

Laser Cladding of Valve Seats

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Automotive engine valve seats are typically made from EN52 (an austenitic valve steel). A Stellite-6 coating is often applied using the Plasma Transferred Arc (PTA) process. This deposition method has traditionally had some limitations due to increased rejection rates caused by blow holes and cracks in the cladding, since the Stellite-6 was applied in the form of a rod.

The presenter has performed laser cladding of valve seats using powder with coaxial feed. The valve was kept at an angle to adjust the distance between the valve stem and the seat. Since the seat diameter was only 30 mm with the stem preventing the nozzle from accessing the point where cladding is applied, a miniature coaxial nozzle was designed which has adjustable focus and angle. An advantage of this method is that the powder is deposited vertically, which increases the cladding depth and reduces the amount of blow holes and cracks.

This method enhances dilution as the powder falls vertical and the laser beam is incident on the powder for longer when compared to angled incident cladding, resulting in fewer blow holes.

ABSTRACT

LASER CLADDING OF VALVE SEAT

The Engine Valve are made of Austenite steel or Martensite Steel EN52 and Deposited on the seat by PTA. This deposition method had more of rejection rates as the Stellite 6 was in the form of Rod which increased blow holes and cracks in cladding.

We have seen laser cladding of seats with powder with coaxial feed. The valve was kept slant to adjust to the distance between stem and the seat as the seat dia was only 30mm with stem being an stoppage to the nozzle we have designed a miniature coaxial nozzle which has adjustable focus and the cladding is vertical and slant. Advantage of this method is the powder is deposited vertically and hence increase in cladding depth less blow holes and cracks

This method enhances dilution as the powder falls vertical as the time incident of the laser on the powder is more compared to angle. We have less of pilferage which decreases the blow holes. The Production volume increases due to the fact that the rejection rate is reduced due to straight powder feeding