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Title: [Redacted] Master, Subject & Correlation Index

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1.0

- 3.3 Supersession of PS 7
- 3.3.1 Title Stress relief and de-embrittlement of electro-plated and phosphate surfaces
- 3.3.2 This process specification was written as a collection of stress relief and de-embrittlement requirements from other Dowty Boulton Paul (now Moog Wolverhampton) and Dowty Rotol chemical processing procedures. The last active issue of this document was 4, dated July 2003.
- 3.3.3 Since stress relief and de-embrittlement requirements are nowadays contained in the corresponding chemical processing procedure, PS 7 is redundant and no superseding document is necessary.

PS	Title
46	Removal of Copper Plugs from Rotary Valve Sleeves
47	CANCELLED
48	CANCELLED
49	Low Hydrogen Embrittlement (LHE) Cadmium Plating of Ultra-high Strength Steel (UTS <2140MPa or 310ksi)
50 *	Chemical cleanliness of steels (sulphur prints)
51	Pre-Treatment and Surface Coating of PTFE Insulated Cables prior to Potting
52	CANCELLED (in house use PCD 52, supplier base use MSPS100.CP.005)
53	CANCELLED (use PS 118)
54	Plugging of Hydraulic Components (other than Lee Plugs)
55 *	Bolt etching process (forged heads)
56	Manipulation of Cold set preformed Rigid Pipes
57	

PS	Title
92*	Printed wiring board manufacture
93	CANCELLED (in accordance withnBTED

4.0 MOOG SUPPLIER PROCESS SPECIFICATIONS (MSPS)

4.1 The following documents are for use within Moog Wolverhampton supplier base.

Document #	Process #	Process Name
MSPS100.CP	MSPS100.CP.001	Anodising of Aluminium & Aluminium Alloys
	MSPS100.CP.002	Chemical Conversion Coatings on Aluminium & Aluminium Alloys
	MSPS100.CP.003	Hard Chromium Plating
	MSPS100.CP.004	Cadmium Plating
	MSPS100.CP.005	Passivation of Corrosion Resistant Steel
	MSPS100.CP.006	Copper Plating
	MSPS100.CP.007	Bronze Plating for Nitriding Stop Off Purposes
	MSPS100.CP.008	Electroless Nickel Plating
	MSPS100.CP.009	Manganese Phosphate Treatment of Steel
MSPS200.HT	MSPS200.HT.001	Furnace Control & Calibration (Pyrometry)
	MSPS200.HT.002	Carburising of Steel Parts
	MSPS200.HT.003	Gas Nitriding of Low Alloy Steel Parts
MSPS300.NDT	MSPS300.NDT.001	Etch Inspection of High Strength Steel Parts
MSPS400.MISC	MSPS400.MISC.001	Shot Peening
	MSPS400.MISC.002	Electro Discharge Machining, EDM

5.0 PROCESS CONTROL DOCUMENTS (PCD)

5.1 The following documents are for use at Moog Wolverhampton in-house treatments department ONLY. **These documents are not to be distributed externally.**

PCD	Title
2	Bronze Plating
3	Furnace Operating Procedures
4	Protective Treatment of Aluminium using Alocrom 1200 and Surtec 650 Processes
7	Metallography & Microindentation Hardness Assessment of Steels
12	Hard Chromium Plating of Steels
14	Cadmium Plating
17	Phosphate Treatment of Steel
27	Gas Nitriding of Steel Components
29	Etch Inspection of Steel Components
34	Electroless Nickel Plating
36	Copper Plating
52	Passivation of Corrosion Resistant Steels
69	Chromic Acid Anodising
71	Electrical Discharge Machining (EDM)
73	Gas Carburising of Steel Components
75	Training for Carburising Personnel
149	Sulphuric Acid Anodising of Aluminium and Titanium alloys

6.0 DAG PROCESS SPECIFICATIONS TRANSFERRED TO MOOG - WOLVERHAMPTON

6.1 The following are process specifications which were originally issued by Dowty Aerospace Gloucester (now GE Aviation Systems Ltd of Cheltenham), but are now controlled by MWL as they represent work that is now the technical and manufacturing responsibility of MWL (see part number groups listed in paragraph 1.2)

PS	Issue	Date	Title
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DAG PS 121	3		
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PCD 34 §	Electroless Nickel Plating
	Electroless Nickel Plating
PCD 12 §	Hard Chromium Plating on Steels
	Hard Chromium Plating
PS 16	Hard Chromium Plating of Aluminium Alloys
PS 114	Hard Chromium Plating of Copper Alloys
PS 162	Ion Vapour Deposition (IVD) of Aluminium on Steel
	Manganese Phosphate Treatment of Steel
PS 180	Nodular Thin Dense Chromium (NTDC) Plating
PS 37	Nickel Plating
PS 165	Nickel Sulphamate Plating
PCD 52 §	Passivation of Corrosion Resistant Steel
	Passivation of Corrosion Resistant Steel
PCD 17 §	Phosphate Treatment of Steels
PS 43	Reclamation of Steel Components by Heavy Nickel Plating
PS 38	Silver Plating
PS 188	Termination Requirements of Chrome Plated Surfaces
PS 21	Tin Plating
PS 228	Stripping of Copper and Bronze Plating
9.2	<u>Painting & Coatings</u>
PS 174	Paint Schemes for use at Smiths Wolverhampton
PS 26	Paint Removers
PS 1	

	PS 132	Thread Rolling of Special Applications
	PS 164	Electropolishing of Investment Castings
	PS 169	Laser Cutting of Metals
	PS 196	Plunge Grinding
9.4	<u>Anodising and Surface Oxidation of Light Alloys</u>	
	PCD 4 §	Alocrom 1200 Process Chemical Conversion Coatings on Aluminium & Aluminium Alloys
	PCD 69 §	Chromic Acid Anodising
	PCD 149 §	Sulphuric Acid Anodising of Aluminium and Titanium Alloys Anodising of Aluminium and Aluminium Alloys
Note:	MSPS100.CP.001 covers chromic acid anodising, sulphuric acid anodising and hard anodizing	
9.5	<u>Heat Treatment</u>	
	PS 118	Heat Treatment of Alloy Steels
	PS 119	Induction Hardening
	PCD 73 §	Gas Carburising Gas Carburising / Case Hardening of Steel Parts
	PCD 27 §	Nitriding of Steel Components Gas Nitriding of Low Alloy Steel Parts
	PS 151	Plasma (Ion) Nitriding
	PS 11	Salt Bath Nitrocarburising - Sursulf and Tufftriding
	PS 160	Nitrotec (Nitrocarburising) Surface Treatment
	PS 155	Hot Isostatic Pressing (HIP) of Investment Castings
	PS 168	Requirements for Hot Form Swaging
	PCD 75 §	Training for Carburising Personnel
9.6	<u>Joining</u> (including adhesives, mechanical and thermal processes)	
	PS 89	General Riveting Process
	PS 90	Cryogenic Jointing
	PS 28	Araldite Epoxy Resin Adhesives
	PS 147	Epoxy Bonding Procedure of Laminated Servo Valve
	PS 33	Loctite Sealants and Adhesives
	PS 77	Jointing and Sealing Compounds
	PS 133	Application of Dow Corning 3145 RTV Adhesive Sealant
	PS 124	Use of Waylock S-17163 Adhesive
	PS 42	Silver Brazing
	PS 32	Induction Brazing
	PS 67	Removal of Excess Copper Braze from Bushes
	PS 86	Brazing Technique for Transducer Type P297-45-0060
	PS 58	Reclamation of Cast Iron components by Powder Welding
	PS 87	General Requirements for Spot Welding Sheet Assemblies
	PS 181	Welding Hydraulic Pipes and End Fittings
	PS 135	Electron Beam Welding of 4340 ESR
	PS 166	Electron Beam Welding of B777 Ball Ramp Assembly
	PS 173	Electron Beam Welding of JAS 39 Engine Accessory Gearbox IDG and Breather Gears Electron Beam Welding of A330/340 Flap System Shafts

PS 207	Electron Beam Welding of Flap System Shafts for A380
PS 211	Requirements for Electron Beam Welding of 787 Diaphragm Sub-Assembly
PS 217	Furnace Copper Brazing
PS 227	Palladium Alloy Vacuum Brazing

9.7 Assembly and Fitting

PS 126	Tube/Pipe Bending
PS 56	Manipulation of Cold Set Performed Rigid Pipes
PS 127	Routing and Installation of Non-Lofted Hydraulic Pipes
PS 88	Assembly of Keelaring Couplings
PS 23	Fitting Heat Shrink on Plastic Sleeving and Boots
PS 123	Sealing of Pipe/Coupling Ends with Heat Shrinkable Sleeving
PS 41	Plugging of Hydraulic Components with Lee Plugs (existing Civil Contracts only)
PS 57	Plugging of Hydraulic Components with Lee Plugs (all current and future contracts)
PS 44	Secondary Staking of Lee Plugs
PS 54	Plugging of Hydraulic Components (other than Lee Plugs)
PS 46	Removal of Copper Plugs from Rotary Valve Sleeves
PS 66	Crimped Cable Connectors
PS 60	Undercutting of Screw Threads
PS 157	MJ Threads Modified for Critical Load Applications
PS 158	UNJ Threads Modified for Critical Load Applications
PS 92	Printed Wiring Board Manufacture
PS 109	Assembly and Protection of Printed Wiring Boards
PS 159	Helical Compression Springs for Aerospace Applications
PS 170	Assembly and Installation of Magnetic Seals
PS 172	Assembly Procedure for Flareless Fittings
PS 182	Fitting of Seals without Lead Groove Locations
PS 189	Torque Loads to be Applied to Union Fittings
PS 198	Assembly of Bushes with Wet Primer
PS 203	Procedure for Installation of Imperial Thin Wall Inserts
PS 205	Thermal Stabilisation of Servo Valves

9.8 Contamination and Cleaning

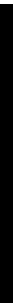
PS 19	Contamination Levels in Hydraulic Fluid
PS 20	Sampling of Fluids for Contamination Checks
PS 5	Cleaning of Hydraulic Pipes

	PS 139	Protective Treatment against Galvanic Corrosion - Mastinox
	PS 171	Aircraft Hydraulic/Mechanical Assemblies Storage and Preservation Information
	PS 183	Control of Shelf Life Limited Items
9.10	<u>NDT and other Inspection Techniques</u>	
	PCD 29 §	Etch Inspection of Steel Components
		Etch Inspection of High Strength Steel Parts
	PS 55	Bolt Etching Process (Forged Heads)
	PS 111	Hardness Inspection of Metallic Materials
	PS 74	Magnetic Particle Inspection
	PS 79	Fluorescent Penetrant Inspection
	PS 167	Grinding and Inspection of Chromium Plated Parts
	PS 102	Ultrasonic Inspection of Aluminium Alloys
	PS 63	Photographic Examination of Hard Chrome Plated Cylinder Bores
	PS 185	Radiographic Acceptance Standards for Castings
	PS 192	Salt Spray Testing to ASTM B117
	PS 197	Visual Inspection
9.11	<u>Component Identification</u>	
	PS 156	Part Marking
	PS 110	Hydraulic Pipe Identification (<12mm)
	PS 40	Adhesive Fixing of Labels (Silastic 738 RTV)
	PS 190	Unit Assembly Label Fixing using Cable Ties
9.12	<u>Potting Techniques</u>	
	PS 51	Pretreatment and Surface Coating of PTFE Insulated Cables Prior to Potting
	PS 101	Application of two Package RTV 88 Silicone for Potting Purposes
	PS 76	Procedure for Potting Concorde Linear Transducers
	PS 120	Crystal clear Silicon Potting Compound
9.13	<u>Miscellaneous</u>	
	PS 31	Impregnation of Coil Windings
	PS 104	Impregnation of Oilite Porous Bronze Bearings
	PS 22	Treatment for Solenoid Coil Assemblies
	PS 6	Surface Sealing of Magnesium Alloys
	PS 175	Manufacture of A330/340 Composite Transmission Shafts
	PS 186	Manufacture of Bevel Gears
	PS 199	JSF Titanium Material Procurement & Casting Inspection Requirements
	PS 204	Barrel De-Burring for Non-Ferrous Loads Under 200g
	PS 210	Mechanical Property Sampling of Oversized Aluminium Billets
	PS 209	787 Aluminium Material Procurement & Casting Inspection Requirements for Casting Housing, P677A0160-00
	PCD 75 §	Training for Carburising Personnel

9.14 Material Specifications (MAT)

MAT 100	Additional Requirements for Tool and Die Steel to BS 4659
MAT 101	Requirements for Valve Spring Steel Wire to AS 33A
MAT 102	Requirements for Aluminium Plate to 7075-T7351 with Thickness >75mm
MAT 103	

	Wolver- hampton (Col A)	RotoI / DAG (Col B)	MWL in- house PS (Col C)	Def Std	Boeing FL1	Liebherr LAT FL2, FL3	Avio FL2	International Alternative **
Plating / Passivation								
Bronze Plating	MSPS100. CP.007	PS 111	PCD 2					
Cadmium Plating	MSPS100. CP.004	PS 100	PCD 14	03-19 (RS 116B)		4-3000		
Cadmium Plating of Cuprous Alloys	PS 116		n/a					



	Wolverhampton (Col A)	Rotol / DAG (Col B)	MWL in-house PS (Col C)	Def Std	Boeing FL1	Liebherr LAT FL2, FL3	Avio FL2	International Alternative **
Anodising								
Alocrom 1200 Process	MSPS100.CP.002	PS 114	PCD 4			4-2004	6618F	
Local chemical conversion coating	MSPS100.CP.002		PCD 4 (Part 2)			4-2005		
Chromic Acid Anodising	MSPS100.CP.001	PS 102	PCD 69	03-24 RS 116D		4-2103		
Sulphuric Acid Anodising of Aluminium and Titanium Alloys	MSPS100.CP.001	PS 102	PCD 149	03-25		4-2001/2/3 4-2500	6603F	
Hard Anodising of Aluminium 591.82 4462.h7 Tm0 4								

	Wolver- hampton (Col A)	RotoI / DAG (Col B)	MWL in- house PS (Col C)	Def Std	Boeing FL1	Liebherr LAT FL2, FL3	Avio FL2	International Alternative **
Surface Treatments (incl. machining)								
Pickling of 5145 Forgings	PS 121		n/a					
Cleaning and Surface Preparation of Metallic Materials	PS 8	PS 207	PS 8	03-4	BAC5749			
Shot Peening	MSPS400. MISC.001	PS 123	n/a					
Abrasive Blasting of Metallic Materials	PS 143	PS 200 PS 201	PS 143					
Application of Extrude Hone Process for Surface Finish Improvement	PS 100		PS 100					
Glass Bead Peening	PS 95	PS 134	n/a					
Special Machining Techniques for UHT Steels	PS 138	PS 1* nBT						

Wolver- hampton (Col A)	Rotol / DAG (Col B)	MWL in- house PS (Col C)	Def Std	Boeing FL1	Liebherr LAT FL2, FL3	Avio FL2	International AI 1 602.0ETQ
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Wolver- hampton (Col A)	Rotol / DAG (Col B)	MWL in- house PS (Col C)	Def Std
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	Wolver- hampton (Col A)	RotoI / DAG (Col B)	MWL in- house PS (Col C)	Def Std	Boeing FL1	Liebherr LAT FL2, FL3	Avio FL2	International Alternative **
NDT & other Inspection Techniques								
Etch Inspection of Steel Components	MSPS300. NDT.001	NDT 6	PCD 29		BAC5436			
Bolt Etching Process (Forged Heads)	PS 55	NDT 6	n/a					
Hardness Inspection of Metallic Materials	PS 111		PS 111					
Magnetic Particle Inspection	PS 74	NDT 2&3 PS 400	PS 74		BAC5424 BSS7040	7-4900	9400F	ASTM E1444
Fluorescent Penetrant Inspection	PS 79	NDT 3&8						

