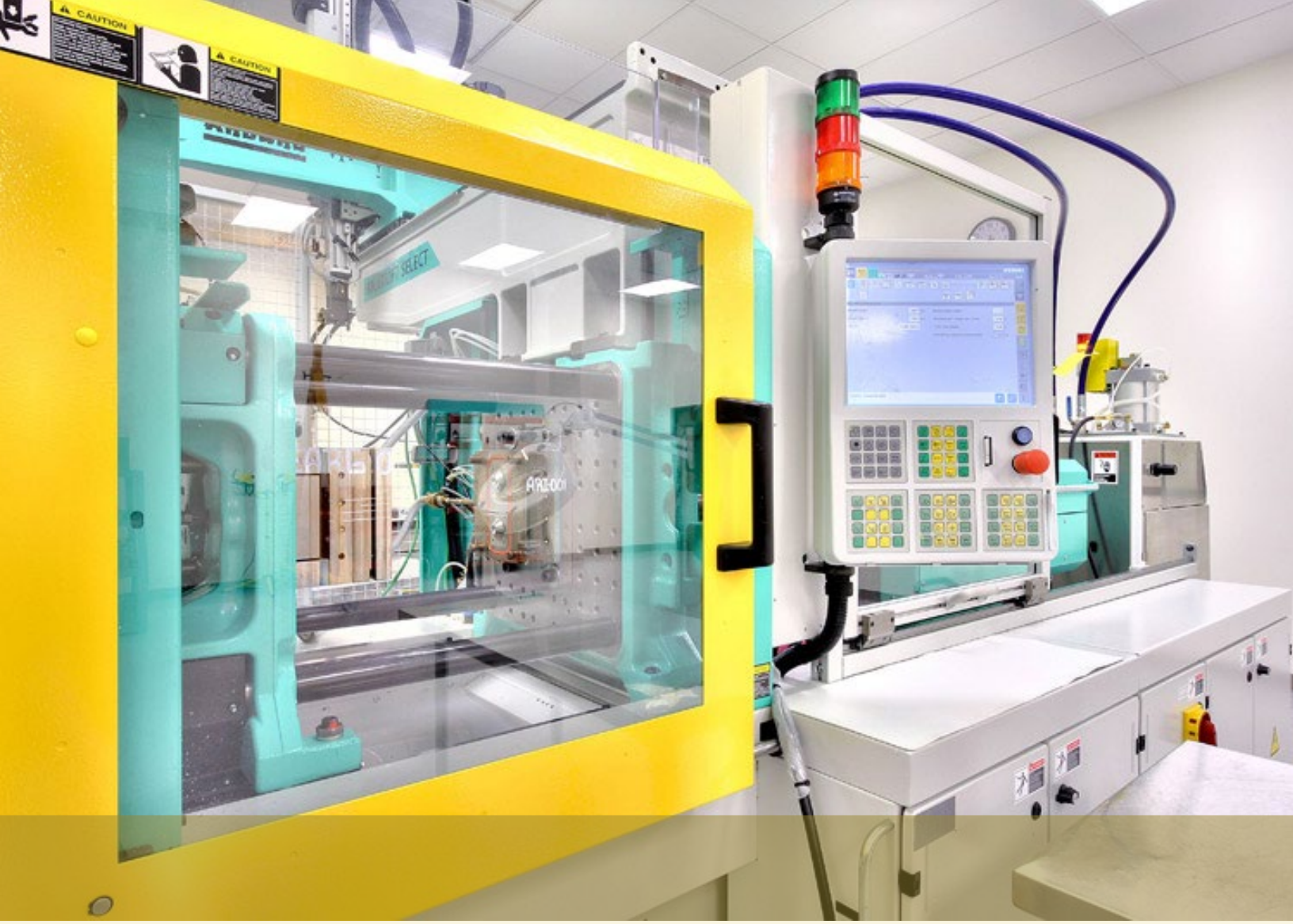


5 Common Liquid Injection Molding Mistakes

(and How to Avoid Them)

Liquid injection molding (LIM) is an industrial fabrication process used to create durable, high-performance parts. It involves the shaping of liquid silicone rubber materials into a range of end products. LIM begins by pumping and mixing two part materials using equipment specially designed to provide a chilled, closed loop constant mix of material to a molding press, where it is then injected into a closed mold under pressure, cured with heat, and finally ejected.

LIM can produce a variety of parts, including seals, o-rings, cables, electronic components, and products that require sterilization.

LIM is advantageous for industries such as:

- AUTOMOTIVE
- AEROSPACE AND AVIATION
- MEDICAL AND DENTAL
- ELECTRONICS
- FOOD

When correctly implemented, liquid injection molding is an excellent way to consistently produce excellent quality components in high quantities of parts. However, there are several common mistakes that can detract from the efficiency and success of LIM projects. **Here are five common pitfalls and ways to avoid them.**

MISTAKE #1

Selecting the Wrong Material or Process

From the outset, material selection is crucial. Choosing a material that does not match up well to the specifications of the end application can be a recipe for disaster and potentially have a negative impact on every subsequent step in the production process.

For instance, it is often assumed that silicone molding processes are a perfect fit for the vast majority of part designs. After all, silicone is a versatile material that features excellent performance within a broad temperature range. However, cost, delivery, lead time, material availability, and part and assembly design features all apply to silicone material selection.

SEVERAL POINTS TO CONSIDER PRIOR TO SETTLING UPON SILICONE:

- Flash will almost inevitably occur on the parting lines of tooling used with silicone-based material. If you are looking for a flash-free end product, silicone might not be the best match. Liquid injection molding of silicone provides a great deal of control when filling parts but is not perfect for all designs and applications.
- Silicone may react with a wide variety of chemical and environmental conditions. For example, pressurized steam at temperatures over 150°C tends to cause a breakdown of silicone's siloxane polymer and a decline in its properties.
- Painting and printing silicone is a challenge; if these aspects of your project are high priorities, then a different material may work better, and results can be achieved more quickly.
- Silicone's abrasive nature can cause damage to molds over time, making it important to add consideration to tool design.
- Some silicone-based compounds need post curing to remove any chemical agents left in the part. This process will improve the product's mechanical properties, but it typically comes at an extra cost to the client.

It might be best to accommodate for several different material options for any long-term project. In case there are difficulties in sourcing one material, you can opt for another as a backup. It is also sometimes the case that where one material will not work for parts' designs, another might work very well. This can be crucial to making acceptable parts. Additionally, it is essential to examine the environmental conditions that a part will be subjected to in its end application. This is a factor we will discuss next.

MISTAKE #2

Overlooking Environmental and Mechanical Conditions

To create LIM parts that will stand the test of time, you must consider the environmental conditions and mechanical demands that will be involved in the end application. Selecting an appropriate LIM material largely depends on these factors. Source material that is incompatible with the environmental and mechanical demands of the end product can lead to increased costs and possible product recalls.

IF CONSIDERING SILICONE, FOR INSTANCE, APPLICATIONS SHOULD BE EXAMINED FOR THE FOLLOWING ENVIRONMENTAL AND MECHANICAL CONDITIONS:

- Exposure to sunlight and other light sources
- Ambient light
- Functional temperature range
- Fresh or salt water
- Oils
- Solvents
- Biotoxicity (primarily for medical applications)
- Abrasive elements
- Compression
- Elasticity
- Lateral stresses
- Hardness

It is highly recommended for part designers to collaborate closely with molders and material compounders for assistance regarding their material requirements. Your LIM solution provider should be able to offer suggestions for optimal material selection based on your project's unique intended operating conditions, among other aspects. However, while molders and material compounders can provide helpful insights and possible recommendations, it is ultimately the responsibility of the part designer to select a material for the application, as well as to weigh all the environmental and mechanical variables that could affect the part and its performance.

MISTAKE #3

Choosing an Under-Equipped LIM Provider

For optimal LIM results, ensure that your part provider has broad expertise and the correct equipment to successfully take on and complete your project. These factors are especially critical when complex part geometries are involved – you do not want less than top-notch parts made due to insufficient capabilities.

As we mentioned, liquid silicone rubber tends to create flash during the molding process. A LIM technician with an extensive LSR background can create parts to correct tolerances and implement extra elements into the mold design, thereby improving cost and quality. Skilled operators with the right equipment can bring precise part requirements to life.

Your LIM provider should consider a number of factors during the molding process, including operator assist, material delivery, pressure control, temperature, press capacity to fill the part and hold the mold shut during injection, and any special equipment required to remove the part from a mold.

WHEN CHOOSING A LIM PROVIDER, LOOK FOR THESE SIGNS OF REPUTABILITY:

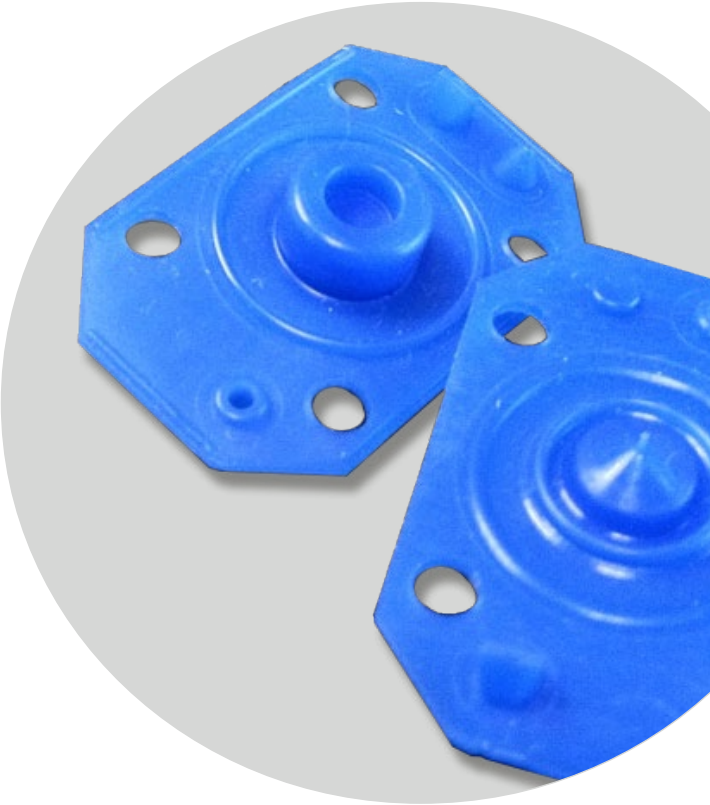
- An immaculately clean shop and possibly a certified clean room.
- Proof of up-to-date certifications and inspections.
- Paper trail in place that records and assists review of data.
- Formal quality control system with evidence of inspection protocols.
- ISO certifications that are pertinent to the kind of product you want to manufacture.
- Mold making sources that address quality, delivery, and appropriate price.
- Injection molding presses that utilize robots and end-of-arm tooling.
- For long-term projects: extra facility space to account for project expansions.

Before finalizing your LIM provider choice, ensure that they have the capacity and expertise needed to deliver on each of your project requirements. Visit them for an evaluation.

MISTAKE #4

Omitting Alternative Molding Processes

For high-volume orders, efficiency, and parts that require tight tolerances, liquid injection molding is often an ideal choice. However, there are alternative molding processes that may be a better fit, and it is important to examine these other options as well.



For example, if you would like to add multiple colors of parts to a small number of parts on a specific product, then it might be much more cost-effective to use a compression molding process for its production. Otherwise, the costs to tear down, clean, and set up a machine between runs using LIM may outweigh the benefits of the process. Compression molding may also offer advantages over LIM in initial tooling investment and lead time and might be a better vehicle to produce usable prototype or test qualification parts.

In short, make sure to check with your manufacturer to determine the best molding process in terms of quantity, quality, lead time, and cost.

MISTAKE #5

Cutting Corners and Overspending

Every LIM project comes with a budget in mind – make sure to channel the bulk of your time and money towards the right areas of production and avoid overdoing others. As one example, ensuring that a part design is as complete as possible at the outset is crucial, since this will inform every other aspect of production. The most time and patience should be granted to this first step.

One common misconception and unnecessary spend point during LIM projects is the need for prototype production. Typically, a LIM prototyping process results in hundreds and even thousands of qualification parts that need to be evaluated. The tooling as well as the materials and qualification runs of the product

can be quite expensive. LIM clients should have a clear objective in mind before they request prototypes from a service provider. Discuss your goal with a molder or tool maker to understand if LIM prototypes would be beneficial and make sense in a particular case, as there are alternatives.

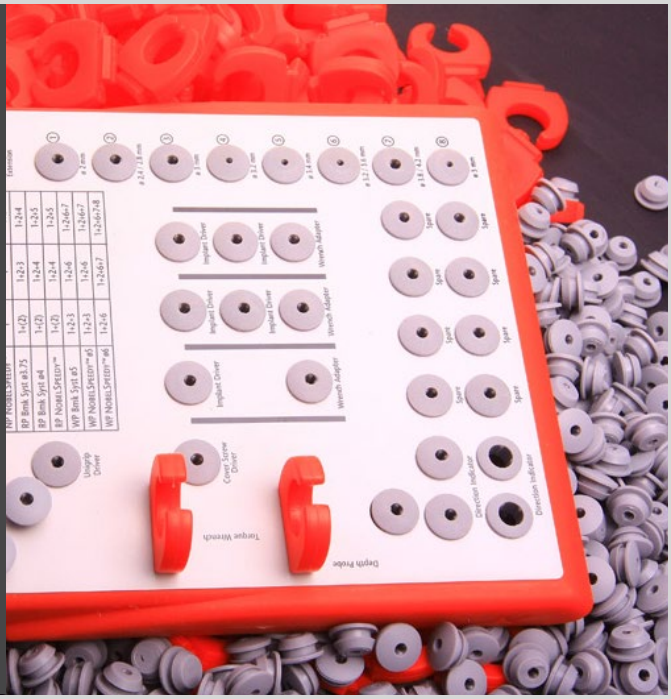
Interact with your potential service provider. It is very important for them to understand your expectations. If the relationship is not focused on getting where you want to go, then find another company to work with. They should be able to help in providing you with clear, consistent, measured information to get things moving in a positive direction.

Choose ETI for Your Liquid Injection Molding Needs

Avoiding these five common mistakes in the liquid injection molding process will help you save time and money, including costly recalls down the road. By opting for the right material, part design, and LIM provider for each aspect of your end application, you will receive excellent custom parts in return.

At Elastomer Technologies, Inc. (ETI), we have provided our clients with superior LIM solutions and premium custom parts for over 30 years. We are fully equipped with energy-efficient 50- and 100-ton injection molding presses with lights-out production capabilities. Our highly capable team and large facility lend to our key advantages, which include:

- Certified ISO 8 positive pressure clean room.
- Versatility to manage lots as small as 1,000 units to quantities of 1 million or more
- 24-hour molding
- 100% process verification and validation
- Excellent record keeping and tracing of materials.
- Design and material selection assistance for LIM prototypes



To learn more about how we can assist with your next LIM project, reach out to us today and our team will promptly respond to your inquiry.

About Elastomer Technologies

Elastomer Technologies was founded on one simple principle — when a customer calls, they have a goal and it is ETI's job to create a way to get there. Over 30 fabulous years later we are still doing just that.

Customers expect solutions and ETI produces, using a diverse portfolio of technology options, some old and some new. But what really keep ETI valuable is that they are always improving:

- New larger facility for better material control and improved flow of work helping to improve quality and provide room for additional technology improvements
- Improvements to hydraulic systems that drive our compression molding equipment to keep costs in check.
- ISO Class 8 clean room to add risk management where it is needed.
- Micro View Coordinate measuring equipment to improve our quality inspection.
- Tougher accredited ISO registrar and implementation of an on-line quality system.
- Two new 50 ton and 100 ton LIM presses to improve delivery of liquid silicone injection molded products with the additional capability to run high constancy silicone rubber.

Responsive, innovative, and diverse range of services that provide solutions is what makes Elastomer Technologies, Inc. a company that will smooth the pathway of your next precision rubber molding or die cutting project.

Contact Us Now | **Visit Our Resource Library**

Elastomer Technologies, Inc.
255 Glider Circle, Corona, California 92880
Phone: 951.272.5820
Email: mbarbour@etirolec.com Website: www.etirolec.com

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