

THE ARCSPRAY RECLAMATION OF RUDDER POSTS

Application Data Sheet MS-DR-001

INTRODUCTION

The Shipping Industry, like any other Industry, has its share of wear problems. These are generated by the very harsh conditions of a Marine Environment; ships are sometimes at sea for months at a time with limited regular maintenance to some of the extreme areas. The rudder post which will only have limited access during a voyage can be one of the offending areas. The inclusion of sand, salt water or other debris into the bearings will create wear on the rudder post leading to possible seizure and loss of steerage. By using the Metallisation Arcspray Process, it is possible to apply a coating of 316 Stainless Steel onto the worn areas of the rudder post bringing them back up to the original size at a very small percentage of the replacement cost and enabling the vessel to be back in service in a very short period of time.

EQUIPMENT

Metallisation Arcspray 528E, 340 or 140E Pistol

MATERIALS

Bond Coat

Metallisation 75E Nickel Aluminium - Specially formulated Arcspray Bonding Wire, which exotherms during spraying, producing a very high bond strength coating.

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.

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 oil, grease, hands or any other form of contamination. Delays between blasting and spraying must not exceed 20 minutes.

Bonding

- (a) The Arcspray Equipment should be set up in accordance with the Metallisation Manual for spraying 75E 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 75E Bond Coat to a depth of 75-100µm (0.003"-0.004") using multiple passes.
- (d) The rudder shaft should be rotated to give a minimum surface speed of 18 metres/minute.
- (e) The Arcspray 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 : 100mm (4")
 - (ii) Nozzle Air Pressure : 3.7 bar (55 psi)
 - (iii) Voltage before spraying : 38V
 - (iv) Voltage during spraying : 34V
 - (v) Amperage : 200A

Note: Parameters may differ in accordance with type and length of power cables being used.

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

- (a) The Arcspray Equipment should be set up in accordance with the Metallisation Manual for spraying 84E 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 rudder shaft should be rotated to give a minimum surface speed of 18 metres/minute.
- (d) The Arcspray 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:
 - (i) Range : 15cm (6")
 - (ii) Nozzle Air Pressure : 4.3-4.6 bar (65-70 psi)
 - (iii) Voltage before spraying : 38V
 - (iv) Voltage during spraying : 35V
 - (v) Amperage : 250A

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

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

✦ REFERENCE TECHNICAL BULLETIN N°S :-

2.3.12 Metallisation Wire 75E - Nickel Aluminium

2.1.12 Metallisation Wire 84E – 316 Stainless Steel

5.2.2 Surface Preparation by Gritblasting

NOTE: - SEE ALSO

MS-DR-002 The Flamespray Reclamation of Rudder Posts