Exhaust Valve Spindles for Marine Diesel Engines Manufactured by Hot Isostatic Pressing -
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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 degrees 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 produced 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.

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