STANDARD OVERHAUL PRACTICES MANUAL

HOW TO MAKE AND INSTALL RESIN BOND LAMINATED SHIMS AND SOLID FILLERS

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STANDARD OVERHAUL PRACTICES MANUAL

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To: All holders of HOW TO MAKE AND INSTALL RESIN BOND LAMINATED SHIMS AND SOLID FILLERS 20-50-20.

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.

Pages replaced or made obsolete by this revision should be removed and destroyed.

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Location of Change	Description of Change
	NO HIGHLIGHTS

STANDARD OVERHAUL PRACTICES MANUAL

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

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All revisions to this manual will be accompanied by transmittal sheet bearing the revision number. Enter the revision number in numerical order, together with the revision date, the date filed and the initials of the person filing.

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Revision		Filed		Revision		Filed	
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STANDARD OVERHAUL PRACTICES MANUAL

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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.

HOW TO MAKE AND INSTALL RESIN BONDED LAMINATED SHIMS AND SOLID FILLERS

1. INTRODUCTION

A. The data in this subject comes from Boeing Process Specification BAC5430. The airline has a copy of the Boeing Process Specification Manual.

B. The data is general. It is not about all situations or specific installations. Use this data to help you write minimum requirements.

C. Refer to SOPM 20-00-00 for a full list of all the vendor names and addresses.

D. This subject tells how to make and install these BAC5430 types of shims and fillers:

Type 1 – Metallic laminated shim stock, such as BAC1534, BACS18AJ, BACS40R, BACS40U, BMS 7-335 (Types 1 thru 5)

Type 2 – Polyimide polymer laminated shim stock, such as BAC1535, BACS40V, BMS 7-335 (Type 6)

Type 3 – Fiberglass laminated shim stock, such as BACS40X

Type 4 – Metallic solid fillers, such as BACF3F, BACF3J, BACF3T, BACF3Y, BACF3AA

Type 5 – Metallic radius fillers, such as BACF3H, BACF3Z, BACF33C

Type 6 – Fiberglass solid fillers, such as BACF3U, BACF3W, BACS40W

Type 7 – Fiberglass radius fillers, such as BACF3V

2. MATERIALS

NOTE: Equivalent substitutes can be used.

A. Abrasive pads

(1) Bear-Tex aluminum oxide, V06565

(2) Scotch-Brite Type A, V76381

B. Adhesives (Ref SOPM 20-50-12)

(1) Type 38

(2) Type 40

(3) Type 50

(4) Type 54

(5) Type 70

C. Polyimide film – BAC1535-29

D. Primer – BMS 10-11, Type 1 (Ref SOPM 20-60-02)

E. Resin – BMS 8-139

F. Shim stock – BMS 7-335

G. Tape, adhesive transfer

(1) Scotch No. 464, 465, 468, 909, 924, Y953, 969, 976 or 9568, V76381

(2) BMS 5-91

H. Wipers – BMS 15-5, Class A or B

3. EQUIPMENT

NOTE: Equivalent substitutes can be used.

A. Vacuum table

4. PREFIT PROCEDURES FOR TYPES 1,2,3,4 AND 6 SHIMS AND FILLERS

A. When the assembly was built at the factory, these procedures were used to make and install shims as necessary to fill gaps between mating parts or to adjust the relative position of the mating parts. Adjustment or replacement of these shims during overhaul is usually not necessary unless one or more of the mating parts is replaced. Then you can use these procedures to make a check of the gaps to see if you can use the old shims, or to make, adjust and install replacement shims.

B. Put the parts together as a test without the shims or fillers, and before you drill full-size holes for fasteners. Use the assembly procedure and clamping forces specified by the overhaul instructions.

C. If the overhaul instructions do not give the assembly procedure or the clamping force, put the parts together. Use a clamping force of 2 pounds maximum per linear foot if the parts are thinner than 0.045 inch thick. Use a clamping force of 5 pounds per linear foot if the parts are 0.045 inch or more thick.

D. To make sure the clamping force is correct, measure it at each attachment point. If the attachment points are 12 inches apart, the force at each point will be the same as the specified value per linear foot. If the attachment points are closer together, the force at each point must be less, because the total per foot must be equal to the specified force per linear foot. For example, if the attachment points are 6 inches apart, the force at each point must be one-half of the specified force per foot. If the attachment points are 4 inches apart, the force at each point must be one-third of the specified force per foot. The total force for the assembly will be the force per foot times the total length in feet of the unit.

E. As an option to force applied at an attachment point, you can use a vacuum table. Apply a constant and continuous pressure along the surfaces of the parts. Use a minimum pressure of 0.014 psi for parts thinner than 0.045 inch. Use a minimum pressure of 0.035 psi for parts 0.045 inch or more thick. If the parts do not touch the table, start with a larger pressure to make the parts touch the table, then decrease the pressure.

F. After this test fit of the parts without shims, and before you drill full-size fastener holes, measure the gap dimension at each fastener location. Refer to the overhaul instructions for the maximum permitted gap dimension. If the overhaul instructions do not give a maximum gap dimension, use shims if the gap is larger than 0.010 inch in metal structure or is larger than 0.008 inch in composite structure of composite/metal structure. If the gap is less than these values or the gap given by the overhaul instructions, do not use shims.

G. Type 1 shims or solid fillers which will be permanently attached can be temporarily bonded in position with Scotch 465 adhesive transfer tape. But all tape and related adhesive must be removed before you install the fasteners.

H. When the overhaul instructions install the shim with permanent fasteners, Type 2 nonmetallic laminated shims and solid fibers can be held in position with Type 50, 54 or 70 adhesive per SOPM 20-50-12. But do not use the Type 50 adhesive to temporarily hold shims in position to machine them, because the adhesive will remove the finish if the shim must be removed before final assembly. Shims can be temporarily held in position with adhesive transfer tape, but all tape, film, or related adhesive must be removed before you install the fasteners.

5. HOW TO INSTALL TYPES 1,2,3,4 AND 6 SHIMS AND FILLERS

A. Use the prefit procedures of Paragraph 4. to see if shims are necessary and how thick they must be.

B. If the old shim thickness is not best for the location, you can use shims of a different thickness, or no shim at all, to agree with the gaps you find.

C. Use the procedure of Paragraph 7. to make thinner laminated shims. You can use flat, tapered, or contoured solid fillers with or as an alternative to the laminated shims.

D. Machine or sand the solid part of the shim or solid filler to the necessary shape. Taper the shim or solid filler in more than one direction if necessary. The surface finish must be 250 microinches or smoother on these changed surfaces of the shims or solid fillers. Cut the outside edges of the shims and solid fillers to the tolerances shown in Figure 1. Machine titanium parts per SOPM 20-10-07. Machine CRES parts per SOPM 20-10-02.

E. Refinish the changed surfaces of the shims or solid fillers by these procedures, unless the overhaul instructions are different:

(1) Aluminum – Chemical treat per BAC5719 (Ref SOPM 20-43-03). Apply BMS 10-11, Type 1 primer (F-20.02) but not on shims or fillers for fuel tanks.

(2) Titanium – Use the overhaul instructions.

(3) CRES – Clean with a dry abrasive blast (BAC5748 Type 2, Class 1). Then apply finish as specified in the overhaul instructions, but not on the bare surface of passivated shims.

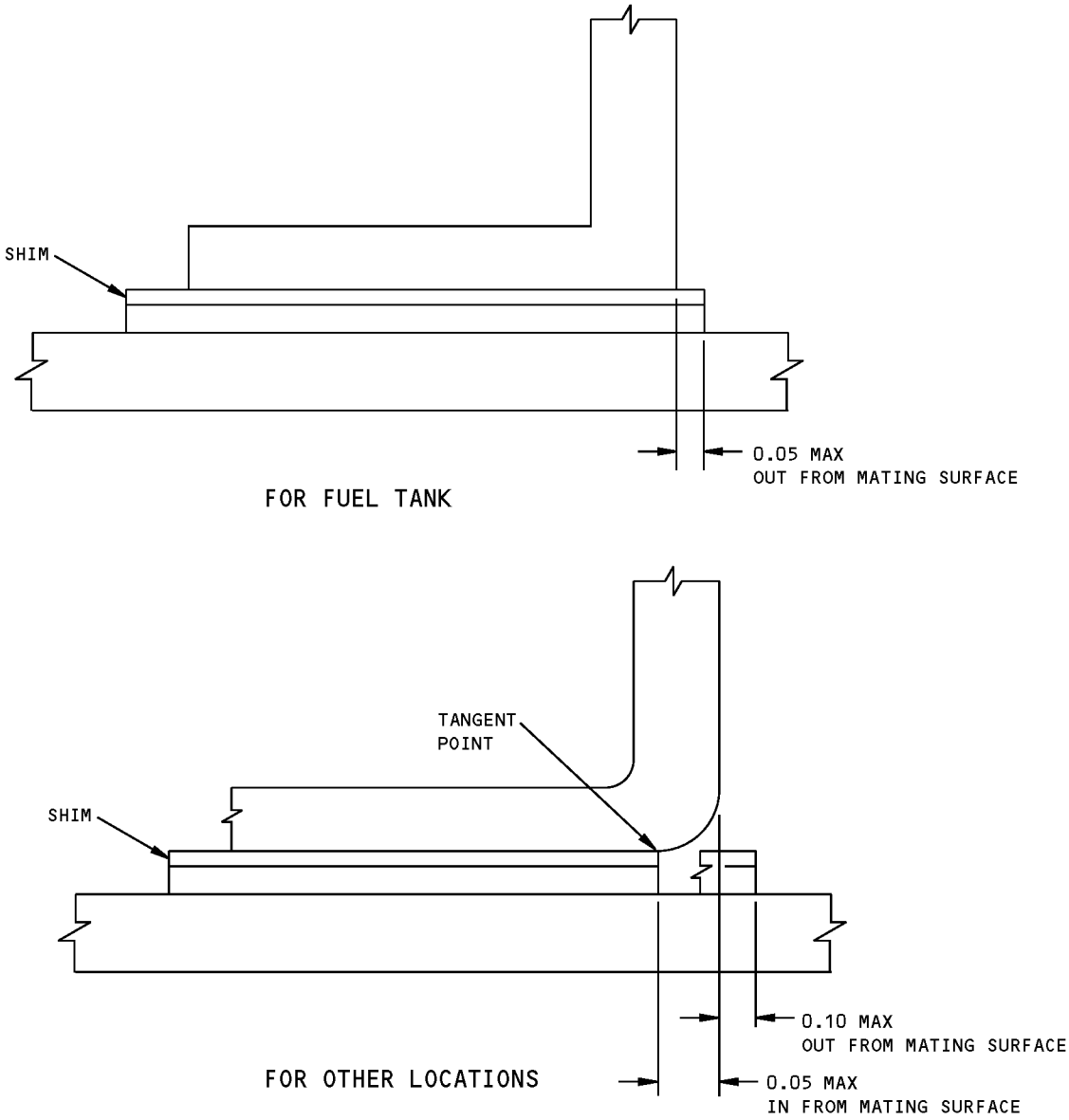
(4) Type 2 or 3 shims – No finish is necessary.

F. Drill full-size holes for the fasteners. Remove burrs from the drilled holes and the edges of the drilled holes.

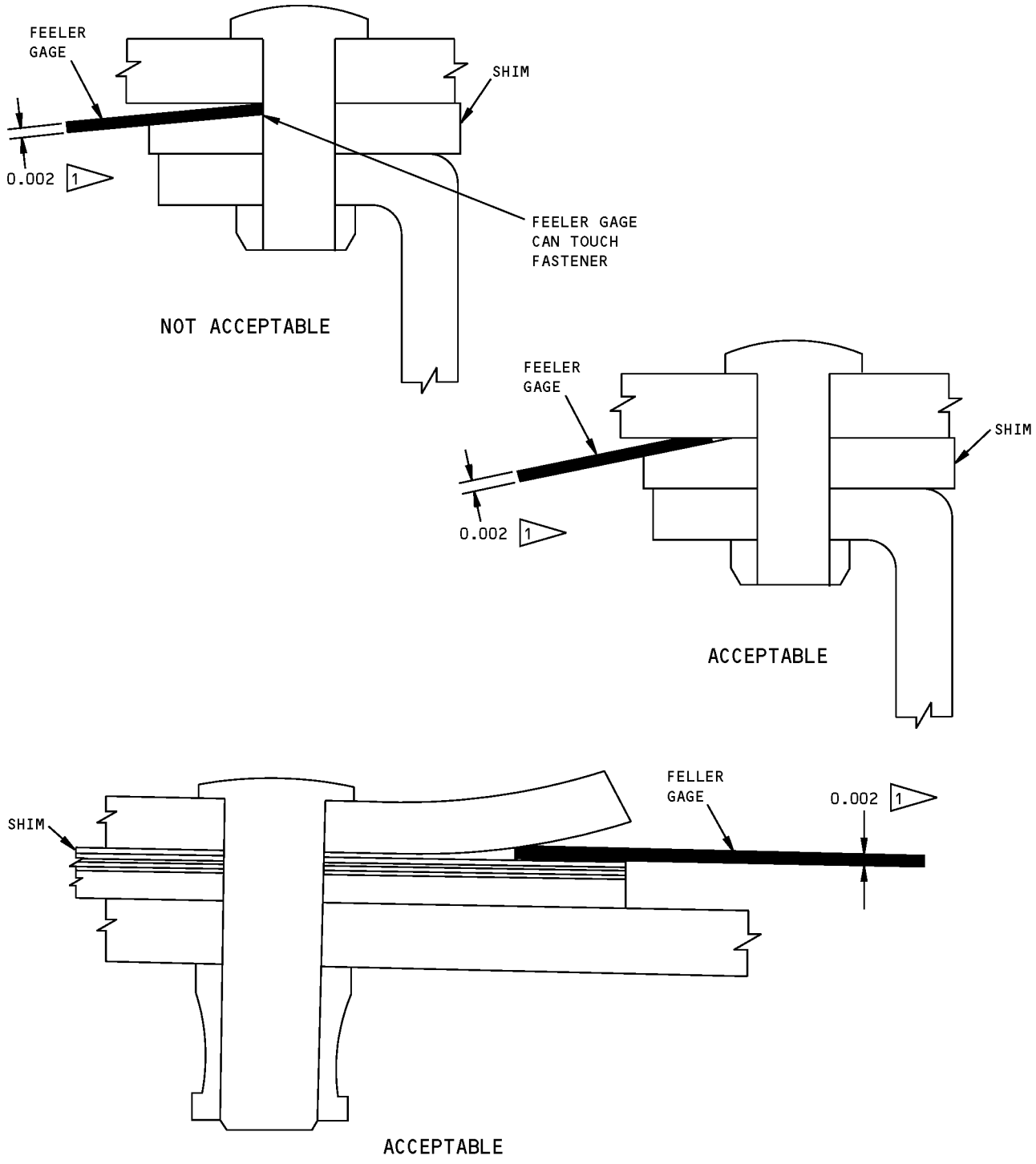
G. If specified by the overhaul instructions, install the shim with a corrosion preventive finish, such as primer, sealant or adhesive.

H. After you tighten the fasteners, gaps at the edges of the structure are acceptable if a shim or feeler gage 0.002 inch thick (or other specified thickness) cannot be put in to touch the fastener (Figure 2).

I. Do not use shims or solid fillers unless specified by the overhaul instructions.



Shim Installation Limits
Figure 1

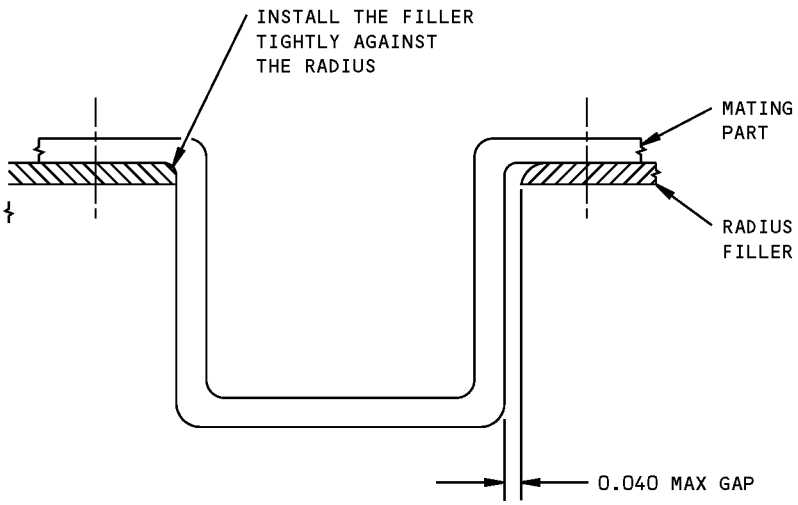


Edge Gap Limits
Figure 2

6. HOW TO INSTALL TYPES 5 AND 7 RADIUS FILLERS

A. Unless specified differently by the overhaul instructions, install these radius fillers against the radius of the mating part, within the gap limits shown in Figure 3. No gap is permitted at the joints between the structure, shims, fillers or other parts unless shown by Figure 2.

B. You can cut or machine these radius fillers to the necessary shape for gap adjustment, but you must refinish the shims per Paragraph 5.E. above.



ALL DIMENSIONS ARE IN INCHES

Radius Filler Installation Limits
Figure 3

7. HOW TO MAKE TYPES 1, 2, AND 3 SHIMS

A. If necessary, you can put together two shims, or a shim and a filler, or add plies of laminations to a shim. Use these procedures to bond them together with adhesive:

(1) This procedure uses BMS 5-36 adhesive. Because this adhesive uses the moisture in the air to cure, keep the container closed, and open it only for the shortest possible time during this operation.

(2) Lightly rub the mating surfaces with a clean abrasive pad. Wipe the surfaces clean.

(3) Apply BMS 5-36 adhesive to one of the mating surfaces. Use Type 1 for metal-to-metal bonds. Use Type 2 when one or each of the mating surfaces is composite. If possible, apply the adhesive to make a layer.

(4) Put the mating surfaces together immediately. Final adjustment must be made within a few seconds, because the adhesive could cure that quickly. Apply pressure by hand, by clamps, or by something equivalent, to make the mating surfaces stay together tightly until the bond cures. The time for this is different for each material to be bonded. Usually it is a few seconds, but it could be as much as 3 to 5 minutes.

(5) Make sure the thickness of this assembly of shim parts is not more than the limit specified by the overhaul instructions.

8. HOW TO MAKE TYPE 3 SHIMS FOR UNUSUAL CONTOURS

A. Use this procedure when the overhaul instructions tell you to make a replacement shim for a location that has sudden bends or other unusual contours. You can bond a Type 2 laminated shim to a solid fiberglass filler which was specifically made for this location.

B. Get the special fiberglass filler for this location, or make one by the procedures in the overhaul instructions. A typical fiberglass material is high-temperature resistant glass fabric prepreg BMS 8-139, Type 1581, Class 1, used per BAC5317 or BAC5317-3.

C. Cut the fiberglass filler to the necessary size. Remove burrs from the edges.

D. Bond laminated polyimide BAC1535-29 to the fiberglass filler with adhesive BMS 5-36, Type 2, Grade 1. (This laminated material is 0.290 inch thick with 0.003 inch thick laminations).

E. Be sure to identify the solid fiberglass filler side of the shim with a rubber stamp.

F. Install the shim by the instructions in Paragraph 4. and Paragraph 5.