

HVOF for Landing Gear

Replacement of Hard Chrome Plating
Program Review Meeting
19-21 July 2004
Yarrow Resort & Conference Center
Park City, Utah

D. Hetherington
Messier- Dowty Inc.



SERVICE - DATE

Stress Considerations

- ▶ **HVOF on 4340 does not exhibit a fatigue deficit over chromium at any stress level, but a conservative KT of 1,35 will be applied as with 300M.**
- ▶ **A conservative limit of 1260 MPa will be applied for both bending and axial loading for a .003-.005” thick coating of HVOF.**
- ▶ **Available information suggests equal to superior maximum bearing pressures for HVOF over Chromium plating.**

- ▶ **Messier-Dowty internal specs written to control HVOF coating definition and processing requirements**
 - **DSS-5351 Drawing Requirements**
 - **PCS-2560 Application Requirements**
 - **PCS-4102 Grinding Requirements**

▶ Requirements controlled by DSS-5351

- **Thickness**

- .003 - .005 in.

- **Runout**


- .008 in. edge taper occurring within .08 max runout band

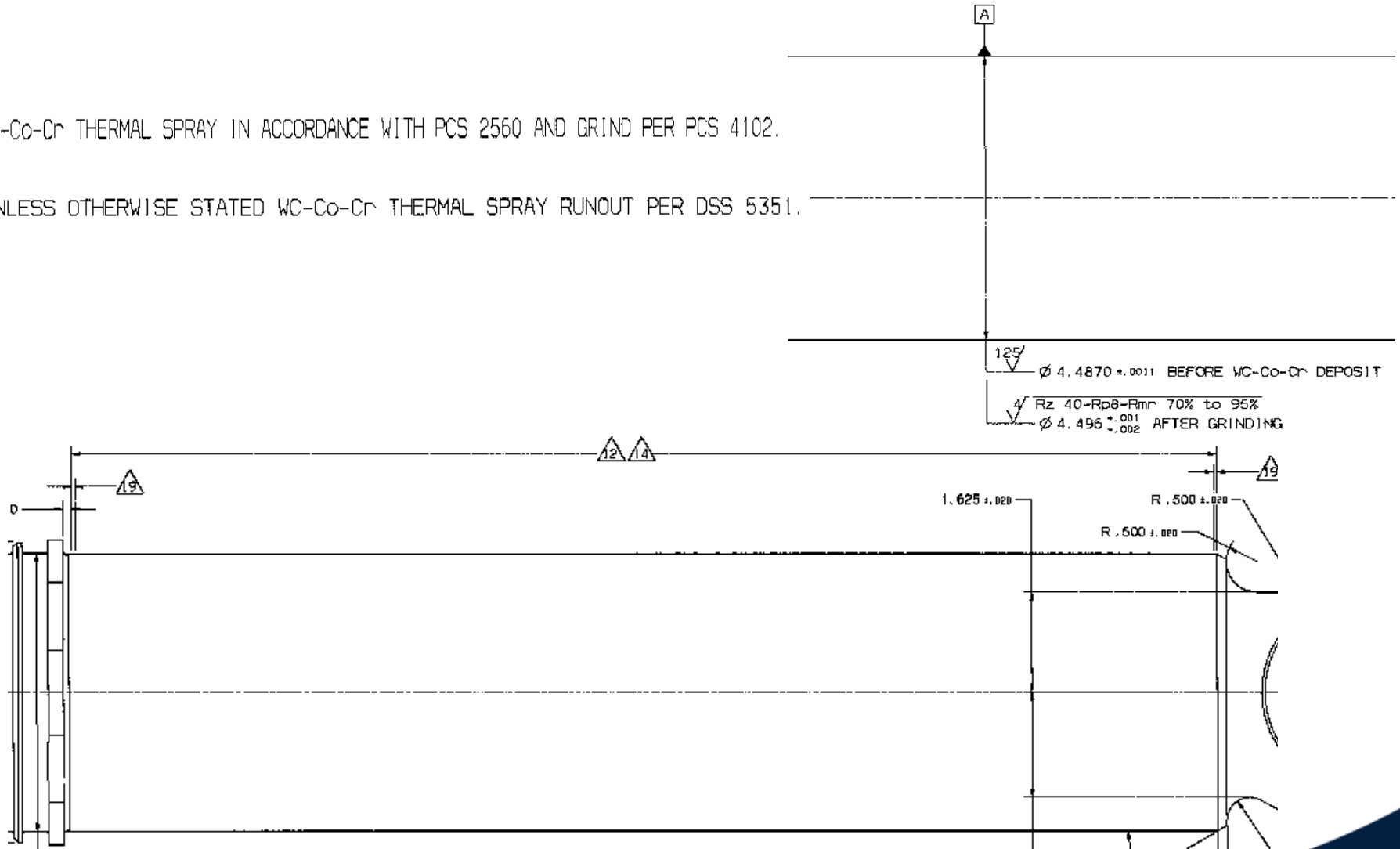
- **Surface Finish**

- Ra = 125 μin max before coating
- For a hydraulic oil seal the requirements are:
 - ▼ Ra = 4 μin max.
 - ▼ Rz = 40 μin max.
 - ▼ Rp = 8 μin max.
 - ▼ Rmr = 70 to 95%, c=5% and at ,25 Rz evaluation depth max.
- For grease seals and bushing interfaces the requirements are:
 - ▼ Ra = 8 μin max.
 - ▼ Rz = 80 μin max.
 - ▼ Rp = 32 μin max.
 - ▼ Rmr = 50 to 80%, c=5% and at ,25 Rz evaluation depth max.

Drawings (cont.)

 WC-Co-Cr THERMAL SPRAY IN ACCORDANCE WITH PCS 2560 AND GRIND PER PCS 4102.

 UNLESS OTHERWISE STATED WC-Co-Cr THERMAL SPRAY RUNOUT PER DSS 5351.



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≡ Test Experience

▶ F/A-18 E/F NLG Fatigue Test

- Did not meet test criteria as a technology demonstrator
- Test rig failed as result of applying significantly higher loads
- Coating did not fail as a result of experiencing higher loads

▶ F/A-18 E/F NLG Drag Brace Endurance Fatigue Test

- Met the test criteria as a technology demonstrator

▶ CL601RJ Flight Testing

- Coating has no visual indications of wear after 5000 cycles
- No reported leakage, elastomeric seals have worn

≡ Test Experience (cont.)

- ▶ **Falcon 7X and A380 Qualification Testing being set up**
 - **Endurance, Strength, Fatigue, etc.**