



DESIGN GUIDE

CABINETS INTERIOR - MATERIALS

BG-7700-01-04-01

Rev. F

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1. CABINETRY

1.1 MATERIAL

Business aircraft cabinets are made with various materials and this section identifies the major ones used to build an interior. See BAERD BA700-006 for the list of preferred materials. As materials require a finish code, the list of finish codes can be found in [BAERD INT-001](#).

Cadmium shall not be used. Should the use of cadmium be absolutely necessary it must be accepted by M&P Engineering.

1.1.1 Honeycomb Panels

As one of the main materials in aircraft completions, honeycomb panels are used in the fabrication of interior cabinets as they are light and strong. A honeycomb panel consists of a core and cover sheets called skins. Preferred types can be found in [Table 1](#). Fiberglass/Epoxy panels are used for general applications with number of skins defined in relation to Stress requirement. Aluminum panels are used for structural applications.

	Type	Class	Thickness	Skin Material	Skin Thickness	Core Material
BAMS 831-004	1	125	0.125	Fiberglass/Epoxy	~0.008"	Aramid
		250	0.250			
		375	0.375			
		500	0.500			
		750	0.750			
	2	125	0.125		~0.015"	
		250	0.250			
		375	0.375			
		500	0.500			
		750	0.750			
BAMS 831-010		250	0.250	Aluminium	~0.016	Aluminium
		500	0.500			
		750	0.750			
		1250	1.250			
BAMS 831-011		375	0.375	Aluminium	~0.016	Aluminium

TABLE 1 – LIST OF HONEYCOMB PANELS

1.1.2 Metal Parts

All metal parts must be designed in order to satisfy technical requirements but also with a focus on weight reduction. For sheet metal parts, it is highly recommended to use 0.040" or 0.050" thick sheet metal. Thinner sheet metal can be used for cosmetic parts.

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1.1.2.1 Aluminium

Metal parts are used for connecting elements together (brackets) as well as for aesthetic purposes. The most common metal is aluminum alloy 2024 under different shapes (sheet, extrusion, plate) but aluminum alloy 6061 and 7075 can be used for specific applications. Aluminum alloy 2024 has slightly lower strength than aluminum alloy 7075. Aluminum alloy 6061 has half the strength of aluminum alloy 2024 and should be used only for lightly loaded parts.

When creating a metallic part such as a bracket, it is preferred to use sheet metal part rather than an extrusion for cost purposes.

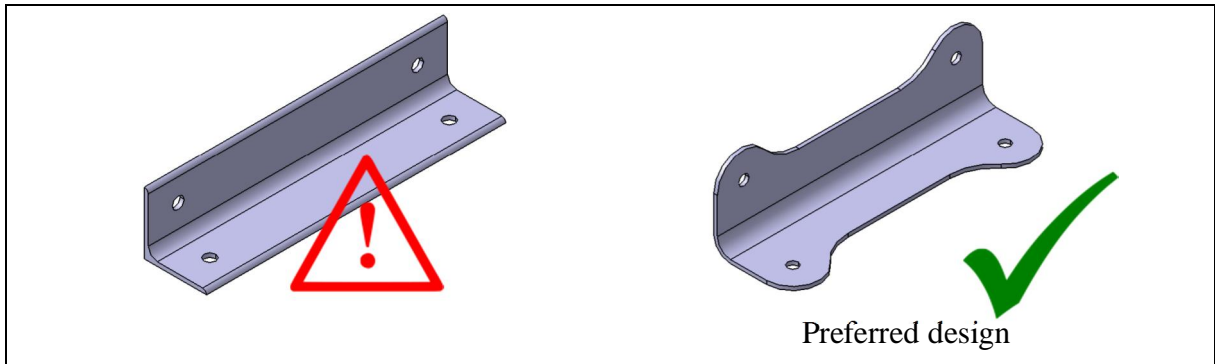


FIGURE 1 – PREFERRED DESIGN FOR A BRACKET

Information regarding the types of aluminum to be used in cabinets can be found in BAERD BA700-006. Refer to BAERD GEN-013 for stock size.

1.1.2.2 Steel

Information regarding the types of steel to be used in cabinets can be found in BAERD BA700-006.

1.1.2.3 Others Metals

Stainless steel, brass, copper and titanium can also be used in some particular cases.

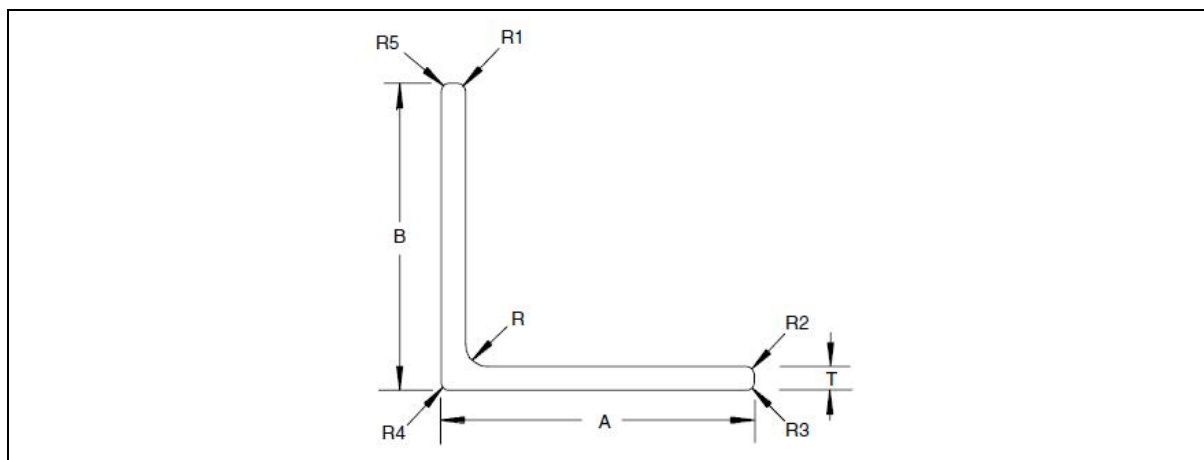
1.1.2.4 Extrusion

The standard extrusions can be found here: [BM9000 Standard Parts Search](#). However, in order to limit material stock, it is recommended to use the following extrusions in [Table 2](#) as much as possible.

When creating parts that are made from extrusions, make sure to follow the recommendations highlighted in the [BM7003.51.10.05](#).

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Part Number	A	B	T	R	R1	R2	R3	R4	R5
B0501020AA	.750 ±.010	.750 ±.010	.040 ±.006	.062 ±.006	.016 ±.016	.016 ±.016	.016 ±.016	.016 ±.016	.016 ±.016
B0501022AA	.750 ±.010	.750 ±.010	.050 ±.006	.050 ±.016	.025 ±.016	.025 ±.016	.016 ±.016	.016 ±.016	.016 ±.016
B0501250AA	1.250 ±.012	.750 ±.010	.040 ±.006	.063 ±.006	.016 ±.016	.016 ±.016	.016 ±.016	.016 ±.016	.016 ±.016
B0501251AA	1.250 ±.012	1.000 ±.012	.050 ±.006	.094 ±.006	.016 ±.016	.016 ±.016	.016 ±.016	.016 ±.016	.016 ±.016
B0501254AA	2.000 ±.024	1.000 ±.012	.040 ±.006	.090 ±.006	.010 ±.016	.010 ±.016	.010 ±.016	.010 ±.016	.010 ±.016
B0501255AA	2.000 ±.024	1.000 ±.012	.050 ±.006	.094 ±.006	.010 ±.016	.010 ±.016	.010 ±.016	.010 ±.016	.010 ±.016

TABLE 2 – PREFERRED EXTRUSIONS

FIGURE 2 – L-SHAPE EXTRUSION DIMENSION

The use of other specific extrusions shall be reviewed by the IPDT team.

All decorative trims made from an extrusion should be as thin as possible, thickness 0.040in is recommended.

Note: Unless otherwise specified, stress considers all machined metallic parts to be Aluminum Alloy 7075-T7351¹ and all other metallic parts (sheet metal, extrusion, etc.) as Aluminum Alloy 2024-T3 and 2024-T3511.

¹ For Al-Aly 7075: T6 has a higher strength than T7351 but T6 are metal sheets up to 0.25in thick whereas T7351 are thicker plates. Avoid using 7075-T6 in stress loaded parts due to poor Stress Corrosion Resistance of material.

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1.1.2.5 Edge Distance - Metal Part

For metallic parts, edge distance shall be respected when a hole is drilled to install a fastener, either a screw or a rivet.

D = hole diameter	Screw	Rivet
A	2D	
B (pitch)		Min 4D , Max 6D

TABLE 3 – METAL PART EDGE DISTANCE

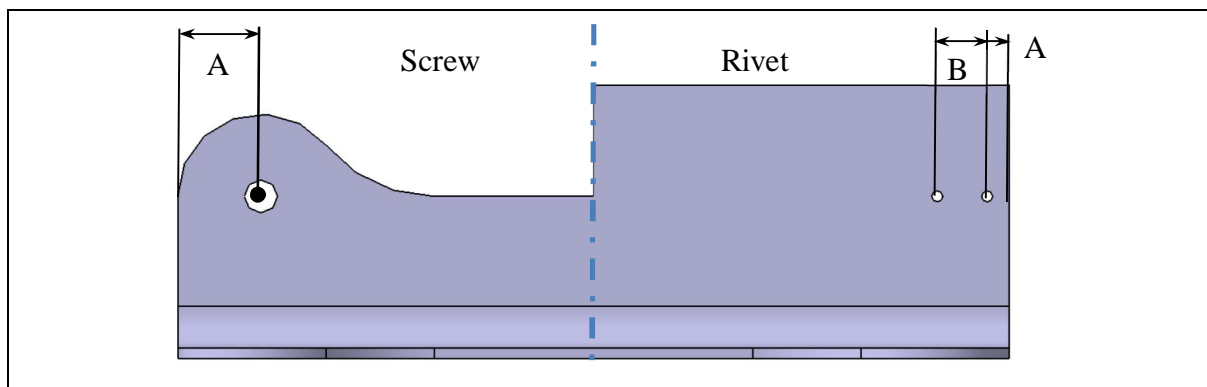


FIGURE 3 – METAL PART EDGE DISTANCE

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1.1.3 Foams

Foams are polymer material and can be divided in two categories: Rigid foams and soft foams

1.1.3.1 Rigid Foams

Rigid foams are non-deformable polymers that can be machined by CNC and can be bonded (refer to Design Guidelines [BG-7700-01-04-02](#) for bonding) to other materials but cannot be used for structural purposes.

Type	Thickness	Density (lbs/ft³)	Size (in)
BAMS 832-001 Type 3	0.500	30	24 x 96
	1.000		
	2.000		
BAMS 832-001 Type 4	TBD	4	TBD
BAMS 832-001 Type 5	0.125	6	48 x 96
	0.250		
	0.500		
	0.750		
	1.000		
	2.000		
BAMS 832-001 Type 6	0.125	12	48 x 96
	0.250		
	0.500		
	1.000		
	1.750		
	2.000		

TABLE 4 – BASE DIMENSION OF RAW RIGID FOAMS

The minimum requirement when the foam is use alone as per FAR 25.853(a)(1)(ii) 12-sec burn test in [Table 5](#). When is bonded with another substrate, such as a panel, the result will be different.

Material	Minimal thickness
BAMS 832-001 Type 3	0.060"
BAMS 832-001 Type 4	0.100"
BAMS 832-001 Type 5	0.190"
BAMS 832-001 Type 6	0.125"

TABLE 5 – BAMS 832-001 MINIMAL THICKNESS

When foams BAMS 832-001 Type 5 or BAMS 832-001 Type 6 are used as a shim, spacer or panel and a fastener transfer its clamping force through the foam, the compression force of the

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foam need to support the clamping force. In order to withstand the compression force by one fastener, the minimal surface should follow values given in [Table 6](#).

Fastener Diameter	BAMS 832-001 Type5	BAMS 832-001 Type6
-04	1.4 in ²	0.6 in ²
-06	2.4 in ²	1.0 in ²
-08	3.7 in ²	1.5 in ²
-3	4.5 in ²	1.8 in ²

TABLE 6 – MINIMAL SURFACE TO WITHSTAND PRESSURE

Avoid using BAMS 832-001 type 5 foam, as it is difficult to work with as well as passing flammability requirements. If no alternative exist, contact your M&P representative for proper acceptance.

1.1.3.2 Upholstery Foam

Upholstery foams are soft deformable polymer of various density that cannot be machined by CNC but can be cut by other means (scissors, ...) and can be bonded as mentioned in Design Guidelines [BG-7700-01-04-02](#). Upholstery foams are used for decorative feature under soft finishes such as paddings, seats and decorative panels.

Per BAMS 832-002, BAMS 832-002 Type 1 Class xA describe a fire retardant treated soft foam and BAMS 832-002 Type 1 Class x is a similar material without Fire retardant. BAMS 832-002 Type 1 Class xA must be used when part thickness is 0.250in or thinner and BAMS 832-002 Type 1 Class x must be use for all parts thicker than 0.250in.

Material specifications	Thickness (in)	Raw size (sheet)
BAMS 832-002 Type 1, Class 1	0.5, 1.0	36 X 72
	1.5, 2.0	24 X 72
BAMS 832-002 Type 1, Class 2	1.0, 1.5, 2.0	
BAMS 832-002 Type 1, Class 2A	0.25	45 X 48
BAMS 832-002 Type 1, Class 3	0.50, 0.75, 1.0, 2.0, 3.0, 5.5	24 X 72
BAMS 832-002 Type 1, Class 3A	TBD	TBD
BAMS 832-002 Type 1, Class 4	TBD	TBD
BAMS 832-002 Type 1, Class 4A	0.125, 0.250	45 X 48
BAMS 832-002 Type 2, Class 1	0.060	42 X 54
	0.125, 0.250, 0.50	
BAMS 832-002 Type 2, Class 2	0.125, 0.250	48 X 56

TABLE 7 – UPHOLSTERY FOAM RAW DIMENSIONS

1.1.4 Consumables

1.1.4.1 Reclosable Fasteners

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Reclosable Fasteners (also called Velcros) must have a maximum dimension of 4” long per 2” wide and the distance between two (2) reclosable items cannot be less than 6”.

All reclosable fasteners should be called color black unless otherwise mentioned.

Reclosable Fasteners can be bonded as indicated in Design Guidelines [BG-7700-01-04-02](#). The addition of aluminum tape can be an option in case of flammability failure. The Aplix840 is only the product that does not need Aluminum Tape. Substrate, adhesive, finish (leather, fabrics), etc.. can influence the results of flammability test.

1.1.4.2 Non-Detachable Fasteners

TBD

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1.1.5 Insulation

The [Table 8](#) lists part numbers associated to the cabinet insulation.

Material Type	Drawing material callout	Notes
Blanket	Supplier Part Number for insulation blankets 0.5" thk: ENM386596001 1.0" thk: ENM386596002 2.0" thk: ENM386596003 3.0" thk: ENM386596004	Fabrication of blankets per BAPS 730-014. Blankets will be bonded using Velcro PN: Aplix 840
Acoustic Felt	BAMS 841-001, Type 6, Grade _	Bonding depends on Grade. Grade 1 requires BAPS 700-002 Type 1 and Grade 2 is a self-adhesive.
Acoustic Barrier	Supplier Part Number Flexthane 0.024" thk: Flexthane SA/1 0.047" thk: Flexthane SA/2 0.098" thk: Flexthane SA/4	No bonding note required. Material is self-adhesive.
Acoustic Damping Composite	Supplier Part Number Deltane Deltane 350 AL0.5 SA/1.6 (Thk:.039") Deltane 350 AL0.5 SA/2.2 (Thk:.047")	

TABLE 8 – LIST OF INSULATION MATERIAL

1.1.5.1 3D Representation

Large cutouts pre-cut on all blankets should be represented on the CATIA 3D parts as shown below left. The clearance for the blanket cutout has been agreed upon to a 1/8 inch (.125) all around the profile of the item to clear. Equally, proper cutouts clearing the brackets on every piece of Felt for all access panels should be represented. Therefore each felt insulation part will be supplied into its final shape and ready to be installed.

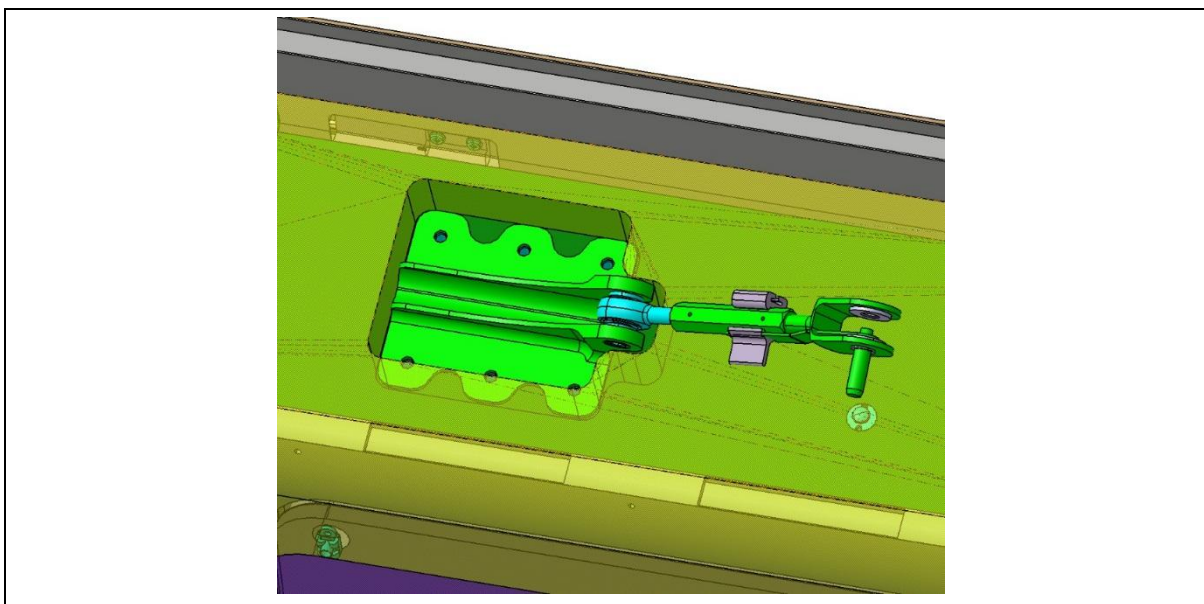


FIGURE 4 – INSULATION CUT-OUT EXAMPLE

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Blankets full thickness are allowed to clash with the aircraft structure as shown below.

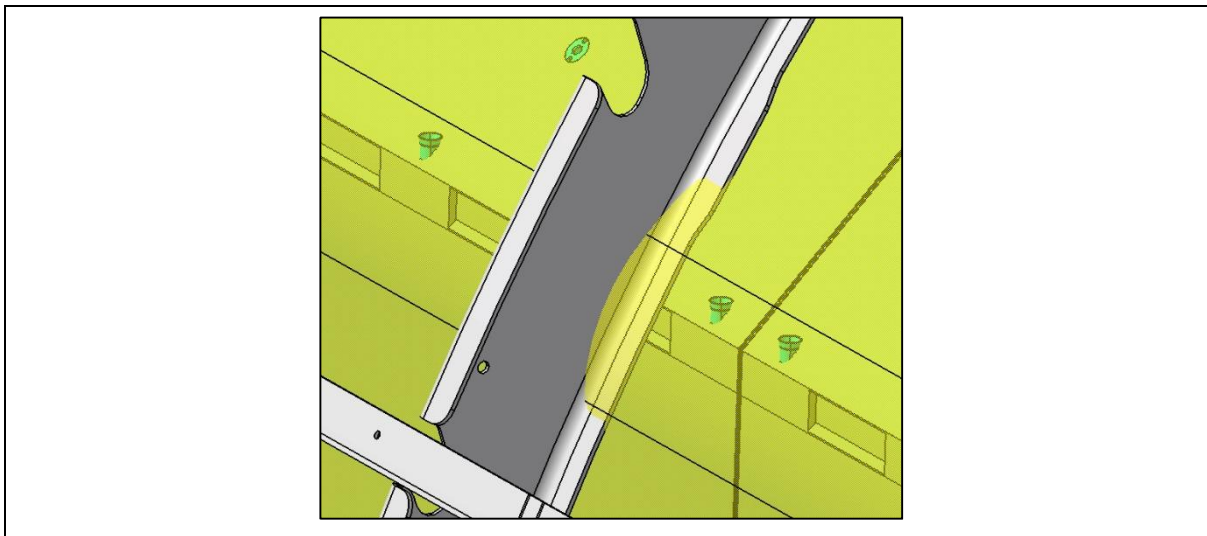


FIGURE 5 – FULL THICKNESS BLANKET EXAMPLE

Details such as shown below left can be left aside in 3D as this will be covered in the installation drawing.

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1.1.5.2 Drawing Content

For small angle brackets, slits will be represented by red dotted lines on the 2D drawing only with a Flag note as shown below. Shop floor workers will make the slits on the blankets as required for smaller brackets and other items such as electrical wires to clear. There will be a general note added to the installation drawing which allows slits to be made on the blankets during the installation following the methods described in the [BAPS 730-014](#).

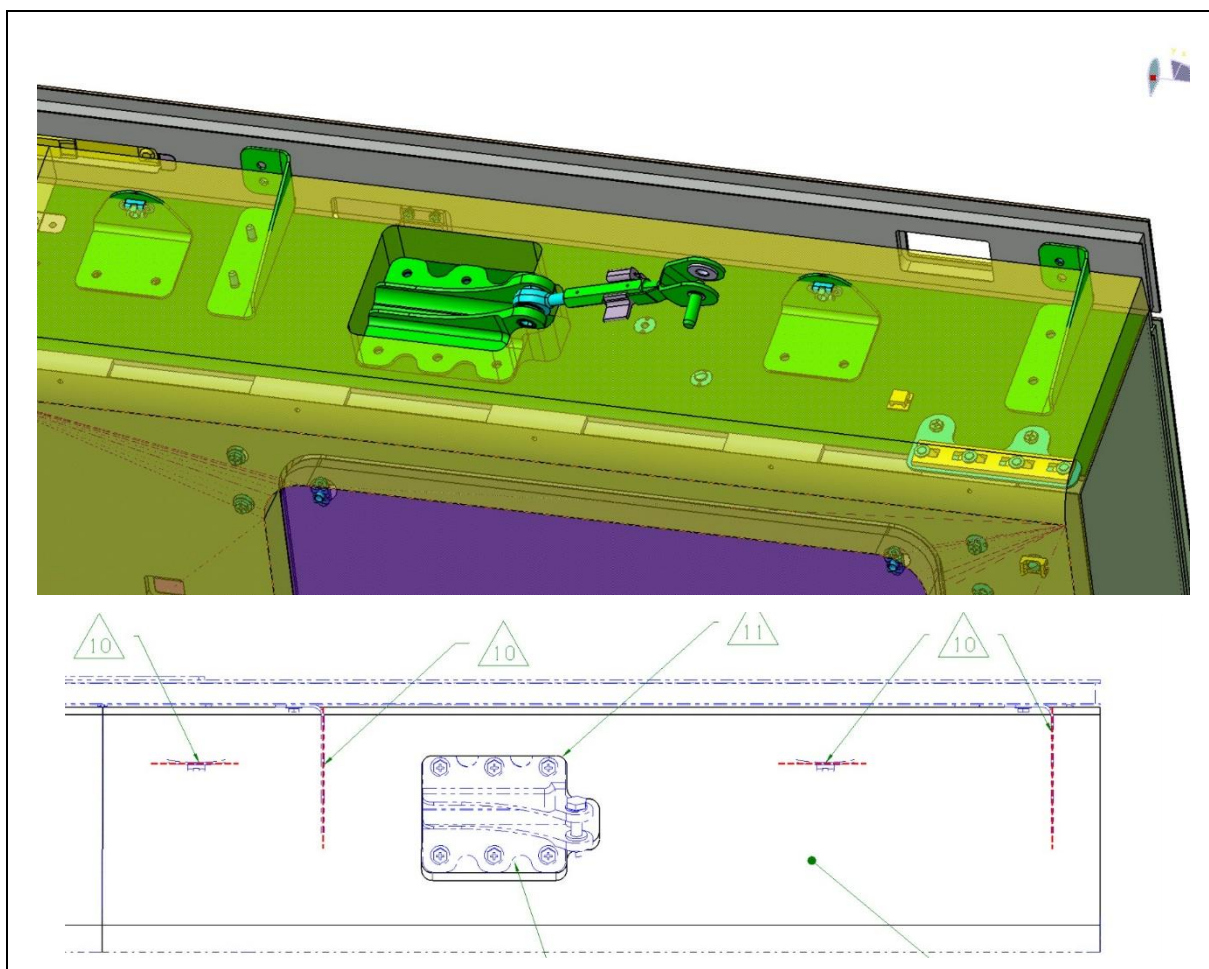


FIGURE 6 – ANGLE BRACKET REPRESENTATION EXAMPLE

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1.1.6 Shims

1.1.6.1 Solid Shims

Solid shims are made from sheet metal material. Most commonly, aluminum 2024 or 7075 shims and can be made per S-standards such as S5324.

1.1.6.2 Laminated Shims

Laminated shims – or peelable shims – are made of multiple layers of very thin material easily peelable to fill space between components to achieve the best possible fit in a mechanical assembly. The Peelable Shims are commonly made of Aluminum 1100 H19 or 5052 (H19 or H39) as per AMS-DTL-22499