WHAT WILL YOUR CUSTOMER GAIN BY USING GAS ASSIST?

There are many reasons why using gas assist injection molding methods are beneficial to the injection molder: improved productivity, production of a higher quality product, and expanded design options not available with convention molding techniques. Above all others, cost reduction is the greatest advantage to utilizing gas assist injection molding.

The gas assist injection molding process enables the molder to design a part that will require, in most cases, lower clamp tonnages. When clamp tonnage is reduced, a smaller machine may be utilized for making the product as compared to conventional injection molding. Clamp tonnage reductions have been seen as low as one half ton per square inch of molded part area. This affects the burden rate of the machine desired to mold the product and can give you an edge in the quoting process, not to mention the elimination of cost for a new, larger molding machine. In some cases the molds can even be operated in lower tonnage molding machines, which reduces the overall energy costs of production and helps to make operations more energy efficient.

Cycle time reductions are another cost savings associated with the gas assist process. When molding with gas assist, pack and hold times and pressures will not be used, resulting in instant cycle time reduction. This is obtainable on every process. In gas assist injection molding, the cavity is NEVER completely filled; it is a short-shot process, even when used in thin wall applications. This means that less plastic material is injected, leaving less plastic material to cool. The gas also promotes internal cooling, which can further slash cycle times.

Based on new methods of tool design, flow and fill of the plastic part has improved such that less fill time is required. The gas will be injected either simultaneously with or just after resin injection to complete the fill of the part cavity. In very thick walled parts, gas follows the path of least resistance rather easily and promotes low-pressure fill of the tool without the attempt of packing out an outboard feature in the tool through the sprue and gate, which is virtually impossible.
Reductions in part weight are almost always realized with the gas assist process. Even in thin wall applications, there can be sink marks on a feature of the part due to the differential in wall thickness. A sink would not be present if the part was completely filled with plastic; in typical conventional molding processes, excessive amounts of plastic are used in an attempt to pack these problematic areas out. Thick walled parts are naturally conducive to the gas assist process. In thick wall applications or structural foam conversions, a great deal of part weight is removed via gas assist; previous gas assist conversions of such molds have helped to decrease part weights by as much as 70 percent.

It is important to remember that gas will always take the path of least resistance. The gas flows through the part removing plastic as it completes the fill of the part. This typically is frowned upon because it appears to weaken the part. By design, we actually form a tube configuration with relatively no stress, which in some cases actually improves the strength of the part. Of course with the elimination of resin from the part, less plastic is required lowering the overall cost of resin. In today’s market, the removal of plastic in an engineered grade is quite cost effective to the bottom line. Many engineered grade resins may be able to be replaced by commodity type resins, depending on the end use of the product.

**Better Part Quality**

In addition to being a notable cost of production, the overall quality of the part has always been of significant concern to the molder. As mentioned above, the weld lines of a part can be minimized or even eliminated with proper implementation of the gas assist process. Other major quality issues that arise from conventional molding processes include warpage and sink marks (in or on the part). By utilizing design or placement of the gas channel or pin, these and other quality issues can be completely eliminated during a much faster cycle.

Stress reductions lead to dimensional stability, another major quality issue observed in conventional molding. By reducing the molded in stress, a part will have a shrinkage rate much less than that of a conventionally molded product. This leads to increased repeatability and reduced deformity within a part. In most cases, weight becomes the quality measure rather than the actual measurement of the part. This can be attributed to a very repeatable process.

When you explain the advantages of the gas assist process, ranging from sink-free surfaces to warp-free walls, you’ll have the close attention of your customer. Sample parts molded using gas assist are also quite helpful in further advancing the proposal.
Help customers understand that their parts can now be delivered defect free, and that they can save money by relaxing the incoming inspection process. When they understand that the process corrects years of frustrating quality issues, your foot is in the door. You can promise immediate improvements in quality along with reduced lead times, and that makes everyone happy!

**Lower Piece Price**
Gas assist is a cost-saving option for both you and your customer. Your production costs can be reduced in several ways. One might be to move a certain mold from a 1000-ton press to a 700-ton press, or possibly even a 500 ton machine. Your scrap will go down to almost zero, eliminating material waste. You may be able to shorten your work week to a normal 40-hour schedule, eliminating costly overtime.

**Shorter Lead Times**
High scrap rates are the leading cause of missed schedules. They cause extended machine times and use of material in excess of that available in-house. If you are using twice as much resin as you need to, a material requirement planning (MRP) system will fail.

From a management standpoint, this is not acceptable. Not only do efficiencies decrease, but also the cost of running one or two bad jobs can ruin a weekly profit-and-loss statement. A missed shipment date can mandate expedited deliveries, an expense that should not be in the P&L equation. With more and more companies looking at delivery as a supplier requirement, the issue has to be addressed. As we all know, in any production environment problems exist that threaten a schedule. Some of these production problems may stem from the high scrap rates of a previous job, some from the lack of machine operators. Due to an increase in capacity and a decrease in startup times, you will be in a better position to control production by using gas assist.

But with a gas assist conversion, a dreaded job becomes one of little concern. The job goes into press when it is scheduled and completed on time. When production is complete, material sent to the production floor as a buffer returns to inventory as virgin resin, retaining full inventory value. A scheduler can rely on gas assist tools to run as planned and can eliminate an environment of backlog. An order is placed, material is ordered, production starts, and then the run is completed. Parts go into work-in-progress or finished goods on time. Shipping pulls the parts from inventory and loads them on a truck for delivery to the customer.
But what about quality? The quality department hasn’t been mentioned, because the inconsistent quality interpretations of different quality auditors can be eliminated. With gas assist, parts are to print and rejection rates cease. The worst running jobs can be corrected to become the best running jobs. Not only are production lead times reduced when gas assist jobs are run, but toolbuilding lead times are reduced as well through the elimination of hot runner systems and/or mechanical slides and lifters.

**Greater Design Freedom**

Design of the tool is the most important part of a successful project, and is crucial whether using gas assist technology or any other conventional molding process. With the gas assist injection process, it is now possible to design a part based on concept for use, rather than on the limitations of conventional molding capabilities. A feature that is many times greater in wall thickness can now be designed directly into the part, rather than using a second mold and secondary operation. This can eliminate many long-term problems with the product. Gas channels or pins can be used to not only help the filling of a cavity, but also to strengthen a feature or an area of the part based on design.

With gas assist, you can take your customer’s concept and develop it with the least amount of deviation concerning part design. In the past, molded parts often have been designed with cores and lifters to reduce the amount of resin in certain areas of the part, as thicker areas would not be aesthetically acceptable.

Designers have also been plagued by an inability to reduce sharp edges and imperfections. The design freedom of gas assist allows for versatility, added strength, and a more aesthetically pleasing finished product. Weld lines can also be eliminated by design. This will also open new avenues for a designer to travel when part designing requires a class A surface, especially in chrome plating where weld lines manifest as defects in the part’s quality. Gas assist mold filling analysis can be used to indicate the result of a particular design. At a relatively low cost, seeking expert advice going into a project can save many headaches after the tool has been built.

Today’s customers are searching for companies capable of unique designs, and plastics industry publications like to carry the stories behind award-winning designs. Gas assist is now a driving force that is helping new parts to win awards year after year. The fact that we are now able to improve a part’s look, as well as its function, has let to serious consideration for awards. Award-winning designs aid a company in attracting new business and customers; this design excellence lets your engineering staff become a valuable sales component of your company.
New Project Advantages
Because of the reduction in clamp force, you will immediately be able to impress upon the customer your new ability to produce parts that used to be beyond your capacity. Your customer may be having quality problems with a job outside our facility. If you are successful in the presentation of your new gas assist capabilities, he may see other jobs he can turn over to you. Using gas assist may also make it possible for you to convert parts previously made of metal to plastic injection molding.

Long Flow Lengths
Gas injection accommodates very long flow lengths by using correct tool design. Parts that are in excess of five feet long have been molded using one gate, a feat that cannot be accomplished in conventional molding. Multiple gates or a hot runner system are required to fill a part with long flow lengths. Using gas assist techniques to mold long flow lengths is not only simple from a design perspective, but it also eliminates the costs associated with extra tool considerations.

Structural Foam Products
The easiest tool to convert to gas assist is usually one that had been designed for structural foam. The typical structural foam part has very thick wall sections which are naturally conducive to gas assist injection molding. The structural foam process mixes the nitrogen or expansion agent with the plastic and leaves a swirl effect on the part surface, whereas gas assist injects the gas after resin injection leaving a smooth skin on the part. Structural foam products usually require secondary operations and multiple coats of paint; elimination of surface defects, secondary operations, and paint are huge considerations for converting these types of tools.

Structural foam products usually require extremely long cycle times to allow completion of part skinning prior to demolding. The activity of the chemical reaction of the foam must be contained within the part; if uncontained, a condition called post-mold blow (evident holes in the part surface caused by the gas blowing through the outer skin of the part) will occur. The structural foam product also requires set up time before being exposed to secondary operations and paint. With gas assist, you can take a part that requires at least 72 hours of finishing time and turn it into a shoot and ship product in most cases.
Disadvantages

As with any process there are certain things occurring with gas assist, some of which could be considered detrimental. For starters, with gas assist you will have a hole in the part. It may be unseen with the naked eye, but at the point of entry and exit for the gas a hole will exist. Another disadvantage of gas assist lies in its use with hot runner systems; for such applications, gas assist should not be used in a hot runner tool that does not have valve gates. As the gas takes the path of least resistance, it is more likely to travel into a 500° F manifold of molten plastic rather than going into a part that is under 200° F in most cases. In some extreme cases, gas assist has been used on hot runner tools but serious design considerations to prevent gas from finding its way back into the manifold. Again, seeking expert advice is recommended.

Read through is also a possible result of gas assist. If the design is not correct, there may be a read through of where the gas went through the wall of the part and where it did not. The placement of gas channels and injector pins is crucial when considering this problem. It is more likely to experience read through on commodity grade resins than on engineered grades.

Making the Case for Gas Assist

As you will see from the variety of case studies, gas assist technology can help eliminate many of the molding problems we face each day. Quality issues associated with conventional injection molding can be reduced; parts can be molded faster in lower-tonnage injection molding machines, saving money for you and your customer. Gas assist also provides engineers an increased array of options that tend to break the rules of conventional part design.

All of these benefits are real. Each day they are realized by gas assist molders throughout the world. We urge all injection molders to explore the gas assist option. It can open up greater opportunities for future products, and help with many of the parts that you are currently producing.

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