



Aluminum Comparison

Aluminum Extrusion Advantages:

versus Stamping:

Stamping tooling is typically 5 times the cost of extrusion tooling and takes many more weeks to build.

versus Roll-Forming:

Roll-forming tooling costs are very high compared to an extrusion die and takes many more weeks to build. In addition, the extrusion process doesn't apply corner stress to the part like forming & bending operations do.

versus Casting:

Sand and permanent-mold casting require extensive finishing before use. Tooling can be very expensive and typically take 20 weeks to build.

versus Welding:

Welding several components together is a much slower process than a single push of aluminum through an extrusion die in an extrusion press. In addition, the cost of welding jigs & fixtures often cost more than extrusion dies.

versus Machining:

Machining a shape from a block of aluminum is almost always more expensive than extrusion. The chips and scrap resulting from machining often weigh more than the finished part. Quite often, aluminum extrusions are even more cost effective for short-run prototypes because the tooling is so inexpensive, the production time is small and the finished part will give you a true structural representation of an aluminum extrusion.

Compare the properties of aluminum to other materials:

Property	Aluminum Extrusions	Roll Formed Steel	Copper Extrusions	Molded Plastics	Wood	Vinyl
Strength (Tensile)	Very good mechanical properties	Very high mechanical properties	Average to low mechanical properties	Wide variation in properties from .08 to .8 tensile strength of aluminum extrusions for glass filled compounds	Good compressive properties; variable with the species of wood and moisture content	Low mechanical properties
Density	Lightweight: about 1/3 that of copper or steel	High density; high pounds per cubic foot	About three times heavier than aluminum	Very lightweight; about 60% the weight of aluminum	Very lightweight; about 1/3 the density of aluminum	Very lightweight; about 60% the density of aluminum
Strength-to-Weight Ratio	Very Good	Good	Low	Low-good	Low-good	Low-good

Information courtesy of
Aluminum Extruders Council

For more information, go to
www.midstal.com or call 920.922.7207.

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(Properties comparison continued)

Property	Aluminum Extrusions	Roll Formed Steel	Copper Extrusions	Molded Plastics	Wood	Vinyl
Corrosion Resistance	Excellent; it can be further increased, along with enhanced appearance, through anodizing or other coatings	Poor; usually requires protective coatings for corrosion service	Excellent	Excellent; choice of compound and color important for weatherability (UV)	Not directly applicable; decomposes in the presence of some acids	Excellent; high resistance to alkalis and salts but is attacked by organic solvents and strong acids
Formability	Easily formable and extruded in a wide variety of complex shapes including multi-void hollows. Formable to net shapes and extrusions provide for the placement of metal where it's needed	Readily formable; thinner cross-sections than aluminum extrusions; metal cannot always be located where best used in design	Excellent formability and easily extrudable. Formable to net shapes	Easily formed or molded into complex shapes	Poor; cannot be routinely formed	Easily formed or molded into complex shapes
Electrical Conductivity	Excellent; on a pound for pound basis, twice as efficient as copper, used in bus and electric connector applications	Poor; cannot usually be used as an electrical conductor	Excellent thermal conductivity	Poor; used as an insulator, high dielectric capability	Poor; cannot be used as an electrical conductor. Usually cannot be employed as an insulator	Poor; electrical and thermal insulating characteristics
Thermal Conductivity	Excellent; ideal for heat exchanger applications	Poor; cannot usually be used as a heat exchanger	Excellent thermal conductivity; second only to silver in industrial applications	Poor; low coefficient of thermal (heat) transfer	Poor	Poor
Finishing	A near limitless array of finishes can be applied including mechanical and chemical prefinishes, anodic coatings, paints and electroplated finishes	Protective coatings such as paint finishes are employed along with electroplated finishes	A variety of coatings and platings can be employed	Color can be integral with material as well as plated, painted and hot stamped	Paint and stain coatings can be employed	Color can be integral with material
Recyclability	High scrap value; routinely reprocessed to generate new extrusions	Low scrap value	Very high scrap value	Routinely reprocessed but loses properties; reprocessed material is added to new stock	Low scrap value	Low scrap value; routinely reprocessed

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Property	Aluminum Extrusions	Roll Formed Steel	Copper Extrusions	Molded Plastics	Wood	Vinyl
Tooling Economics	Extrusion tooling is relatively inexpensive. Generally, a simple shape will cost only a few hundred dollars. Short lead times for tooling construction.	Typical tooling costs are thousands of dollars. Long lead times are required.	Inexpensive tooling costs for extrusions	Tooling is expensive; generally in the thousands of dollars. Long lead times required.	Very inexpensive	Relatively inexpensive
Energy Savings	Lightweight aluminum extrusions can offer energy savings for transportation vehicles.	Life-time energy requirements for wrought steel vehicle components are twice those for aluminum components.	In transportation vehicles, copper is less energy-efficient than aluminum.	Savings for vehicles, processing, insulation	In certain applications	Can offer energy savings in appropriate transportation applications
Combustibility	Non-combustible; does not emit any toxic fumes when exposed to high temperatures	Non-combustible; does not emit any toxic fumes when exposed to high temperatures	Non-combustible; does not emit any toxic fumes when exposed to high temperatures	Combustible; may emit toxic fumes when exposed to high temperatures	Combustible; emits toxic fumes while burning	Combustible. May emit toxic fumes when exposed to high temperatures

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