

Exhaust valve spindles for marine diesel engines manufactured by hot isostatic pressing

Thursday, 7 December 2017 12:30 (25)

The exhaust valve spindle is one of the most challenging components in the marine two-stroke diesel engine. It has to withstand high mechanical loads, thermal cycling, surface temperatures beyond 700 °C, and molten salt induced corrosion.

Powder metallurgy gives the opportunity of improving the component using materials not applicable by welding or forging. Therefore exhaust valve spindles have been produced by Hot Isostatic Pressing (HIP) with a spindle disc coating of a Ni-Cr-Nb alloy that cannot be manufactured by welding or forging.

This paper presents the service experience gathered by MAN Diesel & Turbo in a number of service tests on ships (up to 18000 running hours): corrosion and degradation phenomena in the spindles produce by HIP are presented and compared with the performance of state-of-the-art exhaust valve spindles.

The macroscopic geometrical changes experienced by the spindles are studied by means of Finite Element Method (FEM) calculations and strategies for further development of the component are outlined.

Please choose topic

Power Generation

Primary author(s) : Dr LAPINA, Alberto (MAN Diesel & Turbo); Mr HOEG, Harro Andreas (MAN Diesel & Turbo)

Co-author(s) : Dr KNUDSEN, Jakob (MAN Diesel & Turbo); Prof. HATTEL, Jesper Henri (Technical University of Denmark); Mr MØLLER, Rune (Technical University of Denmark); Mr BERGLUND, Tomas (Sandvik Powder Solutions)

Presenter(s) : Dr LAPINA, Alberto (MAN Diesel & Turbo)

Session Classification : Oil & Gas

Track Classification : Oil & Gas