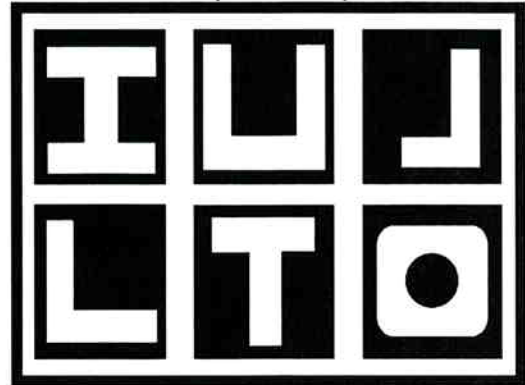


Invar-36®¹ is a nickel alloy used in the manufacture of lay-up tools for the production of components from advanced composite materials. Invar-36 offers the unique combination of durability and low thermal expansion.

Near-Net Shape Examples



Invar-36 Extrusions from Plymouth Extruded Shapes:

- Many design shapes: angles, hollow shapes, channels & tees
- Savings: Cost, labor, material and scrap – versus machined and welded tools from plate and bar
- Low coefficient of thermal expansion to minimize the mismatch between composite materials and molds to avoid warping during the curing cycle
- In-house stretch straightening for exceptional part flatness and straightness to nest well in machining fixtures
- Maximum length: Depends on shape. 30 Ft. (9.1m) typical

Plymouth Tube Company – Plymouth Extruded Shapes has earned an international reputation for quality and consistent attention to detail. In addition to being approved by all major aircraft manufacturers, Plymouth Tube is ISO-9002 certified and a TUV approved supplier.

We welcome your questions and would be pleased to provide support at the design stage to take full advantage of the versatile extrusion process. Please feel free to call us with your design requirements.

Table 1. Type Analysis²

CARBON	MANGANESE	NICKEL	SILICON	IRON
0.02%	0.35%	36.00%	0.20%	Balance

Table 2. Typical Mechanical Properties - INVAR-36²

TENSILE STRENGTH		YIELD STRENGTH		% REDUCTION IN AREA	% ELONGATION IN 2" (50.88mm)	HARDNESS ROCKWELL B
ksi	MPa	ksi	MPa			
65	448	40	276	65	35	70

Table 3. Mean Coefficient of Thermal Expansion²

TEMPERATURE		COEFFICIENT	
°F	°C	in/in/°F x 10 ⁻⁶	cm/cm/°C x 10 ⁻⁶
200	93	0.72	1.30
300	149	1.17	2.11
500	260	2.32	4.18
700	371	4.22	7.60

¹ Invar-36® is a registered trademark of Carpenter Technology Corporation.

² Source: Carpenter Technology Corporation data sheet.

PLYMOUTH EXTRUDED SHAPES

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A member of the

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