Metallisation
Thermal spray equipment and consumables

THE FLAMESPRAY RECLAMATION OF SHIPS PROPELLER SHAFTS

Application Data Sheet MS-DR-004

INTRODUCTION

Due to the constant rotation of a ships propeller shaft in a harsh marine environment, the bearing areas are very susceptible to wear, consequently giving rise to the inclusion of sand, salt water and other debris, leading to bearing seizure and loss of propulsion. By using the Metallisation Flamespray process it is possible to apply a coating of 316 stainless steel onto the worn bearing areas of the propeller shaft; bringing them back up to the original size at a fraction of their replacement cost. On manganese bronze type propeller shafts it has been found that bearing areas reclaimed by applying a layer of Flamesprayed Metallisation 316 Stainless Steel using the same procedure will give up to double the life of original materials and in turn, reducing the total maintenance costs.

EQUIPMENT

Metallisation Mark 61 Flamespray System

MATERIALS

Bond Coat

Metallisation T405/1 Flamespray Bonding Material exotherms during spraying which produces very high bond strength coatings.

The information contained in this Application Data Sheet is offered as a guide to Customers and Metallisation Ltd accept no liability arising from its use.© Metallisation Limited

Main Deposit

Metallisation 84E - 316 Stainless Steel Wire provides a dense, corrosion resistant deposit. Excellent for coastal and offshore environments.

Cleaning

(a) Steam clean if equipment available

(b) Degrease by solvent vapour if equipment available

(c) Inspect for longitudinal distortion, cracks or faults taking the shaft below the manufacturers recommended operating tolerances.

NOTE: Metalsprayed deposits do not impart any strength to base materials.

Pre-Machining

Rough turn or grind areas being reclaimed to a depth of 1.25mm (0.050"), machining their length the width of the bearings plus an allowance of 25mm (1") either side.

RECOMMENDED DEPTH OF UNDERCUT TABLE

Diameter of Shaft	Depth of Cut	
	mm	0.001 inch
50mm - 100mm (2"-4")	1.25	50
100mm - 150mm (4"-6")	1.50	60
Over 150mm (over 6")	1.75	70

Cleaning

(a) Degrease by solvent vapour process if equipment available.

(b) Check that all surfaces are free from contamination and debris.

Preparation

(a) Mask all machined surfaces adjacent to area requiring treatment with a heavy duty masking tape.

(b) Thoroughly inspect for contamination prior to blasting.

(c) Thoroughly blast with clean n° 30-36 grade aluminium oxide grit, the standard of surface cleanliness required is as Swedish Standard SA3.

(d) Ensure that areas to be treated are thoroughly blasted, paying particular attention to edges of machined areas.

The information contained in this Application Data Sheet is offered as a guide to Customers and Metallisation Ltd accept no liability arising from its use.© Metallisation Limited

Application of Sprayed Coating

Masking

(a) Apply sprayshield masking fluid using a small brush to all areas adjacent to the area being sprayed. Ensure fluid is not applied to area being metalsprayed. (Small amounts of masking fluid on area to be sprayed can be removed with emery cloth)

(b) Check thoroughly that area to be sprayed is free from contamination

(c) **IMPORTANT** Areas to be sprayed should not come into contact with chains, rope slings, hands or any other form of contamination. Delays between blasting and spraying should not exceed 20 minutes.

Bonding

(a) The Flamespray Equipment should be set up in accordance with the Metallisation Manual for spraying of T405/1 Nickel Aluminium Wire.

(b) The area to be sprayed should be cleaned with a vacuum cleaner or clean air blast to remove any loose particles of grit.

(c) Apply T405/1 Bond Coat to a depth of 75-100μm (0.003”-0.004”) using multiple passes.

(d) The propeller shaft should be rotated to give a minimum surface speed of 18 metres/minute.

(e) The Flamespray Pistol should be set so that the spray stream is at 90° to the surface being coated and traversed at an even speed, giving a uniform coating.

(f) Spraying Parameters Bond Coat:

(i)	Range:	10cm (4”)
(ii)	Nozzle Air Pressure:	3.37 Bar (55 psi)
(iii)	Oxygen Pressure:	2.0 Bar (30 psi)
(iv)	Acetylene Pressure:	1.02 Bar (15 psi)

Flowmeter Settings Bond Coat

Gas	Oxygen
5.5	2.2

The information contained in this Application Data Sheet is offered as a guide to Customers and Metallisation Ltd accept no liability arising from its use.© Metallisation Limited

84E Deposit (To be applied immediately after bond coat)

(a) The Flamespray Equipment should be set up in accordance with the Metallisation Manual for spraying 84E (316 Stainless Steel) Wire.

(b) Apply 84E final deposit to the specified thickness including grinding allowance

i.e. finished ground dimension plus: 0.375mm - 0.50mm (0.015”-0.020”) grinding allowance

(c) The propeller shaft should be rotated to give a minimum surface speed of 18 metres/minute..

(d) The Flamespray Pistol should be set so that the spray stream is at 90° to the surface being coated and traversed at an even speed to give a deposit of not more than 0.13mm per pass.

(e) Using pre-set callipers, check final sprayed deposit thickness to ensure there are no areas below finished sprayed diameter.

(f) Remove loose particles on surface with wire brush or clean air blast.

(g) Allow to cool thoroughly, preferably whilst rotating.

(h) Spraying Parameters: Main Deposit 84E

(i)	Range:	15cm (6”)
(ii)	Nozzle Air Pressure:	4.51 bar (65 psi)
(iii)	Oxygen Pressure:	1.5-1.8 bar (25-30 psi)
(iv)	Acetylene Pressure:	1.02 bar (15 psi)

Flowmeter Settings Main Deposit 84E

Gas	Oxygen
5.5	2.25

Sealing

(a) Apply Sprayseal "M" in accordance with Metallisation Sprayseal "M" instructions. Keep surface wet by re-application for a period of approximately one hour.

(b) Allow to dry thoroughly

(c) Remove uncured sealer from surface with clean, disposable cloths or paper towels.

De-masking

(a) Remove all masking tape

(b) Remove all overspray thoroughly taking care to prevent coating damage

(c) Remove all traces of sprayshield with solvent

The information contained in this Application Data Sheet is offered as a guide to Customers and Metallisation Ltd accept no liability arising from its use.© Metallisation Limited

Finish Grinding

(a) Grinding Wheel Type N° 46 Grit Blue V Grade

(b) Wet grind to final diameter taking light cuts using feeds and speeds in accordance with grinding machine manufacturer's instructions.

Inspection

(a) Check dimensions

(b) Check for cracks, defects in sprayed coating, i.e. large pores or protrusions and loose particles

(c) Clean to remove all traces of grinding abrasive and loose particles

Finish Clean

(a) Clean to remove any traces of grinding abrasive and loose particles

(b) Wash with petroleum spirit/paraffin

(c) Dry the surface with clean, disposable cloths or paper towels.

- REFERENCE TECHNICAL BULLETIN N°S :-

2.3.17 Metallisation Bonding Material T405/1

2.1.12 Metallisation Wire 84E – 316 Stainless Steel

5.2.2 Surface Preparation by Gritblasting

NOTE: - SEE ALSO

MS-DR-003 The Arcspray Reclamation of Ships Propeller Shafts

The information contained in this Application Data Sheet is offered as a guide to Customers and Metallisation Ltd accept no liability arising from its use.© Metallisation Limited