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Selected Patents Related to Thermal Spraying

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Applications

Adherently Sprayed Valve Seats. A method of defining valve seats on valve seat supports of an internal combustion engine head. The method includes steps of: (a) roughening the exposed surface of the valve seat support to a finish of 10 to 50 μm RA; (b) thermally spraying a stream of composite particles onto the roughened support surface, using gaseous propellants with sufficient heat and force to produce a dense adherent composite coating of metal and metal oxide particles and to a thickness no greater than 1 to 1.5 mm; and (c) finish machining, if necessary, the sprayed coating to define the valve seat surface. The composite coated product consists of a metal/metal oxide mixture that possesses one or more of the following characteristics: a surface porosity of 2 to 5%, a density of 6.5 to 8 g/cm^3, a Vickers hardness of about 280 kg/mm^2 at 450 °C, high wear resistance, and high corrosion resistance.

CA 2221229: Oludele Olusegun Popoola, Robert Corbly McCune, Eddie Lee Cartwright, and Larry van Reatherford. Company: Ford Global Tech. Inc. Issued/Filed: January 15, 2008/November 13, 1997.

Alloyed Donor Roll Coating. A toner donor roll for use in a development apparatus of an electrophotographic apparatus is disclosed. The donor roll includes a conductive core of a ceramic outer coating over the conductive core, the ceramic coating formed from thermal spraying a single homogeneous powder consisting of particles each of which contains a specific ratio of pure alumina and pure titania held together with an organic binder.

CA 2410197: Joy L. Longhenry and Michelle L. Schlafer. Company: Xerox Corp. Issued/Filed: January 8, 2008/October 29, 2002.

Bearing Shell Made of Hybrid Material and Process for Production Thereof. Internal combustion engine with bearing shells, which are formed essentially by thermal sprayed bearing layers, wherein the thermal sprayed bearing layers are formed by at least two slide bearing materials with different hardness, which are spatially separated from each other and are provided on the outer surface of the bearing shell, as well as process for production of bearing shells for internal combustion engines including the steps: mechanical conditioning of the bearing surface, coating of the bearing surface with the materials of the bearing shell by thermal spray processes, finishing flattening processing of the applied layer, wherein as bearing shell at least two slide bearing materials with different hardness were deposited separated spatially from each other, wherein the materials are in contact with each other via interlayers or joint layers.

US 7344312: Jochen Betsch, Florian Lampmann, Harald Pfeffinger, Franz Rueckert, Frank Streicher, and Torsten Wittrowski. Company: Daimler AG. Issued/Filed: March 18, 2008/June 16, 2005.

Emitter for a Thermionic Dispenser Cathode, Method of Manufacturing It and Thermionic Device Including the Emitter. A method of manufacturing an emitter for a thermionic dispenser cathode includes forming a porous emitter body with substantially interconnected pores, having an emission surface from which, upon application of heat, electrons are emitted. The porous emitter body is suitable for transporting, to the emission surface through the substantially interconnected pores, a compound released upon application of heat, which, when deposited on the emission surface, serves to lower an effective work function of the emitter. The porous emitter body is formed by means of a process of deposition of material. At least a region of the porous emitter body is provided with a continuously varying porosity. The porosity is continuously varied by controlling at least one parameter of the deposition process.

WO 28035053: Angelo N. Grubisic. Company: The University of Surrey. Issued/Filed: March 27, 2008/September 18, 2007.

Gas Turbine Nozzle Segment and Process Therefore. A gas turbine engine nozzle segment and the process for producing such a nozzle segment to exhibit improved durability and aerodynamic performance. The process produces a nozzle segment having at least one vane between and interconnecting a pair of platforms. The nozzle segment is cast from a gamma prime strengthened nickel-base superalloy, on whose surface is thermal sprayed an environmental coating formed of a MCrAlX-type coating material. The surface of the environmental coating is then worked to cause the coating to have a surface finish of less than 2.0 μm Ra. Cooling holes are then drilled in the nozzle segment, after which an oxidation-resistant coating is applied on the smoothed surface of the nozzle segment so as to maintain an outermost surface on the nozzle segment having surface finish of less than 2.0 μm Ra.

US 7341427: Andrew D. Farmer, Bangalore A. Nagaraj, Wenfeng Lu, Ching-Pang Lee, and Joseph M. Guentert. Company: General Electric Co. Issued/Filed: March 11, 2008/December 20, 2005.

Method for Manufacturing a Dewatering Member with a Composite Body for a Paper or Board Machine. The invention relates to a dewatering member with a composite body for a paper or board machine, comprising a composite body and a hard surface layer. The composite body has been manufactured in a pultrusion process. An adhesion layer is formed on desired outer surfaces of the composite body such that reinforcements passed to the adhesion layer have been passed to the pultrusion process through a separate resin bath to which an adhesion improving agent has been added such that the hard surface layer can be applied directly onto it, and reinforcements

forming the inner portion of the composite body have been passed to the pultrusion process through a second resin bath. The invention also relates to a method in which a composite body is coated with a hard coating layer produced by thermal spraying, and the coating is ground.

EP 1316640: Veli-Pekka Tarkiainen, Liisa Muilu, Kirsi Kervinen, and Petri Sorsa. Company: Metso Paper, Inc., Exel Oyj. Issued/Filed: January 23, 2008/November 11, 2002.

Production of a Gas-Tight, Crystalline Mullite Layer by Using a Thermal Spraying Method. Production of a dense crystalline mullite layer on a metallic and/or ceramic substrate comprises using a sol with mullite precursors as additive in a plasma spraying process.

EP 1794342: Roberto Siegert, Silke Latzel, Ralf Hansch, Detlev Stoever, and Robert Vassen. Company: Forschungszentrum Julich GmbH. Issued/Filed: February 20, 2008/September 17, 2005.

Protective Coating of Tools and Implements for Preventing Formation of Mechanical Incentive Sparks. In the present invention, a protective coating being formed by thermal spraying of multicomponent materials and containing 94.5 to 95.9 wt.% Ni, 2.7 to 3.8 wt.% Ti, wherein the balance to 100 wt.% being alloying additions is disclosed.

CZ 298780: Jaroslav Parenica, Miroslav Kabelka, and Petr Podana. Company: Koexpro Ostrava, Vitkovice a.s. Issued/Filed: January 23, 2008/December 23, 2003.

Strain Tolerant Ceramic Coating. A strain tolerant ceramic coating for use as an abrasive coating on a substrate is provided. The coating is prepared from an yttria and zirconia powder having an average particle size less than 40 μm. The coating is formed by depositing the powder on the substrate by a plasma spray process. The as-applied coating contains essentially no macrocracks, but a poststressed coating contains a random distribution, population, and orientation of microcracks and macrocracks.

CA 2251756: Purusottam Sahoo and Stephen Sitko. Company: Sermatech Int. Inc. Issued/Filed: January 15, 2008/November 13, 1998.

Thermally Sprayed Refractory Oxide Coating for Precious Metal Glass Delivery Systems. The invention is directed to a process for reducing the oxidation of a precious metal glass delivery system comprising applying with a thermal spray process a sufficient amount of a material comprising a refractory oxide on the exterior surface of and in contact with the precious metal glass delivery system, thereby reducing the oxidation of the precious metal glass delivery system, with the proviso that the process does not include flame sprayed refractory oxide comprising alumina. The invention also includes a precious metal glass delivery system comprising at least one component of the precious metal glass delivery system comprising a precious metal, wherein the precious metal is in contact with and is coated with a material comprising a refractory oxide on the exterior surface of the precious metal, wherein the refractory oxide has been applied with the process of the invention. The invention also provides a precious metal glass delivery system comprising at least one component of the precious metal glass delivery system comprising a precious metal, wherein the precious metal is in contact with and is coated with a material comprising zirconia on the exterior surface of the precious metal. The invention further includes products made by the process of the invention.

WO 28027480: David M. Grzesik and David M. Lineman. Company: Corning Inc. Issued/Filed: March 6, 2008/August 30, 2007.

Thermal Spraying of a Piston Ring. The invention relates to a piston ring coated with a coating material by a thermal spray process, exposed to heat treatment of the coating material at an elevated temperature and for a time effective to at least partially diffuse the coating material into the piston ring surface or underlying layer of coating material, and an additionally applied coating material layer subject to successive heat treatments of each coating material layer to lay down on the piston ring surface a plurality of layers of the same coating material.

US 7332199: Aram Mehdi. Company: Koncentra Marine & Power AB. Issued/Filed: February 19, 2008/February 28, 2002.

Wet Cylinder Sleeve Having a Cavitation-Resistant Surface. The invention relates to a wet cylinder sleeve comprising a cast base that is made of a cast iron alloy, of which at least one external surface area is provided with a thermal spray coating that is made of an iron-base alloy and has a thickness of 1 to 1000 μm.

WO 28031468: Christian Herbst-Dederichs and Michael Buchmann. Company: Federal-Mogul Burscheid GmBH. Issued/Filed: March 20, 2008/June 18, 2007.

Diagnostics and Characterization

Method for Preparing and Ultrasonically Testing a Thermal Spray Coated Article. An article having a thermal spray coating thereon is prepared by thermally spraying a coating material onto a surface of a substrate article. The coated article is nondestructively tested by directing a transmitted ultrasonic signal into the coated article, receiving a received ultrasonic signal from the coated article, and evaluating a near-bondline region of the coated article located adjacent to the surface of the article using the received ultrasonic signal.

US 7341758: Matthew Stewart, Thomas J. Tomlinson, David J. Dietz, and Patsy A. Ruzzo. Company: General Electric Co. Issued/Filed: March 11, 2008/April 24, 2003.

Spraying Systems and Methods

Ceramic Nozzle. The invention relates to a ceramic nozzle for thermal and kinetic spraying comprising a convergent and a divergent section.

WO 28025815: Aloys Eiling, Gerhard Angermann, Stefan Zimmermann, and Peter Richter. Company: H.C. Starck GmBH. Issued/Filed: March 6, 2008/August 30, 2007.

Determination and Regulation of Parameters for Thermal Spray Deposition of Coating of Fine Particles on Substrate. The determination and regulation of parameters for thermal spray deposition of a coating of fine particles on a substrate with a spray torch comprises: (A) determining along the spray jet at each of the distances (d1 to dn) some spray parameters such as powder flow rate, gas flow rate, and electric

current density; (B) automatically regulating the distance between the outlet of the torch and the substrate to a value essentially equal to one of the determined distances; and (C) continuously regulating the spray parameters to maintain them essentially constant. An independent claim is also included for a device for determining and regulating the parameters of thermal spray deposition on a substrate.

FR 2894599 Company: HMR Expert SAS Soc Par Actions. Issued/Filed: February 22, 2008/December 13, 2005.

Methods of Making Finely Structured Thermally Sprayed Coatings. Methods of making a metallic or cermet coating include suspending solid fine metal or cermet particles in a liquid to form a liquid feedstock and injecting the liquid feedstock into a high-velocity oxygen fuel flame gun to thermally spray the liquid feedstock on a substrate to form a coating thereon.

WO 28036887: Xinqing Ma, Jefferey Roth, and Danny T. Xiao. Company: Inframat Corp. Issued/Filed: March 27, 2008/September 21, 2007.

Plasma Spraying Apparatus and Also a Method for Monitoring the Condition of a Plasma Apparatus. The invention relates to a plasma spraying apparatus including a plasma torch for heating up a spray powder in a heating zone and a metering unit for metering the spray powder, the metering unit for conveying the spray powder into an injection unit by means of a conveyor gas under a predetermined pressure being connected with a conveyor gas unit via a conveyor gas line. The injection unit has an inlet and an outlet designed as a powder injector so that the spray powder can be supplied from the metering unit to the injector unit through the inlet by means of the conveyor gas via an injector line to the injector unit. In this arrangement the injector unit is designed and arranged in such a way that the spray powder can be brought into the heating zone by the conveyor gas emerging from the powder injector, with a pressure sensor for the detection of the pressure of the conveyor gas being provided for monitoring the condition of the plasma spraying apparatus. The invention further relates to a method for monitoring the condition of a plasma spraying apparatus.

US 7342196: Peter Koenig. Company: Sulzer Metco AG. Issued/Filed: March 11, 2008/August 12, 2005.

Powder Coating Spraying Device. A thermal spray device for applying powder and polymer coatings to large areas by means of a staged double or triple Venturi oriented at the distal end to produce a compression wave is described. The spray patterns produced by the nozzles can range from about 3 to about 9 in. The gun is designed so that the front-end nozzles are interchangeable with other front-end nozzles so as to allow for quick changes between nozzles designed to cover different coverage areas. The lightweight compact design allows for comfort and high portability.

WO 28033458: Abdel N. Bacchus and Thomas Gardega. Company: Xiom Corp. Issued/Filed: March 20, 2008/September 13, 2007.

Thermal Projection Device. The invention relates to a device and a method for control of the operation of a thermal projection torch, in which the characteristics of the jet and the temperature of the deposit on the piece are measured by means of a camera and a combined pyrometer. The correction to be made to the supply parameters of the torch is deduced therefrom, and the corrected parameters are transmitted to the unit controlling the torch.

US 7323062, US 7332036: Michel Vardelle, Thierry Renault, Cedric Bossoutrot, Frederic Braillard, and Hakim Hoffmann. Company: Snecma Services. Issued/Filed: February 19, 2008/February 28, 2003.

Thermal Spray Coating Processes Using HHO Gas Generated From an Electrolyzer Generator. A thermal spray coating process for depositing finely divided metallic or nonmetallic materials in a molten or semimolten condition to form a coating on a substrate wherein the coating material may be powder, ceramic-rod, wire, or molten materials. The process involves the use of a gas made from water in an electrolyzer, which includes two principal electrodes and a plurality of supplemental electrodes. The supplemental electrodes are not connected electrically to a power source. The electrolyzer is adapted to separate the water such that its constituents of H and O are not recombined and instead produced jointly to make the single combustible gas composed of combinations of clusters of hydrogen and oxygen atoms structured according to a general formula H_mO_n wherein m and n have null or positive integer values with the exception that m and n cannot be 0 at the same time.

WO 28021130: Dennis J. Klein. Company: Hydrogen Technology Applications, Inc. Issued/Filed: February 21, 2008/August 8, 2007.

Thermal Spray Device. A detachable coupling unit connects the supply line adapter section and the base section. The detachable coupling includes an eccentric closure device, bayonet connector, or screw. The burner is a plasma burner. The gun is for flame spraying, arc spraying, or flame shock spraying (i.e., high-velocity oxygen fuel, or HVOF, optionally explosive- or detonation-flame spraying).

EP 1690601: Markus Mueller. Company: Sulzer Metco AG. Issued/Filed: March 26, 2008/January 12, 2006.

Thermal Spraying Device and Thermal Spraying Method. A thermal spraying device with a first blowing mechanism for lengthening a droplet formed near the tips of thermal spraying materials by arc, and a second blowing mechanism for a blowing a tip portion of the lengthened droplet to atomize it into droplets and to scatter atomized droplets toward a face to be thermally sprayed. The first blowing mechanism lengthens the droplet so that the second blowing mechanism propels air to the tip portion of the lengthened droplet that is separated from a location where the tips of thermal spraying materials are adjacent and the arc is generated. Arcing between the tips of the thermal spraying materials continues stably, and satisfactory thermal spraying is possible.

US 7341763: Noritaka Miyamoto, Hajime Kubota, Nobuhide Kondo, Kouta Kodama, and Toshinao Suzuki. Company: Toyota Jidosha Kabushiki Kaisha. Issued/Filed: March 11, 2008/April 22, 2005.

Thermal Spraying Instrument. The invention relates to a device and method for controlling the operation of a thermal spray torch. The inventive device and method are characterized in that an onboard camera and pyrometer are used to measure the properties of the jet and the temperature of the deposit on the part and in that the correction to be made to the supply parameters of the torch is

deduced. Furthermore, the invention is characterized in that the corrected parameters are sent to the cabinet that controls the torch.

US 7323061: Michel Vardelle, Thierry Renault, Cedric Bossoutrot, Frederic Braillard, and Hakim Hoffmann. Company: SNECMA Services. Issued/Filed: January 29, 2008/February 28, 2003.

Thermal Spraying Method and Device. The thermal spraying method comprises the steps of: introducing at least one fuel and at least one oxidant into a combustion chamber, generating combustion and adding a coating material to the flow of hot gas. Furthermore, a partially ionized gas is generated and said partially ionized gas is introduced into the combustion chamber to give rise to combustion of the fuel and oxidant. The invention also relates to a thermal spraying device.

WO 28000851: Georgy Barykin. Company: Fundacion INASMET. Issued/Filed: January 3, 2008/June 28, 2006.

Feedstock

Spray Powder for Manufacturing by Thermal Spraying of a Thermal Barrier Coating Being Stable at High Temperatures. Spray powder comprises particles forming an agglomeratelike microstructure formed by a number of adhering grains. The grains consist of functional materials. An additive is formed on the surfaces of the functional material grains in the boundary zones. The additive exerts a limiting or biding action. Independent claims are also included for: (a) process for the production of a spray powder and (b) coated substrate having a thermal barrier coating.

EP 1422308: Rajiv J. Damani and Kaspar Honegger. Company: Sulzer Metco (US) Inc. Issued/Filed: March 26, 2008/October 24, 2003.

Zirconium Oxide Powder, Process for Producing the Same, and Material for Thermal Spraying. A zirconium oxide powder suitable for use as a material for thermal spraying, a process for producing the powder, and a thermal spraying material comprising the powder. The process for zirconium oxide powder production comprises a step in which hydrated zirconia having a BET specific surface area of 100 to 250 m^2/g and an ignition loss of 5 to 20% is burned in an atmosphere containing a hydrogen halide gas. The material for thermal spraying comprises a zirconium oxide powder that comprises polyhedral particles each having six or more faces and has a cumulative particle size distribution in which when the particle diameters at 10% weight-cumulation, 50% weight-cumulation, and 90% weight-cumulation from the fine-particle side are expressed by D10, D50, and D90, respectively, then D50 is 5 to 15 μm, excluding 15 μm, and D90/D10 is less than 3.

WO 28013296: Yoshio Uchida and Kazuo Sadaoka. Company: Sumitomo Chemical Co., Ltd. Issued/Filed: January 31, 2008/July 24, 2007.