



# **STANDARD OVERHAUL PRACTICES MANUAL**

## **GRINDING OF CHROME PLATED PARTS**

**PART NUMBER  
NONE**

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PUBLISHED BY BOEING COMMERCIAL AIRPLANES GROUP, SEATTLE, WASHINGTON, USA  
A DIVISION OF THE BOEING COMPANY  
PAGE DATE: Jul 01/2009

**20-10-04**

Page 1  
Jul 01/2009



## STANDARD OVERHAUL PRACTICES MANUAL

Revision No. 17  
Jul 01/2009

To: All holders of GRINDING OF CHROME PLATED PARTS 20-10-04.

Attached is the current revision to this STANDARD OVERHAUL PRACTICES MANUAL

The STANDARD OVERHAUL PRACTICES MANUAL is furnished either as a printed manual, on microfilm, or digital products, or any combination of the three. This revision replaces all previous microfilm cartridges or digital products. All microfilm and digital products are reissued with all obsolete data deleted and all updated pages added.

For printed manuals, changes are indicated on the List of Effective Pages (LEP). The pages which are revised will be identified on the LEP by an R (Revised), A (Added), O (Overflow, i.e. changes to the document structure and/or page layout), or D (Deleted). Each page in the LEP is identified by Chapter-Section-Subject number, page number and page date.

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**20-10-04**

TRANSMITTAL LETTER

Page 1

Jul 01/2009

PART NUMBER NONE



## STANDARD OVERHAUL PRACTICES MANUAL

### Location of Change

20-10-04

PGBLK 20-10-04-0

### Description of Change

Added clarification for surface grinding on cylindrical surfaces.

# 20-10-04

HIGHLIGHTS

Page 1

Jul 01/2009



## STANDARD OVERHAUL PRACTICES MANUAL

Subject/Page	Date	Subject/Page	Date	Subject/Page	Date
TITLE PAGE					
O 1	Jul 01/2009				
2	BLANK				
20-10-04 TRANSMITTAL LETTER					
O 1	Jul 01/2009				
2	BLANK				
20-10-04 HIGHLIGHTS					
O 1	Jul 01/2009				
2	BLANK				
20-10-04 EFFECTIVE PAGES					
1	Jul 01/2009				
2	BLANK				
20-10-04 CONTENTS					
1	Nov 01/2006				
2	BLANK				
20-10-04 REVISION RECORD					
1	Jul 01/2005				
2	Jul 01/2005				
20-10-04 RECORD OF TEMPORARY REVISIONS					
1	Jul 01/2005				
2	Jul 01/2005				
20-10-04 INTRODUCTION					
1	Jul 01/2005				
2	BLANK				
20-10-04 SUBJECT					
1	Nov 01/2006				
R 2	Jul 01/2009				
R 3	Jul 01/2009				
4	Jul 01/2005				
5	Mar 01/2007				
6	Nov 01/2006				

A = Added, R = Revised, D = Deleted, O = Overflow

**20-10-04**

EFFECTIVE PAGES

Page 1

Jul 01/2009



STANDARD OVERHAUL PRACTICES MANUAL

TABLE OF CONTENTS

<u>Paragraph Title</u>	<u>Page</u>
GRINDING OF CHROME PLATED PARTS	1
INTRODUCTION	1
GRINDING PROCEDURES	1
POST GRIND BAKE FOR ALUMINUM	2
QUALITY CONTROL	3
APPLICATION OF WIPED-ON PRIMER	5
REWORK	5

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## STANDARD OVERHAUL PRACTICES MANUAL

### INTRODUCTION

#### 1. General

- A. The instructions in this manual tell how to do standard shop procedures during maintenance functions from simple checks and replacement to complete shop-type repair.
- B. This manual is divided into separate sections:
  - (1) Title Page
  - (2) Transmittal Letter
  - (3) Highlights
  - (4) Effective Pages
  - (5) Contents
  - (6) Revision Record
  - (7) Record of Temporary Revisions
  - (8) Introduction
  - (9) Procedures
- C. Refer to SOPM 20-00-00 for a definition of standard industry practices, vendor names and addresses, and an explanation of the True Position Dimensioning symbols used.
- D. The data is general. It is not about all situations or specific installations. Use it as a guide to help you write minimum standards.
- E. If the component overhaul instructions are different from the data in this subject, use the component overhaul instructions.

**20-10-04**

INTRODUCTION

Page 1

Jul 01/2005



## STANDARD OVERHAUL PRACTICES MANUAL

### GRINDING OF CHROME PLATED PARTS

#### 1. INTRODUCTION

- A. The data in this subject comes from Boeing Process Specification BAC5032. The airline has a copy of the Boeing Process Specification Manual.
- B. This subject contains recommended procedures for grinding and honing of chromium-plated surfaces. The procedures are important because incorrect procedures can cause cracks and heat damage to the chrome plate and the base metal.
- C. Do not grind the special thin dense chrome plate (BAC5709, Class 4, SOPM 20-42-03). This chrome plate is applied to get the final dimension during the plating procedure itself.

#### 2. GRINDING PROCEDURES

- A. Surface Preparation
  - (1) To prevent contamination of cutting fluids and the grinding wheel, remove oil, dirt, or unwanted matter. This includes protective coatings, unless they are protection for other plating as noted below.
  - (2) If the chrome plate to be ground is on parts which also have cadmium or cadmium-titanium plating, make sure the cadmium or cadmium-titanium plating has the protection of BMS 10-11, Type 1 primer (if primer is specified by the overhaul instructions), or give this plating the protection of Type 4, Class 3 chemical processing tape per BAC5034 (SOPM 20-44-02) (for surfaces such as threads) or plugs (for close-tolerance holes).
- B. Dressing of Grinding Wheel
  - (1) Dress the wheel frequently and also when the chrome plated surface is less than 0.003 inch from the finish dimension.
  - (2) Turn the diamond nib frequently to apply the maximum radius of the nib to the grinding wheel.
  - (3) Use a nib cross speed for dressing the wheel sufficient for the grade and abrasive of the wheel.
- C. Coolant
  - (1) Give the interface between the wheel and the part surface a good flow of continuously filtered cutting fluid.
  - (2) For external grinds, put the nozzle in a position to apply a stream of fluid at the point where the grinding wheel touches the part surface.
  - (3) For internal grinds, it is not necessary for the fluid to directly hit the point of grinding. But there must be a sufficient volume of fluid to cool the part and remove the grinding sludge.
- D. Be very careful when you grind with the side of the wheel. A large contact area can put too much heat into the part. If you must grind with the side of the wheel, use cupped or dished grinding wheels to decrease the area of contact.
- E. Grinding Details
  - (1) Wheel Speed
    - (a) For surface and OD cylindrical grinding, use a maximum speed of 6500 surface feet per minute (sfm). If possible, use a speed below 3000 sfm.
    - (b) For internal grinding, use a maximum speed of 6500 sfm.
  - (2) Downfeed or Infeed
    - (a) To prevent too much infeed, find the high spots before you start to grind.

# 20-10-04



## STANDARD OVERHAUL PRACTICES MANUAL

- (b) For surface and OD cylindrical grinding, use a maximum of 0.0005 inch per pass until you get to 0.0010 inch from the finish dimension surface. Then use 0.0002 inch maximum per pass to get to the finish dimension surface.
- (c) For plunge grinding with automatic equipment, feed at 0.0001 inch maximum per revolution of the part. For plunge grinding with manual equipment, use a gradual infeed (approximately 0.0001 inch maximum per revolution of the part) and do not force the wheel into the part. Let the sparks from each infeed stop before the next infeed.
- (3) Work Speed
  - (a) The speed is important. When possible, use the maximum speed available. Usually this is 60 sfm on surface grinders.
  - (b) Rotational speeds could permit higher surface speeds (related to work diameters on cylindrical grinders) and speeds above 200 sfm are recommended when possible.
- (4) Crossfeed
  - (a) For surface grinding, use a maximum of 1/4 of the wheel width per pass.
  - (b) For cylindrical and internal grinding, use a crossfeed that agrees with the surface finish and tolerance requirements. A 5-10 inch per minute crossfeed is recommended to help control the surface finish and diametrical tolerances.

**NOTE:** Usually when a crossfeed procedure is used, the wheel must go in both directions for each infeed during the final passes.

- (c) Plunge grinding procedures can be used to grind plated areas adjacent to shoulders which cannot be ground with a crossfeed. Use the same limits as Paragraph 2.E.(2)(c) above.
- F. Honing – When parts are chrome plated not more than 0.002 inch thickness oversize, the surfaces can be honed to final dimensions. Use standard industry practices.
- G. Grinding Wheel Specifications – See Table 1. Use a wheel of the minimum hardness in the range given, if the wheel can keep the surface within the specified surface smoothness and dimensional tolerance limits.

**Table 1: Grinding Wheel Data**

Abrasive (Alundrum or Aluminum Oxide)	Type of Grinding		
	Surface	Cylindrical OD	Cylindrical ID
Grain (Grit) Size	46-90	46-90	46-120
Bond Strength	G-I	H-K	H-K
Structure Density	8-12	6-10	6-10
Bond Type	Vitrified	Vitrified	Vitrified

### 3. POST GRIND BAKE FOR ALUMINUM

- A. After you grind or hone the chrome plating on aluminum parts, bake the parts for 1 hour at 175-225°F or put them in boiling water for 1 hour.

# 20-10-04



## STANDARD OVERHAUL PRACTICES MANUAL

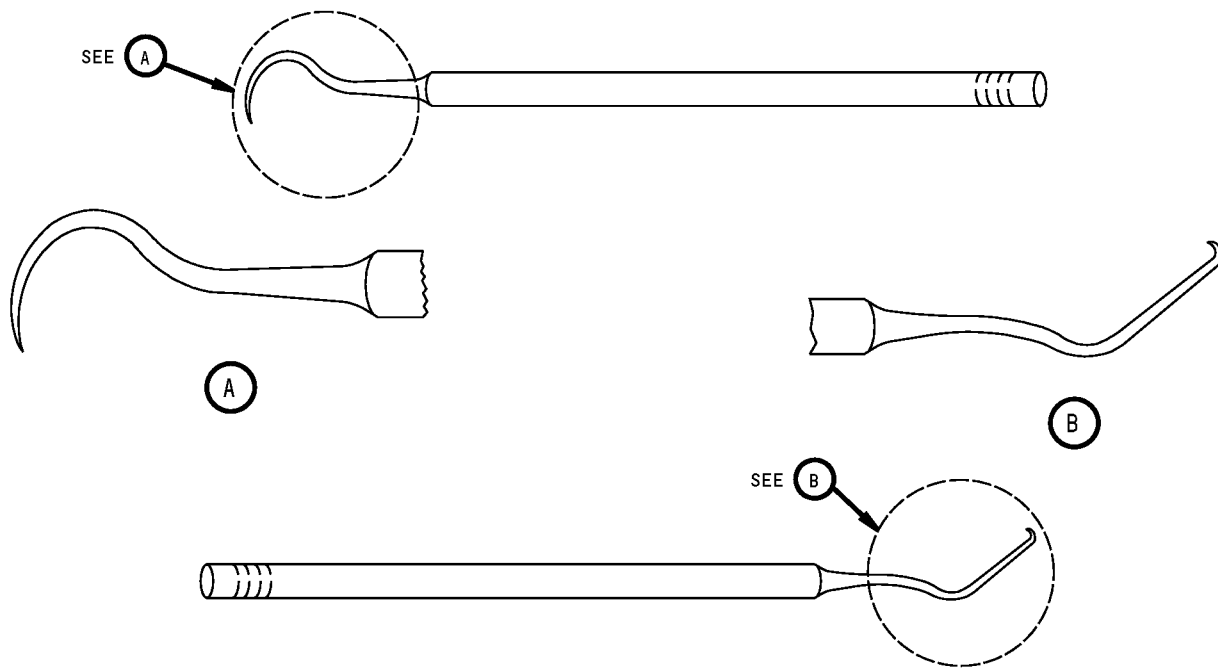
### 4. QUALITY CONTROL

- A. Visually examine the ground chrome plated surfaces without magnification and with lighting at an angle. Examine from different directions to make sure there are no cracks. There must be no sign of heat damage (indicated by bubbles in the chrome, bad colors, or darkened streaks), cracks, tears, cold flow (metal rubbed into adjacent areas), warped plating or base metal (indicated by plating not visually smooth after grinding), or surface defects other than the usual grinding marks.
- B. For the optional Barkhausen inspection procedure, refer to BAC5653.
- C. Unless the overhaul instructions are different, after grinding, magnetic particle examine (SOPM 20-20-01) the steel parts heat-treated 180 ksi or higher to look for cracks in the base metal.
- D. If penetrant inspection after grinding is specified by the overhaul instructions, penetrant examine (SOPM 20-20-02) at the high sensitivity level.
- E. You can also find cracks in the plating by a sudden drag or catch when you rub the surface with the sharp point of a dental explorer (Figure 1).

# 20-10-04



## STANDARD OVERHAUL PRACTICES MANUAL



SINGLE-END DENTAL EXPLORERS SUCH AS THESE ARE AVAILABLE FROM ANY DENTAL SUPPLY HOUSE. THE ENDS SHOWN CAN ALSO BE COMBINED IN A DOUBLE-END EXPLORER. KEEP THE POINTS SHARP WITH FINE ABRASIVE PAPER, OR REPLACE THE EXPLORERS WHEN THE POINTS BECOME TOO WORN TO FIND THE CRACKS IN THE CHROME PLATING.

Example Dental Explorers  
Figure 1

**20-10-04**



## STANDARD OVERHAUL PRACTICES MANUAL

### 5. APPLICATION OF WIPED-ON PRIMER

- A. This procedure is recommended to fill the fine cracks in the chrome plate with primer to increase corrosion resistance. This procedure could also decrease liquid or gas leakage under seals.
- B. This procedure is optional unless specified by the overhaul instructions.
- C. The procedure details given below come from drawing 60B10031. Equivalent procedures can be used, such as wiped-on primer (F-19.451) (preferred) or (F-19.45) (SOPM 20-41-01) which is the wiped-on primer procedure specified on finish control drawing 65B19999.
- D. Apply this primer to chrome plate after you grind it and after you apply such finishes as cadmium plate or phosphate treatment.
- E. Application Procedure
  - (1) Vapor degrease the chrome plated surface per SOPM 20-30-03.
  - (2) With cheesecloth or equivalent, apply a large amount of BMS 10-11, Type 1 primer to the chrome plated surface and the chrome runout area. Rub the primer into the chrome plating with a vigorous scrubbing motion. Scrub each square foot of surface for 15-30 seconds. If primer gets onto adjacent surfaces, remove this primer per Paragraph 5.E.(3).
  - (3) Before the primer dries, remove unwanted wet primer with a clean dry cloth. Do not use a solvent.
  - (4) Cure the primer per SOPM 20-41-02.
  - (5) Apply primer to other surfaces as necessary per overhaul instructions. You can do this before you cure the wiped-on primer if you keep all cleaning fluids and equivalent agents away from the primed chrome plated surface.

### 6. REWORK

- A. As an alternative to removal of chrome plate by chemical stripping per SOPM 20-30-02, you can grind it off. Use the applicable procedure for the base metal as given below.
- B. Alloy steels
  - (1) Grind as necessary per Paragraph 2.
  - (2) Etch examine the areas per SOPM 20-10-02. Reject parts with rehardening or tempering burns.
  - (3) Stress relieve per SOPM 20-10-02. If the stress relief temperature will be above 400°F, remove all cadmium plating before you stress relieve.
  - (4) Magnetic particle examine per SOPM 20-20-01.
  - (5) If the stress relief temperature was above 400°F or if metal removal was more than 10% of the shot peening intensity, shot peen the part again per SOPM 20-10-03 and the overhaul instructions.
  - (6) Plate and refinish as necessary.
- C. Precipitation hardened CRES
  - (1) Grind as necessary per Paragraph 2.
  - (2) Stress relieve per SOPM 20-10-02. If the stress relief temperature will be above 400°F, remove all cadmium plating before you stress relieve.
  - (3) Magnetic particle examine per SOPM 20-20-02.

# 20-10-04



## STANDARD OVERHAUL PRACTICES MANUAL

(4) If the stress relief temperature was above 400°F or if metal removal was more than 10% of the shot peening intensity, shot peen the part again per SOPM 20-10-03 and the overhaul instructions.

(5) Plate and refinish as necessary.

### D. Nickel-base alloys

(1) Grind as necessary per Paragraph 2.

(2) Penetrant examine the area per SOPM 20-20-02.

(3) If the overhaul instructions include shot peening and metal removal was more than 10% of the shot peening intensity, shot peen the part again per SOPM 20-10-03.

(4) Plate and refinish as necessary.

# 20-10-04