

Technology – driven  
component and  
assembly solutions  
for aerospace  
and industry



AEROSPACE • SPECIALIZED ENGINEERING • CRITICAL PERFORMANCE



professionalism  
commitment excellence

## Component and assembly solutions for aerospace and industry

Bolsan Company Inc is a member of Hampson Aerospace, an operating division of Hampson Industries PLC, a publicly quoted group on the London Stock Exchange. The Group comprises sixteen technologically-driven manufacturing companies serving the international aerospace, defence, automotive and specialized engineering industries.

The aerospace division provides integrated value-added supply chain solutions to many of the world's leading gas turbine and aerostructure manufacturers with a range of system components and airframe fabrications for commercial and military aircraft.

Bolsan manufactures and supplies laminated sheet stock, shims, made-to-print parts and fillers, tapers and spacers used for the assembly of aerostructures and high-precision industrial equipment.



Solutions are delivered through the supply of products that allow close-tolerance dimensions to be achieved on complex engineering and aerostructural assemblies that would otherwise be too costly or impossible to manufacture.

Our expertise in a wide range of materials is supported by specialized laminating processes, CNC machining, laser, EDM and water jet cutting facilities.



- Modern 20,000 sq.ft. facility
- Over 20 years service to the industry
- Manufacturers own material and tooling
- All major aircraft and industry related approvals – Boeing, Lockheed Martin, Northrop, Grumman, General Dynamics, Kaman Aerospace
- AS9100, ISO 9001:2000 and ISO 14001 approved
- High levels of customer service, short lead times and fast on-time delivery
- Integrated packages, custom solutions and extensive kitting capabilities for direct line feed supply
- Sister shim companies in Los Angeles and London, UK
- Located 30 minutes from Pittsburgh airport

## Selecting the correct laminated shim

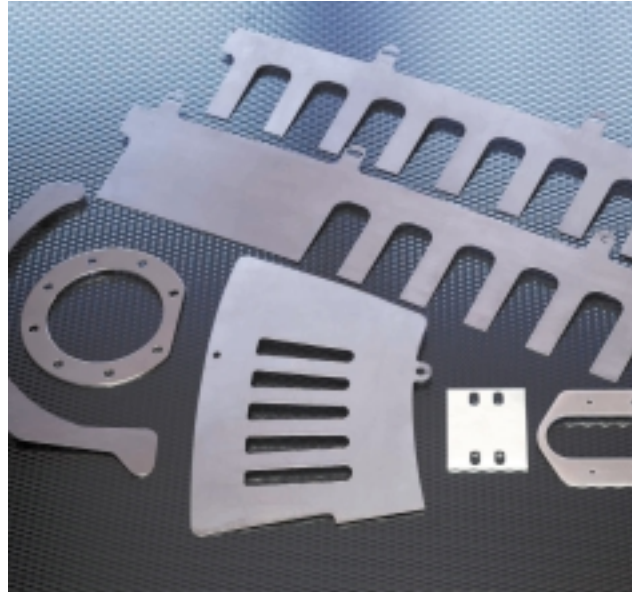
### Material Selection

Where electrolytic reaction with dissimilar metals is a possibility, consideration should be given to the use of cadmium-plated steel LS3 variant which is prepared with a coating to both sides of each foil prior to lamination. If the shim is to be used in a stressed location, it is important, especially in the aluminium range, that the shim strength is similar to the surrounding structure.

### Specifications Listings

There are hundreds of specifications for the Bolsan product range.

Typical specifications are listed below, however this list is not complete or comprehensive – call us if you don't see your specification requirement here – we probably have it!



Laminated Shim Stock	Laminated Shims	Solid Shims, fillers, tapers, standards, etc.
AMS-DTL-22499	120-001 to 009	20-042
AMS4013	120-030 to 038	20-047
AMS4508	120-040 to 049	50-030
AMS5500	120-059	BACF3A
BMS7-335	120-060	BACF3F
BAC1534	120-062	BACF3H
BAC1535	120-164 (edge bonded)	BACF3T
STM07-105	120-082	BACF3V
LAC 07-605	120-098	BACF3W
20006026	120-170	BACF3Y
P103GS100B	BACS40R	BACF33C
CVC 570	BACS40U	LS 12379
	BACS40V	
	LS 15222	
	LS 5940	
	5PTC1001	
	5PTC1013	
	5PTC4211	
	5PTC7004	
	5PTC7010	
	GS12D	
	CVC 573	

### Foil thickness

Foils ranging from 0.001" to 0.004" are used in the manufacture of standard shim stock and will impact on the final degree of accuracy achieved on the assembly fit. Foils of 0.002" or 0.003" normally satisfy most assembly demands.

### Hybrid shims

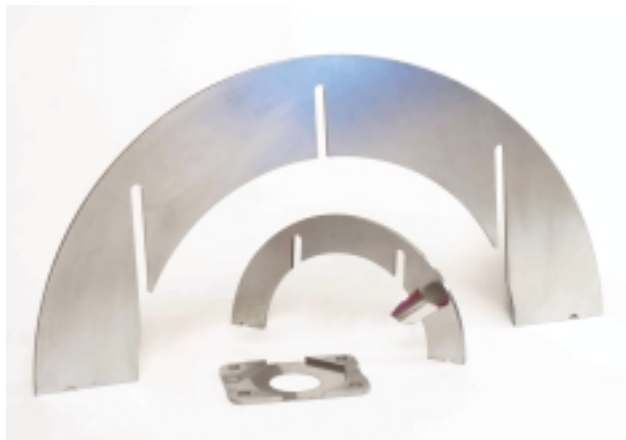
Where gaps in assemblies are likely to be larger than most, a hybrid shim, comprising a solid part and a laminated part will frequently provide the solution. Hybrid shims offer strength while still providing for adjustment. It should be noted that it is possible to employ the solid part of the shim as a bearing surface. Further, a hybrid shim tends to offer better economies compared with a fully-laminated shim.

### Specified shapes

Bolsan's standard shim stock sheet size is 48" x 24". Sheets can be profiled by punching and die pressing. As a general rule punched hole diameters must be twice the material thickness and the flange or remaining width similarly must be twice the material thickness. Light, single curvature forming can be achieved but double curvature forming invariably results in laminate failure.

### Peel strength

Bolsan is able to provide a peel strength according to the wishes of the customer. Shims are normally manufactured to ensure simple and easy adjustment with a knife or by hand.



### Standard Range

#### Part number codes

Codes to determine the requirement of sheet stock are based on the US military (AMS) specifications or on a Boeing part number. As an example, 112125 is a sheet composition:

1 = Aluminium

Type1 = all laminations

Class 2 = 0.003" laminations

Thickness = 0.125".

Note: USA Military Specification MIL-DTL-22499D is identical to AMS-DTL-22499.



## Laminated peelable shims

Bolsan specializes in the manufacture and supply of laminated shim materials and components for achieving close tolerance dimensions on complex aerostructures and engineering assemblies. Using foil materials from 0.025mm (0.001") to 0.1mm (0.004") the company has perfected a process of bonding multiple layers together under heat and pressure to produce a strong and rigid structure that functions as a solid but may be reduced to the precise thickness by peeling off layers.

The primary function of a shim is to provide dimensional adjustment within a mechanical assembly to compensate for:

- Tolerance accumulation
- Precision Alignment
- Wear Compensation



The ability to peel individual layers to achieve a shim of variable thickness provides time and process advantages when assembling components where top and bottom tolerances combine to produce a different dimension for each assembly. Laminated shims also offer economic benefits by reducing the need for customers to maintain a large stock of solid shims.

### Laminated peelable shims provide:

- Reduction in assembly time
- Dimensional accuracy without expensive machining of components
- Quick production-line adjustments and field repairs
- Minimum costs and maximum precision with fewer items of inventory

### They are used...

- Where rotating shafts, sliding surfaces or stationary surfaces must be parallel
- Where the end play is unacceptable
- Where stacked or accumulated tolerances are difficult to control
- Where rotating wear, sliding wear or crushed forces change dimensions of an assembly or component

...and they eliminate the need for grinding to size

### Laminated shims have applications in almost every manufacturing sphere:

- Pumps & motors, motor support struts, thrust reversers, fuselage, landing gear, gas turbines.
- Hydraulic controls, refrigeration and industrial machinery
- Injection moulding, extrusion, printing and paper machinery
- Machine tools
- Automation, Aerospace, Agriculture and Civil Engineering equipment

...and many more

A range of standard sheet materials in metals such as titanium, steel, stainless steel, brass, aluminium alloy and in polyimide (Kapton® and Apical®), polyester (Mylar®) film and polyamide nylon is offered. Shims are available either surface or edge bonded as required.

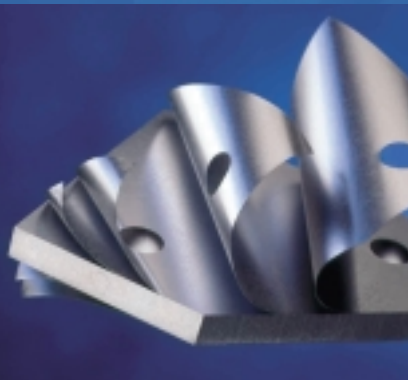
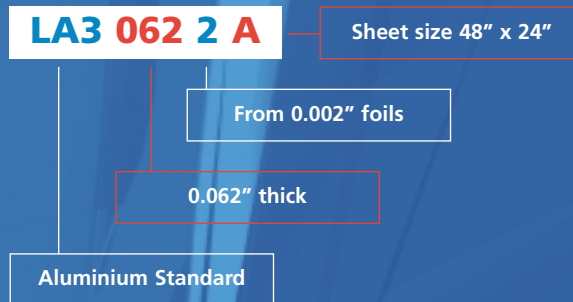
Components from sheet stock are easily manufactured since the material can be sheared, machined, punched, or water-jet cut.

## The Easy Code System

Materials can be specified to US Standard, British or European Standard. All standards can be cross-referenced with a simple code system indicating the exact product requirement.

Considerations are:

- Shim material
- Finished shim thickness
- Thickness of laminations
- Solid stock sheet size.



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