BOMBARDIER
Toronto (de Havilland)
PROPRIETARY INFORMATION

PPS 27.07

PRODUCTION PROCESS STANDARD

Vibratory Tumble Deburring

Issue 6
- This standard supersedes PPS 27.07, Issue 5.
- Vertical lines in the left hand margin indicate changes over the previous issue.
- Direct PPS related questions to PPS.Group@aero.bombardier.com or (416) 375-4365.
- This PPS is effective as of the distribution date.

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1 Scope

1.1 This PPS (Production Process Standard) specifies the procedure and requirements for vibratory tumble deburring of 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 must 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 (de Havilland), all materials must be approved and assigned Material Safety Data Sheet (MSDS) numbers by the Bombardier Toronto (de Havilland) 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 (de Havilland) Environment, Health and Safety Department.

3 References

3.1 PPS 13.26 - General Subcontractor Provisions.

3.2 PPS 16.02 - Application of Hot-Dip Strippable Protective Compound.

3.3 PPS 16.20 - Temporary Corrosion Protection of Carbon and Low Alloy Steel Parts.

3.4 PPS 20.03 - Fluorescent Penetrant Inspection.

3.5 PPS 27.11 - Automatic Belt and Rotary Disc Deburring.

3.6 PPS 31.04 - Degreasing Processes.

3.7 PPS 31.17 - Solvent Usage.

4 Materials and Equipment

4.1 Materials

4.1.1 Finishing compound (e.g., Vibra-Glo L-460). Use only finishing compound which will have no adverse affect on parts.

4.1.2 Abrasive media. Use only abrasive media which will have no adverse affect on parts. The following abrasive media is in use at Bombardier Toronto (de Havilland):

- F-33 ACE stones, 3/4" x 3/8" x 1".

4.2 Equipment

4.2.1 Vibratory tumble deburring machine capable of deburring parts meeting the requirements of this PPS. The following are vibratory tumble deburring machine is used at Bombardier Toronto (de Havilland):

- VIBRA FINISH Model VF-14U Vibratory Finishing Machine, CE 7851.

5 Procedure

5.1 General

5.1.1 Vibratory deburring consists of tumbling (by means of a controlled vibrating tub) a number of parts, together with a suitable abrasive media, to remove burrs and to give a radius to the edges of machined and fabricated metal and plastic parts.

5.1.2 As an alternative to vibratory tumble deburring as specified herein, it is acceptable to **deburr** flat aluminum sheet metal parts using an automatic belt and/or disc deburring machine according to PPS 27.11 provided that the part size is within the limits of acceptability of the deburring machine (e.g., for the Timesavers Inc. Series 2200 deburring machine used at Bombardier Toronto (de Havilland) refer to Table 1 for the part size limits).

Table 1 - Timesavers Inc. Series 2200 Deburring Machine Capacity

THICKNESS LIMITS	WIDTH LIMITS	MINIMUM SURFACE AREA
0.020"- 0.125"	0.75" - 36"	0.6 sq. in.

5.2 Restrictions

5.2.1 Choose the size of the parts to be deburred so that the number of parts in one load makes the process economical.

5.2.2 For parts for which fluorescent penetrant inspection is specified, perform fluorescent penetrant inspection according to PPS 20.03 before vibratory deburring.

5.2.3 Do not vibratory deburr transparent or decorative finished plastic parts.

5.2.4 Due to differing hardnesses, do not process any of the following groups of material with any other material group:

- Carbon or low alloy steels
- Corrosion resistant steels
- Aluminum or aluminum alloys
- Titanium or titanium alloys
- Magnesium alloys
- Nickel base alloys
- Copper base alloys
- Plastics

5.2.5 Refer to Table 2 for a listing of the machine size, part applicability and tumbling media used in the machine used at Bombardier Toronto (de Havilland).

Table 2 - Vibra-Finish VF-14U Machine Capacity and Applicability

DEBURRING MACHINE	TUB SIZE	TUMBLING MEDIA	APPLICABILITY
Vibra-Finish VF-14U	2 sections: 14" x 22" x 10" & 14" x 72" x 10"	F-33 ACE ellipses	General purpose use for all machined parts, threaded parts, extrusions and sheet metal details, including clad aluminum parts.

5.3 Preparation of Parts

5.3.1 Degrease parts contaminated with oil, grease or non-water soluble cutting fluid according to PPS 31.04, or solvent clean according to PPS 31.17 before deburring.

5.3.2 Mask any close tolerance threads with plastic caps or hot-dip strippable compound according to PPS 16.02.

5.3.3 Mask any close tolerance holes and bores with suitable plastic plugs or masking tape.

5.3.4 Tie batches of small parts together using aluminum wire and aluminum spacers, to make it easier to recover them from the deburring tub. Alternatively, parts may also be loaded in a round steel cage to facilitate the recovery of vibratory tumble deburred parts.

5.4 Set-Up and Operation of Vibratory Deburring Equipment

5.4.1 Load the tub of the deburring machine with the appropriate abrasive media to a level approximately equal to 3/4 of the total tub volume. Replenish the abrasive load with new abrasive media as necessary to maintain this level.

5.4.2 If running the Vibra-Finish VF-14U in automatic mode, set-up the machine for operation as follows:

Step 1. Select the desired cycle time on the AUTO CLEAN CYCLE TIMER dial.

Step 2. Set the CONTROL selector switch to AUTO.

Step 3. Set the VIBRATOR SPEED selector switch to HIGH, and press the AUTO & MAN START button (green). The finishing compound pump will start automatically.

Step 4. The machine will run until the AUTO CLEAN CYCLE TIMER times out, when the machine will stop and a red light will flash.

Step 5. Press the ACKNOWLEDGE FLASHING LIGHT button (black) to stop the flashing light and reset the timer.

5.4.3 For the Vibra Finish VF-14U in manual mode, set the metering pump speed to 80, initially.

5.4.4 Adjust the flow of the water and finishing compound mixture, as required, to keep the load of parts and abrasive media in the tub wet. The correct ratio of finishing compound to water will keep the abrasive media and the parts clean and free from surface deposits and will show a slight bubble or foam in the mixture during deburring. Insufficient finishing compound will leave parts and media dirty, while too much finishing compound will cause excessive foaming.

5.4.5 Except as noted herein, operate vibratory tumble deburring machines according to the manufacturers instructions.

5.5 Deburring of Parts

5.5.1 With the machine set up and operating according to section 5.4, distribute the parts evenly throughout the abrasive media to reduce the possibility of impingement of parts on one another.

5.5.2 It is recommended that a record of the number of parts being processed at any one time be kept to ensure retrieval of all parts at the completion of processing.

5.5.3 The time that the parts remain in the tub varies according to the degree of burring, nature of the part, hardness of the material, etc. Make spot checks on work in process to determine when the parts are sufficiently deburred. Do not deburr parts any longer than is necessary to remove burrs and sharp edges.

5.6 Removal of Parts

5.6.1 Remove the finished parts from the deburring tub by hand while the machine is running.

5.6.2 Verify that the total number of parts removed from the deburring tub agrees with the number of those parts in process, to ensure that all the parts have been recovered.

5.7 Post-Deburring Procedure

5.7.1 Wash all parts thoroughly in water to remove residue of the abrasive media and finishing compound, and then dry them using compressed air.

5.7.2 Oil-treat ferrous metal parts according to PPS 16.20 if the parts will be in transit to and from sub-contractors or in long term (6 months) storage. Otherwise, parts require no further cleaning or treatment except for pre-cleaning before anodic or organic surface treatment.

6 Requirements

6.1 Vibratory tumble deburred parts must be clean and free from surface residue or holes and the edges of the part must be completely free from burrs with a slight radius on all edges. Evidence of saw or cutter marks on cut edges is acceptable provided that none of the marks exceed 0.010" in depth.

6.2 Ensure that deburred parts are not nicked, or otherwise damaged through impingement of parts on one another. Parts with evidence of such damage are not acceptable.

7 Safety Precautions

7.1 Observe general shop safety precautions when performing the procedure specified herein.

7.2 Refer to the equipment manufacturers operating instructions for additional safety precautions.

8 Personnel Requirements

8.1 Personnel responsible for vibratory tumble deburring must have a good working knowledge of the procedure and requirements as specified herein and must have exhibited their competency to their supervisor.

9 Maintenance of Equipment

9.1 It is recommended that all maintenance and repairs on machines and associated equipment be performed according to the manufacturers' instructions.