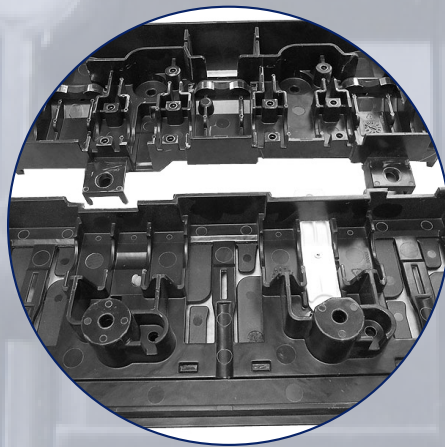


Advantages of Thermoset Plastics vs. Engineered Thermoplastics and Metal Parts



For nearly 40 years, MCM Composites has been a leading provider of molded thermoset plastic components. Through the use of injection, compression, and transfer molding processes combined with our tooling, design, machining, assembly, and high-tech quality control capabilities, we turn the ideas of our customers into reality. We work closely with material suppliers to find the perfect thermoset option for your project, and our dedicated engineering team works to ensure that the finished product meets your specifications.

Thermoset plastics provide a versatile, cost-saving alternative to certain metals and engineered thermoplastic materials. Thermoset plastics are often overlooked as a quality substitute for metal in rigid applications such as heavy equipment, automobile components, and rugged consumer goods, but can often provide a lightweight and durable material solution for these applications.

Advantages of Thermoset Plastics Over Engineered Thermoplastics

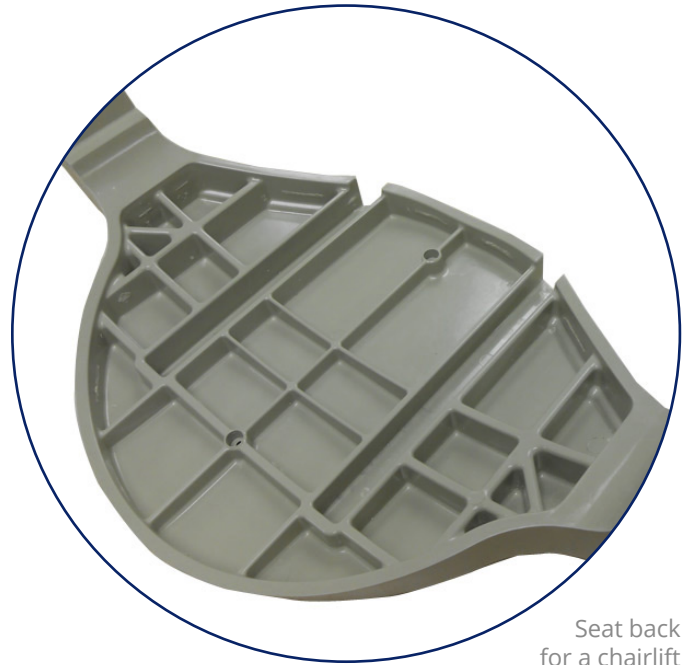
Thermosets and engineered thermoplastics are sometimes better suited to differing situations, but they do have some overlap in relevant use cases. When the selection comes down to a thermoset plastic or an engineered thermoplastic, there are several areas where thermoset plastics excel.

- **Cost.**
 - Thermosets are often less expensive than other materials.
 - Thermosets can also be used to create complex geometries and multi-part components using a single mold to produce a net-shaped part. This makes the overall manufacturing process less expensive.
- **Quality/Stability.**
 - Thermosets exhibit a high strength-to-weight ratio, temperature resistance, non-magnetic qualities, and resistance to rust and corrosion, making them more durable and reliable than thermoplastic counterparts in many situations.
 - Thermosets have better UV stability.
 - Thermosets do not break down when exposed to hydrocarbons, but most thermoplastics do.
 - Thermosets are fundamentally altered on a molecular level when heated. The heat-setting process creates crosslinked polymers, which allows thermosets to keep their form and solidity even when exposed to high temperatures.
 - Parts made using thermoset compounds have very low creep compared to thermoplastics due to the molecular structure change.

Physical Properties

Thermoset plastics outperform engineered thermoplastics in nearly all physical aspects, including:

- Heat resistance
- Tight tolerances
- Strength and rigidity
- Low specific gravity
- Dimensional retention with minimal creep
- Corrosion resistance
- Low water absorption
- Low smoke and toxicity
- Sound deadening
- Electrical insulation
- Low to no electrical arc tracking
- High fire resistance and retardant properties
- Antimicrobial qualities
- Petrochemical resistance
- UL flammability



Seat back
for a chairlift

Surface Finish

- The advantage of thermoset plastics over engineered thermoplastics is the ability to create high gloss parts without adding coatings.
- Thermoset materials have the capability of creating a surface finish with a much higher surface hardness than thermoplastics.

Manufacturability

A common misperception is that thermosets do not have the moldability that thermoplastics do. This is not true. Thermoset materials can be molded into any geometry. Complex geometry does not dictate thermoplastic materials over thermoset materials. Thermosets are easily shaped using a variety of molding processes, including injection molding, transfer molding, and compression molding. The ease with which thermosets are molded allows for a great deal of design flexibility, even for extremely complex or detailed components.

Common Applications

Thermoset plastics are highly versatile, and their durable nature makes them ideal for a number of applications, including:

- Appliance parts
- Aerospace components
- Food grade parts
- Food and beverage processing equipment
- Outdoor furniture
- Public transportation seating
- Outdoor lighting
- Marine applications
- Arc shielding
- Medical devices and equipment
- Electrical and electromechanical components
- Connector housings
- Parts requiring insert molding
- Oil and gas
- Lawn and garden

Advantages of Thermoset Over Metal Cast and Machined Parts

When compared with metal cast and machined components, thermoset plastics exhibit a number of advantages. Some of these include:

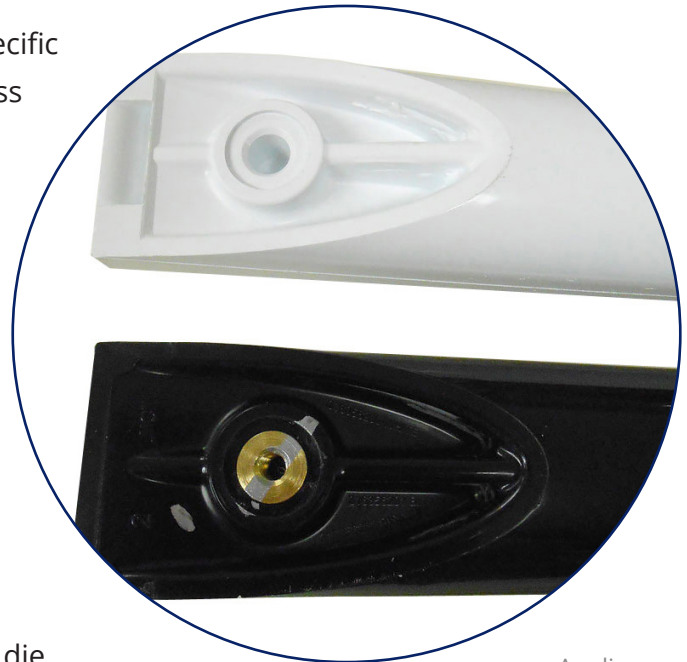
- **Cost.**
 - Thermoset plastics are capable of being molded to net-shape without the need for additional machining, thereby reducing production costs. With the cost of steel and aluminum continuing to rise, thermoset plastics offer a durable and cost-effective alternative. As a less expensive material overall, thermosets offer a cost advantage that is multiplied by reduced machining and finishing costs.
 - Thermosets can be molded into a variety of colors, so no additional coatings or painting required.
 - A polished part can be produced right out of the mold, whereas metal parts require finishing to achieve the same surface finish.
 - Thermoset tooling life is much longer than die cast or cast metal tooling.

- **Weight.** Thermosets are available with low specific gravity (1 to 1.2 range), which is significantly less than most metals. This makes thermosets perfect for use in weight-sensitive applications in aerospace and medical industries.

- **Vibration resistance.**

- Thermosets reduce vibration, which makes them superior to metal for engine housings and enclosures where they can reduce unwanted noise and mitigate damage.
- Thermoset parts are often used in place of die cast parts because of the noise reduction they offer.

- **Corrosion resistance.** Unlike steel alloys and copper-based metals, thermoset plastics will not rust or corrode when exposed to moisture or corrosive elements, making them a better option for marine and outdoor applications.



Appliance handle

Physical Traits of Thermoset Plastics Compared to Traditional Materials

In various applications, thermoset plastics are superior to more traditional thermoplastic and metal materials. In applications that require heat resistance, tight tolerances and low creep, thermosets are superior for reliable component shapes with even the most complex geometries. The strength and rigidity of thermosets is comparable to that of metal, but with

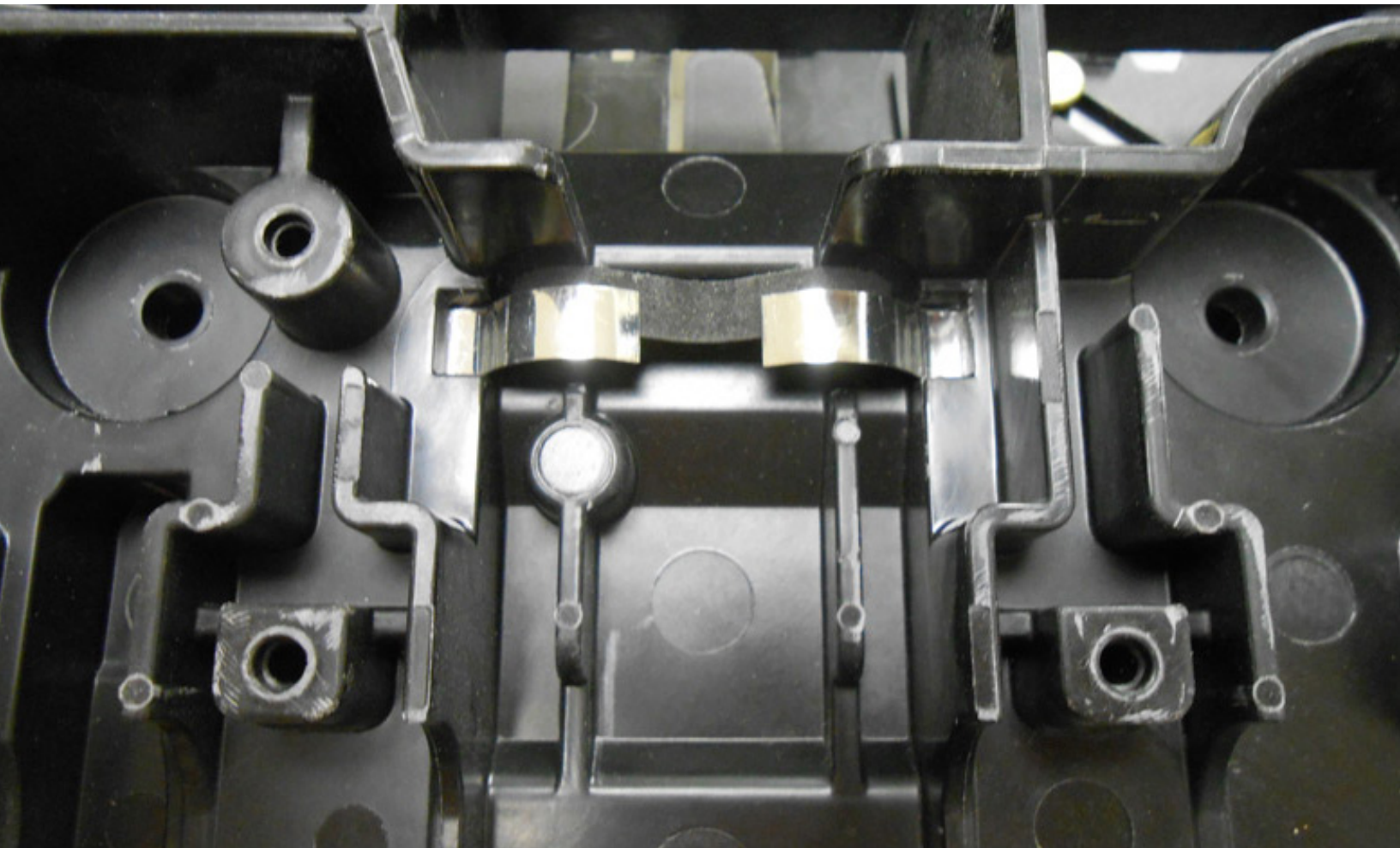
much lighter weight and greater corrosion resistance than available metals. Their strength also allows for greater impact resistance and durability than engineered thermoplastics. Thermosets are less expensive to procure and shape than both thermoplastics and metals, and they do not require surface finishing, further reducing overhead costs.

Choose MCM Composites for Your Thermoset Plastic Solutions

Thermoset plastics offer an excellent alternative to more expensive metal and thermoplastic components and parts. For nearly four decades, MCM Composites has been a premier provider of thermoset plastic solutions for an expansive range of industries. We are committed to providing the highest quality thermoset components to meet the particular needs of your application and budget. Our dedicated engineers and specialists are available to help you find the perfect thermoset material for your project.

To learn more about the ways that thermoset plastics can improve your manufacturing processes, don't hesitate to contact [MCM Composites](http://www.mcmusa.net) today. Let us help you turn your projects from Ideas to Reality.

Electric contactor housing





About Us

With over 35 years of experience, MCM Composites has delivered successful projects across a broad spectrum of industries. Our facility houses more than 45 presses. We are capable of producing parts from .1 gram to over 40 lbs. We sell products to companies around the globe. Our modernized 65,000 square foot plant sits on more than seven acres in Manitowoc, WI, allowing us to accommodate large or small production volumes.

A background image of the MCM Composites facility, showing a large industrial building with a corrugated metal roof and several flagpoles in the foreground. The image is faded and serves as a backdrop for the contact information.

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