BOMBARDIER
Toronto Site
PROPRIETARY INFORMATION

PPS 33.02

PRODUCTION PROCESS STANDARD

REMOVAL OF METALLIC COATINGS

Issue 18
- This standard supersedes PPS 33.02, Issue 17.
- Vertical lines in the left hand margin indicate technical changes over the previous issue.
- Direct PPS related questions to christie.chung@aero.bombardier.com or (416) 375-7641.
- This PPS is effective as of the distribution date.

Signed original on file. Validation of paper prints is the responsibility of the user.

Prepared By:	(Chung Chung)	March 10, 2016
	PPS Group	
Approved By:	(*K. Quon*, for Bruce Campbell)	March 14, 2016
	Materials Technology	
	(Stephen Pitt)	March 21, 2016
	Quality	

TABLE OF CONTENTS

Sections **Page**

Tables

Flow Charts

1 SCOPE

1.1 This Production Process Standard (PPS) specifies the procedure and requirements for the removal of metallic coatings from ferrous and non-ferrous aircraft parts.

1.1.1 This PPS complements the engineering drawings that specify its use as an authorized instruction. The procedure specified in this PPS shall be followed to ensure compliance with all applicable specifications. In general, if this PPS conflicts with the engineering drawing, follow the engineering drawing. The requirements specified in this PPS are necessary to fulfil the engineering design and reliability objectives.

1.1.2 Refer to PPS 13.26 for the subcontractor provisions applicable to this PPS.

1.1.3 Procedure or requirements specified in a Bombardier BAPS, MPS, LES or P. Spec. do not supersede the procedure or requirements specified in this PPS. Similarly, the procedure and requirements specified in this PPS are not applicable when use of a BAPS, MPS, LES or P. Spec. is specified.

2 HAZARDOUS MATERIALS

2.1 Before receipt at Bombardier Toronto, all materials shall be approved and assigned Material Safety Data Sheet (MSDS) numbers by the Bombardier Toronto Environment, Health and Safety Department. Refer to the manufacturer's MSDS for specific safety data on any of the materials specified in this PPS. If the MSDS is not available, contact the Bombardier Toronto Environment, Health and Safety Department.

3 REFERENCES

3.1 PPS 13.13 - Personal Protective Respiratory Equipment.

3.2 PPS 13.26 - General Subcontractor Provisions.

3.3 PPS 13.39 - Bombardier Toronto Engineering Process Manual.

3.4 PPS 30.04 - Steel Heat Treatment - Carbon and Low Alloy Steels.

3.5 PPS 30.06 - Heat Treatment of Precipitation Hardenable (PH) Stainless Steels.

3.6 PPS 30.08 - Heat Treatment of Martensitic Stainless Steels.

3.7 PPS 31.03 - Cleaning of Carbon and Low Alloy Steels.

3.8 PPS 31.04 - Degreasing Processes.

3.9 QDI-09-02 - Process Control - *Bombardier Toronto internal Quality procedure.*

4 MATERIALS, EQUIPMENT AND FACILITIES

4.1 Materials

4.1.1 Refer to Table I for the applicable stripping media for various metallic coatings on Bombardier Toronto aircraft parts.

4.1.2 Maskant (e.g., Micro-Stop lacquer).

4.1.3 Maskant remover (e.g., Microstrip solvent).

4.2 Equipment

4.2.1 Protective gloves, rubber (e.g., DSC 422-2) or neoprene (e.g., DSC 422-5).

4.2.2 Bombardier approved rubber aprons.

4.2.3 Bombardier approved chemical splash goggles.

4.3 Facilities

4.3.1 This PPS has been categorized as a Controlled Special Process according to PPS 13.39 and as such only facilities specifically approved according to PPS 13.39 are authorized to perform the removal of metallic coatings from ferrous and non-ferrous aircraft parts according to this PPS.

4.3.2 Bombardier subcontractors shall direct requests for approval to Bombardier Aerospace Supplier Quality Management. Bombardier Aerospace facilities shall direct requests for approval to the appropriate internal Quality Manager.

4.3.3 Facility approval shall be based on a facility report, a facility survey and completion of a qualification test program, if required. The facility report shall detail the materials and equipment to be used, the process sequence to be followed and the laboratory facilities used to show compliance with the requirements of this PPS. Any deviation from the procedure or requirements of this PPS shall be detailed in the facility report. Based upon the facility report, Bombardier Toronto Engineering may identify additional qualification and/or process control test requirements. During the facility survey, the facility requesting qualification shall be prepared to demonstrate their capability. Once approved, no changes to subcontractor facilities may be made without prior written approval from Bombardier Aerospace Supplier Quality Management.

4.3.3.1 For approval of subcontractor facilities to perform the removal of metallic coatings from ferrous and non-ferrous aircraft parts according to this PPS, completion of a test program and submission of suitable test samples representative of production parts may be required. Test samples shall meet the requirements specified by Bombardier Toronto Engineering.

5 PROCEDURE

5.1 General

5.1.1 For the purposes of this standard, the term “metallic coatings” shall include the various types of platings and aluminum coatings applied to Bombardier Toronto aircraft parts according to the engineering drawing or process standard.

5.1.2 Except as noted in paragraph 5.1.2.1, stripping of a metallic coating shall be done by the subcontractor responsible for the application of the coating.

5.1.2.1 Stripping of aluminum spray coating (M1) from carbon and low alloy steel parts having a tensile strength of 180 - 200 ksi and under may be performed at Bombardier Toronto using Rust-Off #2 according to PPS 31.03.

5.2 Stripping Processes

5.2.1 Table I specifies stripping processes for various metallic coatings.

5.2.2 Carry out the removal of the various metallic coatings according to Flow Chart 1.

5.2.3 In order to prevent etching of the substrate metal, do not leave parts in the stripping baths any longer than is necessary to remove the coating completely.

5.2.4 If stripping is to be localized, mask as required (see paragraph 4.1.2).

TABLE I - APPLICABILITY OF STRIPPING PROCESSES TO METALLIC COATINGS

METALLIC COATING			SUBSTRATE METAL	STRIPPING BATH (NOTE 1) OR MEDIA
TYPE	CODE	PPS		
Cadmium	E1	33.01	Carbon and low alloy steel, stainless steel, copper and copper alloys	Immerse in Rust-Off #2 or in ammonium nitrate
Hard Chromium	E2	33.04	Carbon and low alloy steel, stainless steel	Immerse in M-629 Maintain stripping rate of approximately 0.003" per hour at 100°F
Decorative Chromium	E5 E6	33.07	Carbon and low alloy steel	
Electrodeposited Nickel	E3	33.03	Carbon and low alloy steel, stainless steel, copper alloys	Immerse in Strip-Aid (7% sodium cyanide) for approximately 10 minutes
Electroless Nickel	E4	33.06	Carbon and low alloy steel	Immerse in IN-S Stripper Maintain stripping rate of approximately 0.0005" per hour at 150°F or in Enstrip S (60 g/L Enstrip S to 90 g/L sodium cyanide) operating at 70 - 140°F for the time as required
Copper	E7	33.05	Carbon and low alloy steel	Immerse in Strip-Aid (12% sodium cyanide) for 10 - 15 minutes or in Enstrip S (60 g/L Enstrip S to 120 - 180 g/L sodium cyanide) operating at 70 - 140°F for the time as required
Silver	-	33.08	Aluminum bronze	Immerse in sodium cyanide solution as anode. Strip at 4 volts and 10 - 20 amps per square foot
Nickel-Boron (Nibron)	-	33.09	Carbon and low alloy steel	Immerse in Dinacon S-70
			Nickel alloys	Immerse in 50% nitric acid solution
Aluminum Spray Coating	M1	24.01	Carbon and low alloy steel below 200 - 220 ksi	Immerse in 20-25% sodium hydroxide solution (Note 2) or Rust-Off #2
			Carbon and low alloy steel 200 - 220 ksi and over	Immerse in 20-25% sodium hydroxide solution (Note 2)
Ion Vapour Deposited Aluminum Coating	M2	24.02	Carbon and low alloy steel, stainless steel	Immerse in 20-25% sodium hydroxide solution (Note 2)
			Aluminum alloys	Lightly abrasive blast using 200 grit aluminum oxide at a maximum pressure of 60 psig according to PPS 17.02 (Note 3)

Note 1. Where stripping rate or total stripping time is not indicated, immerse parts until completely stripped (see paragraph 5.2.3).
Note 2. Once monthly at Bombardier Toronto, the Laboratory shall analyze the sodium hydroxide solution to ensure a concentration of 20 - 25%.
Note 3. Where parts do not have close tolerances, 100% removal of the IVD coating is not necessary, provided all loose or poorly adhering coating is removed.

5.3 Post Stripping Procedure

5.3.1 Maskant Removal

5.3.1.1 Unless masked parts are to be re-plated, remove the maskant (see paragraph 4.1.3) after stripping of parts is complete.

5.3.2 Embrittlement Relief

5.3.2.1 Except for paragraph 5.3.2.1.1, parts which were embrittlement relieved after plating and are to be re-plated within 4 hours of completion of the stripping operation do not require embrittlement relief.

5.3.2.1.1 Embrittlement relieve the following parts according to PPS 30.04, PPS 30.06 or PPS 30.08, as applicable, within 4 hours of stripping:

- Parts with a tensile strength range of 150 - 170 ksi or greater
- martensitic corrosion resistant steel parts with a tensile strength range of 150 - 170 ksi or greater
- Coil springs which are stressed during plating
- Parts heat treated to a range of 220 - 240 ksi or greater.

6 REQUIREMENTS

6.1 Except as noted in paragraph 6.1.1, there shall be no visible signs of plating or metallic coating remaining on parts after stripping.

6.1.1 If parts do not have close tolerances, 100% removal of ion vapour deposited aluminum coating (M2) is not necessary, provided all loose or poorly adhering coating is removed.

6.2 There shall be no evidence of pitting or etching of the stripped surfaces after removal of plating.

7 SAFETY PRECAUTIONS

7.1 Observe standard plant safety precautions when performing the procedure specified herein.

7.2 Wear Bombardier approved chemical splash goggles, rubber aprons, and protective rubber or neoprene gloves when handling chemicals and solutions.

7.3 Wear protective respiratory equipment according to PPS 13.13 when working with stripping solutions.

7.4 Ensure adequate ventilation is supplied to the areas where stripping bath is being used.

7.5 Avoid eye contact with caustic or acid solutions. If eye contact occurs, immediately flush eyes in a directed stream of water for at least 15 minutes while forcibly holding eyelids apart to ensure complete irrigation of all eye and lid tissue. Contact the Health Centre and a physician.

7.6 Avoid skin contact with caustic or acid solutions. If skin contact occurs, wash the affected area immediately with large quantities of water. If irritation of the skin occurs, contact the Health Centre immediately.

7.7 Avoid ingestion of caustic or acid solutions. If ingestion occurs, do not induce vomiting. Drink large amounts of water, but never give anything by mouth to an unconscious person. Immediately contact the Health Centre and a physician.

8 PERSONNEL REQUIREMENTS

8.1 This PPS has been categorized as a Controlled Special Process according to PPS 13.39. Refer to PPS 13.39 for personnel requirements.

9 MAINTENANCE OF SOLUTIONS

9.1 Analyze stripping baths at regular intervals so that proper concentrations and operating conditions are maintained.

9.2 Prepare and maintain records of all solution tests according to applicable facility Quality specifications (e.g., QDI-09-02). If additions are required, then indicate in the report the amount to be added. Re-test the solution within 24 hours of any adjustment.

10 DISPOSAL OF CHEMICAL WASTES

10.1 Dispose of all chemical solutions according to national legislation and local regulations. At Bombardier Toronto, dispose of chemical wastes according to EHS-OP-005.

FLOW CHART 1 - STRIPPING OF METALLIC COATINGS