THERMASPRAY	TECHNICAL BULLETIN	HYDRAMAX

The Use of Thermal Spray Coating in Turbomachinery Applications
Technical Bulletin Ver. 1
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Journals on engineering machinery can become damaged as a result of bearing failure, lubrication contamination or lubricant supply failure, seal failure, fretting wear, arc-erosion, seizure during assembly or disassembly, or other systemic failures. This can result in shaft journals that are so badly damaged that they are no longer functional, and these journals are traditionally refurbished using chrome plating or weld repair.

Thermal spraying is a powerful alternative refurbishment technique with certain key benefits:

- There is a wide variety of different thermal spray coatings available, allowing for significantly improved functional performance – it is not a one-size-fits-all solution.
- Thermal spray is a “cold” process, eliminating the risk of distortion of the shaft during refurbishment.
- There is no metallurgical damage to the shaft substrate, eliminating the risk of subsequent fatigue failure.
- Thermal spray coatings can be applied to virtually any metal substrate, including hardened steel (excluding nitrided steel) and cast irons.
- Certain thermal spray coatings can be several millimetres thick, facilitating the repair of severe damage.

Thermaspray uses a variety of advanced thermal spray coatings to routinely refurbish a variety of critical shafts, including pump shafts, turbine shafts, electric motor shafts, gearbox shafts, pelton runner shafts, crankshafts, compressor piston rods and high-speed reciprocating shafts. Coating selection is based on the functional requirements of the relevant journal(s), and we have proven coating solutions for the following applications:

Roller bearing locating journals: Bearing failure often results in damage to the bearing locating diameter. These journals can be repaired to very precise tolerances using coatings that were specifically developed for bearing fit applications.

Press-fit (coupling) journals:A suitable coating can restore damaged journals, and also eliminate the risk of component seizure or galling during subsequent assembly or disassembly.

Seal landings: Seal landings are prone to wear damage whenever there are small hard solid particles in the seal environment (either from the external environment, or from contamination of the lubricant), as these particles become trapped under the seal and result in abrasion damage to the shaft. A suitable coating can restore wear damage, and also eliminate further wear in service. Surface finish is critical to ensure that the journal does not damage the seal, and superfinishing is used to achieve the required finish.

White-metal bearing journals: White-metal landings are prone to wear whenever there is contamination of the lubricant, or when there was a lubrication supply problem. A suitable coating can restore wear damage, reduce the risk of white-metal pick-up, and also eliminate wear in service. Certain coatings also provide emergency running ability through controlled porosity, which acts as a lubrication reservoir. Surface finish is critical to ensure lubrication film stability in the bearing, and superfinishing is used to achieve the required finish.

Electrically insulating journals: In certain electrical machinery, stray currents can result in severe arc-erosion damage in the bearings. A suitably non-conducting coating (with breakthrough voltage of > 14kV/mm) can eliminate the flow of stray high-voltage electrical currents.

High-speeds reciprocating landings: Certain shafts are exposed to high speed reciprocating motion, typically compressor piston rods and punch rams. These shafts must maintain very tight geometrical tolerances to operate correctly, and a suitable coating can restore wear damage, reduce the risk of bearing pick-up, and virtually eliminate wear in service.

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Shafts are sprayed in our large top-loading spray booth, where we can handle rods up to 5,500 mm in length and up to 6,000kg in weight.

The grinding of the shafts is done in our grinding workshop, where we have several large cylindrical grinding machines (maximum 3800 mm between centres, maximum 700 mm swing), all fitted with diamond wheel grinding capability. For specific surface finisheswe have two dedicated finishing lathes for the polishing and/or superfinishing of shafts.

Grinding of larger shafts is outsourced, and we have refurbished shafts up to 5,600 mm in length.

Apart from the repair of damaged journals, we can also grind precision probe tracks, bearing thrust faces, and arrange for the NDT and balancing of shafts.

Please contact Thermaspray to discuss your specific problems and the proven solutions we can offer you.