

Plastic Injection Molding for Firearm Manufacturing

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Nearly every common gun component can be replaced by a plastic part, from grips and handguards to frames and lower receivers

The Rise of Plastic Injection Molding for Firearms

To ensure optimal product quality and public safety, the firearms industry is heavily regulated, requiring manufacturers to receive a Federal Firearms License (FFL) and comply with standards from the Bureau of Alcohol, Tobacco, Firearms and Explosives (ATF). These factors serve as a barrier of entry for many groups who might have the capabilities to create firearms and firearm components, but don't have the time or resources to pursue a license.

As the demand for firearms steadily rises, many manufacturers are turning to polymers in lieu of traditional metal parts to effectively meet the industry's stringent standards, as well as their increased product demands. These polymers, heat-resistant plastics known as resins can be injection molded to the same tight tolerances as metal components while offering significant time and cost savings as well as enhanced performance. Nearly every common gun component can be replaced by a plastic part, from grips and handguards to frames and lower receivers.

In terms of availability, there is an enormous range of resins that can be used for injection molding, each varying in performance, wear, finish, and aesthetics. This technology also allows for the manufacture of a variety of firearms types; while composites and plastics were only used early on for handguns, these materials are becoming increasingly popular for use in long rifles, which have traditionally used metal components.

This eBook will examine the ways polymers can optimize the form, fit, and function of your firearm components.



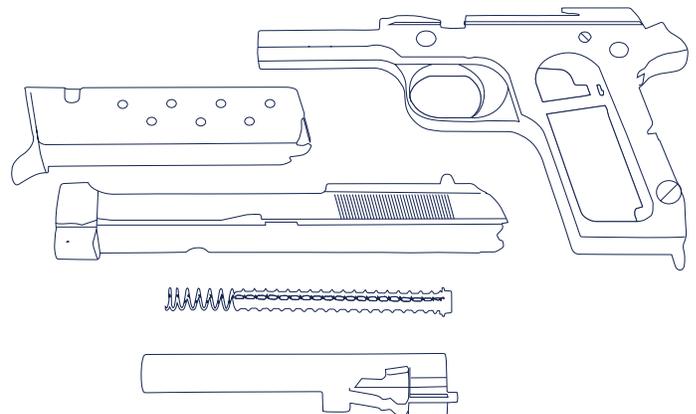
Final Assembly Performance

Use of injection-molded plastics in firearms can greatly enhance the overall quality and efficiency of final assemblies. Injection molding allows for lighter-weight parts, for instance, which can reduce overall product weight by up to 50%.

While it's fair to assume that a lighter-weight firearm would have greater recoil, the use of plastic polymers actually allows for more compression. Unlike its metal counterpart, a polymer frame can absorb the slide's recoil when a round is fired, providing an extra level of "give" that ultimately serves to extend the life of the components moving in the weapon.

Plastic components can also fare better through rigorous wear, offering higher resistance to chemicals, moisture, impact, and harsh environments while providing tensile-strength properties similar to those of metal. Durable polymer materials minimize the risk of weapon failure caused by erosion and rust.

Also, the use of robotics during the manufacturing process provides superior precision and design flexibility at lower costs. The process is highly repeatable, eliminating unnecessary waste, and can be adapted to comply with all of the industry's stringent regulations.

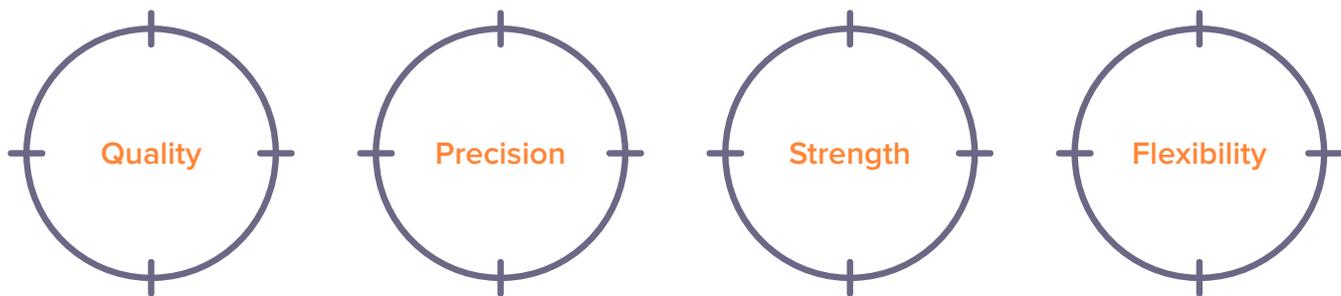


Improved Manufacturing Process

Material selection is the first step — and one of the most important — in developing a reliable part for your firearms application. Resins come in a wide range of colors, textures, and finishes, all of which impact the look, feel and performance of the final product. The versatility of injection molding allows for the elimination of common aesthetic and practicality issues, such as visible seams or uneven grip, while also removing the need for many secondary processes.

During the prototyping and design phase, it's important to select a material and a mold that will stand up to heat and impact; manufacturers should partner with a reliable plastic injection molding group that can offer assistance during this critical process. Careful consideration of factors such as draft angles, witness lines, wall thickness, support ribs, and undercuts will help ensure effective production of the part.

After the materials have been selected, the part is designed, and a mold has been created, it's time to build the part; molten resin is pressurized and injected into the mold. Once it fills out the desired shape, it is cooled and cured before being released. Because this process is highly repeatable compared to metalworking, it saves manufacturers both time and money; injection molding produces less material waste while increasing production speeds and delivery times.



Transitioning from Metal to Plastic

Using plastic injection-molded parts in firearms allows for greater design freedom and, ultimately, a higher-quality product, as manufacturers are better able to create parts that may be difficult to make with traditional metal cutting, stamping, or forming tools. And instead of creating parts individually, manufacturers can combine numerous pieces into a single mold for high-volume, high-precision production.

From a manufacturing standpoint, plastics offer comparable strength characteristics to many metals while reducing the need for additional finishing services or secondary operations. The repeatable injection molding process yields a faster turnaround time at a lower price point, creating less expensive inputs with more cost stability for final assemblies.

For end users, plastic allows for a lighter-weight product with better wear, with the added benefit of highly customizable aesthetics. And with multiple color, texture, and finish options available, plastic can be used in a wide range of firearms, from handguns to rifles.

Enhance Performance with Decatur Mold

Decatur Mold proudly holds a Federal Firearms License Type 7 from the U.S. Department of Justice's Bureau of Alcohol, Tobacco, Firearms and Explosives, allowing us to manufacture top-quality firearm components and non-destructive devices.

We also carry an International Trade in Arms Regulations (ITAR) certification, allowing us to produce components for government defense applications. Our expert team has experience with military-grade projects and is readily available to offer insight on mold designs and create prototypes to match your specs and material type.

Decatur Mold is a one-stop shop for reliable prototyping, production builds, molding, mold maintenance, and service follow-up. To learn more about how we can help you get started on your next firearms project, [contact us today](#).

About Decatur Mold

In 1966, Decatur Mold was a five man shop with a 2,400 sq foot facility, an excellent work ethic and a desire to provide the best service and quality the industry had to offer. That commitment has proven successful and now Decatur Mold has grown to a world class facility, with 100+ employees and more than 87,000 sq ft.

Decatur Mold continues to incorporate state of the art equipment and technology from design to finished mold. Our facilities operate 24/7. Technology and concepts have changed since 1966, but commitment to our customers, our quality and our employees has not.

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