch Components

Clutch Pressure Plate and Flywheel With Friction Wear Surfaces. An Al pressure plate and flywheel, for a clutch in a vehicle drivetrain, have wear-resistant surfaces applied at the clutch disk interface. The wear-resistant surfaces are applied to the pressure plate and flywheel using a plasma transferred wire arc thermal spray process.

US6651795. L.E. Ellis, J.S. Vanselous, J.E. Chancey, L.G. Gargol, and S.C. Reddy. Company: Ford Global Technologies LLC, Dearborn, MI. Issued/Filed: 25 Nov 2003/11 March 2002.

Wear-Resistant Coatings

Process and Configuration for Producing Wear-Resistant Surfaces. A wear-resistant surface is formed on a component formed of an AlSi alloy by using a thermal spraying or a laser beam treatment. A thermally conductive device is brought into a thermally conductive contact with the component so that the thermally conductive device touches the component during the step of forming the wear-resistant surface. The thermally conductive device is actively cooled.

US6634179. R. Heinemann, K. Farber, and T. Heider. Company: Volkswagen AG, Wolfsburg, Germany. Issued/Filed: 21 Oct 2003/20 Aug 2001.

Wear-Resistant Coating for Extruding Dies

Aluminum or Aluminum Alloy Extruding Die. There is disclosed an aluminum or aluminum alloy extruding die, which comprises Co-group alloy, Ni-group alloy, Cr-group alloy, or similar high-temperature wear-resistant alloy coating applied by thermal spraying on a required die surface portion having been formed in the shape of a rough surface having surface roughness R_z of 5 μm or more. Preferably, after application of the alloy coating, the die is held at a temperature in the range from 500 to 800 °C for a predetermined period of time or the alloy coating surface is so roughened as to have surface roughness R_z of 10 μm or less.

US6668611. K. Kashiwazaki, H. Yamaguchi, R. Shoji, and T. Kakinoki. Company: Ltd. The Furukawa Electric Co., Tokyo, Japan. Issued/Filed: 30 Dec 2003/4 April 2002.

Feedstock

Chromia Powders for Wear-Resistant Coatings

Chromia Spray Powders and a Process for Making the Same. Particles particularly useful for thermal spraying a wear-resistant coating on to a substrate comprise an essentially single-phase crystalline structure comprising from 45 to 100 wt.% chromia and from 0 to 55 wt.% alpha alumina.

WO03086974. S.H. Yu and H. Wallar. Company: Saint-Gobain Ceramics & Plastics, Inc., Worcester, MA. Issued/Filed: 23 Oct 2003/4 April 2003.

Composite Powder with Self-Melting Alloy

Ceramic Particle-Containing Self-Melting Alloy Thermal Spraying Material. A ceramic particle-containing self-melting alloy thermal spraying material, characterized in that it comprises secondary particles prepared by admixing at least one ceramic powder selected from the group consisting of a carbide, an oxide, a nitride, and a boride with at least one alloy powder having self-melting property selected from the group consisting of a Ni-base self-melting alloy powder, a Co-base self-melting alloy powder, and an Fe-base self-melting alloy powder, and coagulating the resulting mixture into particles having an average secondary particle greater than the average primary particle diameters of the above powders, wherein the average secondary particle is 15 to 250 μm.

WO04001090. S. Nakahama, H. Nagasaka, and K. Sugiyama. Company: Ebara Corp., Tokyo, Japan. Issued/Filed: 31 Dec 2003/25 June 2003.

Copper-Based Powder for Abradable Coatings

Abradable Material. A Cu-base abradable material for use with knife edge seals is disclosed. The Cu-base abradable contains a significant amount of a lubricating material such as boron nitride. The material can be abraded by smooth knife edges, is oil compatible, and any abraded material will not cause bearing damage. The material is preferably applied by a thermal spray process. Preferably, the material comprises, by volume, 35 to 50% Cu alloy matrix, 25 to 55% lubricant (preferably BN), balance porosity and matrix material oxides.

EP1013782. W.J. Dalzell and C.G. Davis. Company: United Technologies Corp. Issued/Filed: 29 Oct 2003/22 Dec 1999.

Cored Wire

Abrasion-Resistant Material Composite Wire for Arc Thermal Spraying. An abrasion-resistant material composite wire for arc material spraying that has an outer skin made from at least one material selected from the group consisting of a Ni-base alloy, a Co-base alloy, and an Fe-base alloy and, covered thereby, a powder prepared from at least one material selected from the group consisting of a metal, a ceramic, and a combination thereof, characterized in that the composite wire further comprises a powder prepared from at least one material selected from the group consisting of boron or a boron compound, silicon or a silicon compound, and phosphorus or a phosphorus compound, so as to have self-melting property.

WO04001089. S. Nakahama, H. Nagasaka, and K. Sugiyama. Company: Ebara Corp., Tokyo, Japan. Issued/Filed: 31 Dec 2003/25 June 2003.

Powder for Abradable Coating

Thermal Spray Compositions for Abradable Seals. A thermal spray composition and method of deposition for abradable seals for use in gas turbine engines, turbochargers, and steam turbines. The thermal spray composition includes a solid lubricant and a ceramic preferably comprising 5 to 60 wt.% total of the composition in a ratio of 1:7 to 20:1 of solid lubricant to ceramic, the balance a matrix-forming metal alloy selected from Ni, Co, Cu, Fe, and Al and combinations and alloys thereof. The solid lubricant is at least one of hexagonal boron nitride, graphite, calcium fluoride, lithium fluoride, magnesium fluoride, barium fluoride, tungsten disulfide, and molybdenum disulfide particles. The ceramic includes at least one of albite, illite, quartz, and alumina-silica.

WO03104511. P. Fiala, A.P. Chilkowich, and K. Hajmrle. Company: The Westaim Corp., Fort Saskatchewan, Alberta, Canada. Issued/Filed: 18 Dec 2003/3 June 2003.

Zinc-Aluminum Wire for Corrosion-Resistant Coatings

Wire Based on Zinc and Aluminum and Its Use in Thermal Spraying for Corrosion Protection. The Zn-Al alloy wire contains a small amount of In. The Zn alloy wire has composition (wt.%) 8 to 33% Al, up to 500 ppm In, bal Zn, and impurities. Preferred features include: the zinc alloy contains 10-24% Al, 10-300 ppm In, less than 0.1% Cu, less than 0.1% Fe, and less than 1% Pb.

EP0943695. J. Spriestersbach and P. Staubwasser. Company: Grillo-Werke AG. Issued/Filed: 29 Oct 2003/4 March 1999.

Spraying Methods, Posttreatment

Laser-Assisted Plasma Spraying

Coating Deposition Process by Plasma Spraying. Plasma spray coating process employing a continuous laser beam in a plasma spray coating process, a continuous laser beam directed through the spray jet, with a predetermined interaction time, directly onto the surface of the substrate or an already applied layer to cause fusion.

EP0903423. E.P.I. Beyer and S.I. Nowotny. Company: Fraunhofer Gesellschaft zur Foerderung der Angewandten Forschung E.V. Issued/Filed: 5 Nov 2003/10 Sept 1998.

Masking

Method and Assembly for Masking. A mask assembly for protecting a portion of a workpiece from overspray while coating a preselected surface of the workpiece with thermal spray. The mask assembly includes a sheet sized and shaped for covering the portion of the workpiece that the assembly is intended to protect and a support plate selectively mountable over the sheet while the surface is coated with thermal spray. The mask assembly also includes a clamp mountable on the support plate for selectively attaching the support plate to the workpiece, thereby clamping the support plate and sheet in position over the portion of the workpiece.

US6645299. P.M. Brown. Company: General Electric Co., Schenectady, NY. Issued/Filed: 11 Nov 2003/18 Sept 2001.

Posttreatment—Fusing

Method for Applying Self-Fluxing Coatings to Noncylindrical Ferritic Objects. This disclosure describes a technique for fusing self-fluxing metallic coatings on noncylindrical objects without the need to conduct the fuse operation in a vacuum furnace or some other type of protective environment. The technique consists of first applying the self-fluxing coating to the surface, then optionally applying a ceramic coating on top of the self-fluxing coating. The object is then submerged into a vessel containing a low-melting inert material. The aggregate is then heated, and as the glass becomes molten, it encases the object and protects it from oxidation. As heating continues, the fusing temperature is reached and the self-fluxing alloy becomes molten. The ceramic coating encases the self-fluxing alloy and acts as a mold. When fusing is complete, the aggregate is then slowly cooled to ambient temperature. The glass frit and the ceramic shell are then removed, and one is left with an object coated with a uniform thickness of a dense adherent fused coating on the surface of the object.

US6648207. E.R. Buchanan. Company: Cincinnati Thermal Spray Inc., Cincinnati, OH. Issued/Filed: 18 Nov 2003/22 Jan 2002.

Spraying Nanoparticles

Thermal Spray Coating Process With Nanosized Materials. A method for coating materials on substrates is disclosed that includes providing a dispersion of the coating material in a liquid carrier wherein the material includes individual, non-agglomerated particles having diameters of less than 500 nm, injecting the dispersion into a thermal spray to form droplets of liquid carrier and particles, burning the droplets of liquid carrier and particles within the thermal spray so the particles begin to melt and wherein, as the droplets burn, at least some of the particles begin to form agglomerates of particles within the droplets and directing the droplets containing the agglomerates of particles toward the substrate to coat the substrate with the particles.

WO03100109. D.C. Coy, K.C. Kelley, W.I. Roberts, and W.C. Smith. Company: Caterpillar Inc., Peoria, IL. Issued/Filed: 4 Dec 2003/5 March 2003.

Temperature Control in Spray Forming

Automated Spray Form Cell. Spray form cell including a two-wavelength imaging pyrometer adapted to provide real-time measurement of the surface temperature distribution of a metal billet thereby formed. The steel billets may be advantageously used as tools in metal forming processes, injection molding, die casting tooling, and other processes that require hard tooling, such as in the automotive industry. The steel billet is formed based on a goal of uniform surface temperature distribution thereby minimizing thermal stresses induced within the steel article thereby produced.

US6640878. R.L. Allor, D.R. Collins, J.M. Nicholson, and G. Grinberg. Company: Ford Motor Co., Dearborn, MI. Issued/Filed: 4 Nov 2003/27 Nov 2001.

Method and Apparatus for Controlling a Spray Form Process Based on Sensed Surface Temperatures. Method and apparatus incorporating an infrared sensor, in the form of a two-wavelength imaging pyrometer into a metallic spray form process for providing real-time measurement of the surface temperature distribution of a steel billet thereby formed. The steel billets may be advantageously used as tools in metal forming processes, injection molding, die casting tooling, and other processes that require hard tooling, such as in the automotive industry. The steel billet is formed based on a goal of uni-

form surface temperature distribution, thereby minimizing thermal stresses induced within the steel article thereby produced.

US6648053. R.L. Allor, J.R. Baer, and K.P. Regan. Company: Ford Motor Co., Dearborn, MI. Issued/Filed: 18 Nov 2003/27 Nov 2001.

Method of Reducing Distortion in a Spray Formed Rapid Tool. A method of reducing distortion in a spray formed rapid tool includes the steps of making a model of a desired tool and constructing a ceramic pattern as the inverse of the model. The method also includes the steps of building a thermal model of the desired tool from a solid model of the ceramic pattern and applying thermal boundary conditions to the thermal model based on known conditions. The method also includes the steps of running the thermal model to produce a temperature distribution of the desired tool and determining any temperature deviations in the temperature distribution above a predetermined value. The method further includes thermally spraying a metal material against the ceramic pattern to form the desired tool if there are no temperature deviations in the temperature distribution above the predetermined value.

EP1038987. G. Grinberg, C. Chen, D.R. Collins, J.A. Kinane, and P.E. Pergande. Company: Ford Motor Co., Dearborn, MI. Issued/Filed: 10 Dec 2003/15 March 2000.

Wire Arc Spraying

Thermal Spraying Method and Device Used for Coating Surfaces. The invention relates to a method for thermally spraying, in particular, metals in order to coat surfaces, whereby the material used for coating is fed in the form of a wire, is melted, and is sprayed. The inventive method utilizes a plasma arc.

EP1135538. D. Kley. Company: Grillo-Werke AG. Issued/Filed: 8 Oct 2003/29 Oct 1999.

Spraying Systems

Microwave Plasma Torch

Microwave-Driven Plasma Spraying Apparatus and Method for Spraying. A microwave-driven plasma spraying apparatus can be utilized for uniform high-powered spraying. The plasma sprayer is constructed without a dielectric discharge tube, so very high microwave powers can be utilized. Moreover, the plasma sprayer is relatively free of contamination caused by deposits of heat-fusible material.

EP0829184. M. Read, J.F.I. Davis, and M.M. Micci. Company: Physical Sciences Inc. Issued/Filed: 15 Oct 2003/28 May 1996.

Plasma Torch for Microwave-Induced Plasmas. A plasma torch for microwave-induced plasma spectrochemical analysis of a sample includes a nozzle in an inlet for the main plasma gas flow between outer tube and intermediate tube of the torch. The nozzle increases the gas flow velocity in the sheathing gas layer for the plasma, which is provided by the gas flow from the annular gap between the tubes. The increased velocity of the gas in the sheathing gas layer "stiffens" that layer and thus better confines the microwave-induced plasma (such better confinement not being necessary for an ICP torch). Thus the torch is of improved durability for a microwave-induced plasma compared to an ICP torch. The sample injection (inner) tube may have a reduced diameter outlet at its end that is substantially level with the end of intermediate tube to improve injection of a sample into the microwave induced plasma. The inlet end of the sample injection tube may include a heater to assist in preventing blockages in tube near its outlet end.

WO03098980. M.R. Hammer. Company: Varian Australia PTY LTD, Victoria, Australia. Issued/Filed: 27 Nov 2003/21 May 2003.

Plasma Spray Torch Head

Torch Head for Plasma Spraying. A torch head includes a torch body that is inserted into the tube member, a cathode tube that is arranged in the torch body such that the longitudinal axis of the cathode tube is aligned to the longitudinal axis of the torch body and that has a cathode at the distal end of the cathode tube, an anode member that is arranged on the distal end side of the cathode tube, and a spraying material supply tube that opens toward a mouth opening formed in the anode member and that is arranged outside the torch body. In the anode member, a plasma gas supply chamber in which the front end of the cathode tube is stored in a noncontact state, an orifice that communicates with the plasma gas supply chamber and in which the cathode is stored in a noncontact state, and a plasma generation chamber that communicates with the orifice, which has a longitudinal axis substantially perpendicular to the longitudinal axis of the torch body, and which has the mouth opening are formed. The opening area of the orifice when the anode is inserted is made 1/3 to 1/10 the opening areas of the plasma (generation chamber and the mouth opening so that an arc from the distal end of the cathode is generated within a range of 0° to 40° with respect to the longitudinal axis of the plasma generation chamber perpendicular to the longitudinal axis of the cathode.

US6657152. T. Shimazu. Company: Shimazu Kogyo Yugengaisha, Gifu, Japan. Issued/Filed: 2 Dec 2003/17 July 2002.

Protective Cap for Plasma Torch

Plasma Torch Provided with a Ceramic Protective Cap. Protective cap for a plasma arc working torch, includes a cap body having an opening for the passage of plasma gas, the cap body being made of at least one material of ceramic type. The ceramic is a silicon nitride or an aluminum silicate. Preferably, the ceramic cap body is clad with boron nitride deposited on the external surface of the cap body, the thickness of the cladding of boron nitride being less than 3 mm. Torch provided with such a cap and its use in a steel plate plasma cutting operation.

US6639174. R. Augeraud and M. Delzenne. Company: La Soudure Autogene FrancaiseL'Air Liquide, Paris, France and Societe Anonyme and Directoire et Conseil de Surveillance pour l'Etude et l'Exploitation des Procedes Georges Claude, Paris, France. Issued/Filed: 28 Oct 2003/14 Dec 2001.

Spray Torch Nozzle

Nozzle for Thermal Spray of Low Oxide Content Coatings. The present invention provides a spray gun with associated nozzle attachments for high deposition efficiency for thermal spray of high-quality, dense, low-oxide content coatings. The spray guns are used to produce coatings using a thermal spray process, a high-velocity oxyfuel process, a high-velocity air-fuel process, cold spraying, and plasma spraying in which the process is characterized by having an overexpanded flow with a Mach number from about 1.0 to about 4.0, which have passageway section that diverges to the gun outlet. In one embodiment, the nozzle attachment is another diverging section with a greater angle of divergence than the diverging nozzle section. In another embodiment, the nozzle attachment includes the aforementioned diverging

nozzle attachment section followed by a converging nozzle section having an outlet section through which the thermal spray is emitted.

WO03080255. J. Mostaghimi, A. Dolatabadi, and V. Pershin, Canada. Issued/Filed: 2 Oct 2003/14 March 2003.

Wire Arc Spray Torch

Arc Thermal Spray Gun Apparatus. An arc spray gun has a pair of wire guides that guide two metal wires to an arc zone near the wire tips where an electric current through the wires effect an arc, thereby melting the wire tips. The wire guides are of a two-part design. One part is easily removable without the need for tools. Generally, each removable part of the wire guide is temporarily held within a stationary wire guide by an O-ring. A retainer then holds the removable wire guide firmly in place. A gas cap keeps the retainer firmly against the removable wire guides while the gun is in use.

US6663013. T.R. Vanden Heuvel, D.D. Lewisen, and J.J. Calaway. Company: Thermach Inc., Hortonville, WI. Issued/Filed: 16 Dec 2003/7 June 2001.

Thermal Barrier Coatings

Furnace Conveyer Belt Having Thermal Barrier. A brazing furnace includes a housing defining an interior environment having an inlet and an outlet, a plurality of heating elements mounted within the housing and adapted to heat the interior environment to an elevated temperature, and a conveyor belt extending through the housing and supported on a plurality of driven rollers whereby an object placed upon the conveyor belt at the inlet is transported through the inlet into the interior environment and out through the outlet. The conveyor belt includes a plurality of interconnected metal links and a thermal barrier coating applied to the metal links, thereby insulating the metal links and restricting the amount of thermal energy that is absorbed by the conveyor belt as the conveyor belt moves through the interior environment.

US6669471. T.V. Evans, J.S. Southwood, and I.I.T.M. Hudson. Company: Inc. Visteon Global Technologies, Dearborn, MI. Issued/Filed: 30 Dec 2003/13 May 2002.

Carbon Deposit Inhibitor for Thermal Barrier Coating

Carbon Deposit Inhibiting Thermal Barrier Coating for Combustors. A carbon deposit inhibiting thermal barrier coating for an internal element or component in a gas turbine engine. Such coating includes a layer of thermal barrier material coated onto the surface of an engine component that will be exposed to the flow of burning engine gases. Such coating further includes a layer of carbon deposit inhibiting material coated on top of the layer of thermal barrier material.

US6656600. T.E. Strangman, D. Narasimhan, J.P. Armstrong, and K.R. Karasek. Company: Honeywell International Inc., Morristown, NJ. Issued/Filed: 2 Dec 2003/16 Aug 2001.

Dual Bondcoat Thermal Barrier Coatings

Article Having a Superalloy Protective Coating, and Its Fabrication. An article protected by a protective coating includes a substrate made of a first nickel-base superalloy substrate material that is susceptible to the formation of a secondary reaction zone when overlaid by a diffusion aluminide coating or an aluminide overlay coating. A protective coating including a deposited coating at the substrate surface. The deposited coating is a second nickel-base superalloy different from the first nickel-base superalloy and that does not produce a secondary reaction zone when interdiffused with the first nickel-base superalloy. In one version, the deposited coating has a nominal composition of about 3.1 wt.% Co, about 7.6 wt.% Cr, about 7.8 wt.% Al, about 5.45 wt.% Ta, about 3.85 wt.% W, about 1.65 wt.% Rh, about 0.02 wt.% C, about 0.016 wt.% Hf, about 0.015 wt.% B, about 0.5 wt.% Si, balance nickel and incidental impurities. A ceramic thermal barrier coating may overlie the protective-coating outer surface.

US6641929. T.J. Kelly and P.K. Wright III. Company: General Electric Co, Cincinnati, OH. Issued/Filed: 4 Nov 2003/31 Aug 2001.

Fused Bondcoats for Thermal Barrier Coatings

Method of Applying a Bond Coating and a Thermal Barrier Coating on a Metal Substrate, and Related Articles. A method for applying at least one bond coating on a surface of a metal-based substrate is described. A foil of the bond coating material is first attached to the substrate surface and then fused thereto, for example, by brazing. The foil is often initially prepared by thermally spraying the bond coating material onto a removable support sheet and then detaching the support sheet. Optionally, the foil may also include a thermal barrier coating applied over the bond coating. The substrate can be a turbine engine component.

US6637643. W.C. Hasz, M.P. Borom, W.A. Nelson, J.E. Viggiani, and J. Zanneti. Company: General Electric Co., Niskayuna, NY. Issued/Filed: 28 Oct 2003/4 Feb 2002.