



T **TOOLING**
TECHNOLOGY
A TOOLING TECH GROUP COMPANY

THE TRUTH ABOUT POROSITY

WHITEPAPER

THE TRUTH ABOUT POROSITY

Most people within the mold and tooling industry know about porosity. At least they know what it looks like! It is often considered a dirty word as it implies a lower quality tool and/or sub-par construction. As tooling experts, especially with an in-house foundry, we are often asked by our customers, “Why can’t you just get rid of the porosity?” Believe us, if it was that easy, we would certainly do it. Unfortunately, there is a lot more to the story that prevents us from fully eliminating this occurrence within the tooling we build. To better understand why this isn’t a simple fix, let’s take a look into what causes porosity and how we can help you limit its exposure.

First, let’s clarify exactly what porosity is. A full dissertation could be written on this subject, but because we all have a to do list a mile long, we will spare you that explanation. Simply put, porosity is the result of air trapped within the molten material during the casting process that typically creates small holes and voids in the mold when the metal has cured (see Figure 1). The result can lead to imperfections on the part during the forming process (see Figure 2).

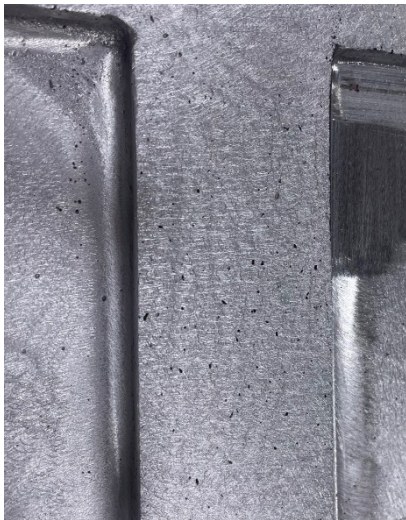


Figure 1 Example of minor porosity in a cast aluminum tool.



Figure 2 Result of tool porosity on the finished part.

Now that we have an understanding of what porosity is, we can turn our focus to why it occurs and what factors affect it. However, before we do that, we need to be clear that although some shops claim they can eliminate porosity, that is simply not true. Unfortunately, it is an inherent part of the sandcasting process. This is mainly due to the wide variety and number of variables in play with both the casting process and the materials being used.

We won't do a deep dive into each of these individually, but some of the things we have to consider include outside temperatures, humidity, mold venting, pouring turbulence, mold surface geometry, casting thickness at the face of the mold compared to the thickness or mass of the underlying support structure and, of course, the chemistry of the sand and the aluminum. All of these play a role, and usually we're dealing with multiple variables at the same time. In truth, this list is not comprehensive, but rather a small sample of what we have to manage on a day-to-day basis.

So, what are the options? If we can't guarantee a porosity free tool, what can we do? The good news is that it's not all doom and gloom when we talk about this subject as there are options to manage the severity and frequency of porosity within your tooling.

One way is to consider selecting cast oversized and machined tooling, which is referenced in our previous blog entitled, *Choosing the Right Tooling for the Job*. In choosing this type of tool, we can take steps to help draw the impurities and porosity towards the surface of the casting, which will then be machined away from the face of the mold.

Another option would be to consider billet construction, which would guarantee a porosity free tool. This method is typically much more expensive though, so it is only considered when the part application requires absolutely zero imperfections.

By working with Tooling Tech Group, you can be assured that our 40+ years in business and lessons learned from thousands of tools built will be applied when considering your project. Our experienced application engineers meet with you and ask a lot of questions, such as:

- What's the forming process?
- What is the end use application?
- What is the function of the part?
- What are the critical characteristics?

Knowing this type of information ensures we provide the best possible solution for your tooling needs. By gaining an in-depth understanding of your requirements, we can analyze the process to see which of the many variables are most likely to affect your project and focus on controlling these in a way that delivers the most optimized tool to meet your expectations.

For more information on Tooling Tech Group's cast aluminum tooling capabilities, call 231-400-4884.

COMPANY OVERVIEW

Tooling Technology, originally founded in 1989, specializes in providing thermoform tooling as well as rotational and blow molds for producing plastic components and structures. Equipped with its own aluminum foundry, Tooling Technology handles all phases of the tool build in-house, from design and pattern to fabrication and finishing, as well as providing solutions for automating secondary processes. Additionally, the company is home to the Segen Quick System for simplifying industrial setups, changeovers, workholding, clamping, fixturing and alignment.

Tooling Tech Group builds custom automated systems for assembly, joining and inspection as well as tooling for a variety of applications including thermoform molding, high compression composite molding, blow molding, rotational molding, die casting, and stamping. Industries served include automotive, appliance, lawn and garden, agricultural, aerospace, marine, and off-road vehicle industries, among others. Through organic growth and acquisitions, the company has become the largest tooling provider in the United States with 650+ employees, 13 modern facilities and over 1 million square feet of manufacturing space across four states.

The depth and breadth of our capabilities is achieved through the combined experience of our company units, with each of these companies being in business for 30+ years, providing both extensive industry experience and financial stability that you can rely upon. Our unique differentiator is the ability to provide all tooling services from design to engineering to simulation to machining to fabrication to try-out all within one company. This single source ability can help to streamline your business operations and simplify your life. We take full responsibility for quality, delivery, and cost management of each project starting at concept through “on time, every time” delivery.



TOOLINGTECH GROUP