VDM Metals presents a new material development for valves

Werdohl, Germany. With VDM Alloy 788 A®, VDM Metals presented a new material for highly-loaded outlet valves. In particular, the nickel-iron alloy is suited for use in commercial vehicles and passenger cars with diesel engines, and it has the material number 2.4959. Owing to its novel composition, it is characterized by improved wear properties, with high application temperatures and combustion pressures.

The objective of the new material development was to improve the wear resistance of valve materials on a nickel basis and, by means of this, enable the avoidance of hardfacing of the valve seat with weld-cladding. “With highly-loaded in- and outlet valves – especially in engines of commercial vehicles and diesel passenger cars, pressures of up to 260 bar are possible in a temperature range of more than 800 °C,” explains Frank Scheide, application technology at VDM Metals. “Thanks to the newly-patented VDM Alloy 788 A® material, the need of hardfacing the valve in the aforementioned temperature and pressure area can be foregone.”

“With the new development, the alloy’s nickel-content is reduced, while the iron content is increased at the same time. This results in the formation of a wear-free layer, the so-called glace layer,” explains Dr. Jürgen Kiese, responsible project manager in the research and development area. “In addition to this, the chemical composition of the material has been modified in such a manner that the creep and creep rupture strengths are comparable with those attained by VDM® Alloy 80 A.” To date, the material of choice for applications in the heavy-duty area has been VDM® Alloy 80 A, with the necessary hardfacing. However, this goes hand in hand with increased weight as well as own construction challenges, for instance the possible armoring flaking, due to thermally-induced stresses that occur between the base and hardfacing material. In addition to this, hardfacing involves a cost-incurring process step during valve manufacturing, which one would be happy to dispense with.

As in the passenger car area, there also is a downsizing trend with commercial vehicles and, in addition to this, with regard to the cost pressure for the freight forwarders, increasing the service-free engine life is just as desirable as increased fuel efficiency while, at the same time, reducing the pollutant emissions. Due to physical restrictions, the combustion temperatures and peak pressures increase in the engine. The result of this is an increased strain on the materials

and building components used. With the new and continued material developments for high-temperature applications, VDM Metals has offered solutions to these challenges in the automotive area for many years.

Additional information

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About VDM Metals

The VDM Metals Group, based in Werdohl, Germany, develops and manufactures nickel, cobalt and zirconium alloys as well as high alloyed special stainless steels. For over 85 years, the company has been supplying sheet metal, strips, rods, wires and welding consumables to customers in the chemical industry, plant construction, energy generation, oil and gas, electrical and electronics, as well as automotive and aerospace industries. Worldwide, VDM Metals employs more than 1,900 people.

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