

Do Not Get Caught Without a Backup Material

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Choosing the correct material for a part is a significant, and perhaps the single most important step of the design process. The material chosen will greatly influence how the part will perform today and in the future, its cosmetic appearance, the cost, and how well the part will mold. There is typically a tremendous effort put into selecting the correct base resin; its additives, fillers and reinforcements. Once the ideal material is chosen, the part is molding seamlessly and performing as expected, the work is not yet done. Finding a backup material is the next critical step in the design process. Engineers that are on “top of things” will consider this step during the initial design stage.

What happens if your material supply is suddenly cut-off? Do you have a backup material? If so, have you put the alternative material into action to ensure parts can be made with no interruption? Molders are being informed at an accelerated rate that the material they are using will suddenly not be available for the unseeable future. This is happening with many different types of resins, from lightly used to very popular ones. This leaves many molders at the 11th hour scrambling to find a replacement to meet their client’s production demands. This article will discuss how this very real situation can be avoided, and in the end, make the molder look like a champion to their client.

A popular credo that exceptional molders follow is “Expect the best, plan for the worst, and prepare to be surprised,” *Denis Waitley*. These molders take it in stride when they receive the call that a material is being discontinued or unavailable for an extended period of time. This is because these same molders also put into practice the mantra “Change the changeable, accept the unchangeable, and remove yourself from the unacceptable,” *Denis Waitley*. These molders have another material to substitute at a moments notice, in which they have complete confidence in, since they had previously done the work to verify it as a replacement.

Do you have a plan in place in case you were to receive the call? At the very least, wouldn't you like to know if there is (or is not) a replacement material for what you are currently using? If the answer to this question is “no,” you are playing Russian roulette with your molding operation and your client’s parts. I challenge you to examine some of your most important products and play the “what-if” scenario. Essentially, perform a risk management routine where you receive the notice - “we are inflicting a *force majeure* and your firm will not be receiving xyz material for the indefinite future.” Do not kid yourself. These calls are occurring at what appears to be at an increasing rate. You should expect at some point in your “plastic” career you will experience such a situation.

There are a number of reasons why materials become in short supply or are discontinued. Here are a few:

- The resin manufacturer decides the material is no longer profitable.
- Two resin manufacturers decide to merge. A major reason mergers occur is that someone has decided major savings can be realized by cutting “repeat or similar products.” Guaranteed that one of the *similar* products will be cut and a substitute material will be offered.
- Resin manufacture declares *force majeure* preventing the fulfillment of the contract. This could be caused by sudden shutdown at the resin manufacturer due to some emergency situation, such as a hurricane, fire, software issue, or logistical issues.

- One or more of the raw ingredients, additives or fillers the resin manufacturer requires becomes in short supply.
- Planned or unplanned shutdown for plant repair.

Typically, the resin manufacturer or your supplier is going to provide replacements. These options should be weighed heavily. In most cases, you will not be able to simply substitute a new material. Molds are made and processing conditions are set to a specific material. Making the situation extremely daunting to resolve in a short period of time, is if the material needs to be certified to a standard or approved by an agency, such as UL or the FDA. If this is the situation, your options for a replacement material are extremely limited, making the need to have one in place even more critical. If you are faced with a material being in short supply or discontinued, it is likely you will need to recertify the part. This could be a torturous process if the material is not UL or FDA certified. Who then is responsible for the costs involved with having the material certified under these agencies? It is noted that because the FDA requirements are one of the most stringent, many resin suppliers will explicitly state that the resin can be used for food contact in all countries but the United States.

The expression “Expect the best, plan for the worst, and prepare to be surprised,” means that things should be put into place now to ensure that there is a backup material. This is done by the OEM, the molder or a collaboration of both parties. This process involves many of the steps that were done when the original material was chosen:

- Review certifications required for the material. If they are required, this is the first place to start since quite a few materials will be eliminated right away.
- Review materials in the same class of the original resin. This will give you the best opportunity to meet the required mechanical properties and moldability.
- Review specific additives, colorants, and reinforcements. Understand why they are in the resin and how they affect the performance of the part, e.g. UV protection.
- Review how the material arrives from the resin manufacturer or supplier. Does it arrive clear, natural or pre-colored?
- Review how the material is delivered; rail, truck, gaylord or bag. Make sure your facility has the ability and capacity to accept the material.
- Review material data sheets for properties such as modulus, strength at yield, elongation at yield, elongation at break, melt flow rate (at same conditions), notched Izod strength, and density/specific gravity.
- Review multipoint material property data (temperature and time) if available.
- If the part is used at an elevated temperature, it is recommended that the modulus of the material be evaluated over a temperature range via dynamic mechanic analysis (DMA) in order to determine how the stiffness decreases as the temperature increases. Also, test samples following ASTM D 638 “Standard Test Method for Tensile Properties of Plastics.”
- Mold both materials.
 - Understand the nuances of molding the alternative material.
 - Keep a number of molded “golden standard” for both materials that you can refer to. This will allow you to test a new part to the golden standard properties.

- Determine a method to mark the mold so that you know what material is being molded.
- Ensure the part with the backup material performs as well as the original material.
- Continue to monitor the availability of the backup material. You want to prevent the situation where you have done all the necessary steps listed above to only find out that the backup material has been eliminated.
- It is not necessarily recommended to keep a large amount of backup material in stock. However, it would be excellent planning/foresight if another product being molded in your facility used the backup material. Thus, if something were to occur with either product, you readily have a supply of material, a current source, and you understand how to condition and mold the material, and how the part will behave after molding.

If the material you are molding is cut-off and you do not have a backup material, you are likely going to have to follow the same procedure, but at a more rapid pace. You will likely be told that there is an immediate substitute. However, this is rarely the case. By using the steps provided above, you can put into place an immediate replacement material, and give you and your client confidence you will not incur interruption if that call ever comes.

Summary

Molders are more frequently facing the situation where the material they are molding is suddenly cut-off with no insight as to when the supply will be continued. This situation is occurring with all different types of resins and to different size molding operations. There will inevitably be a substitute material recommended, but do not be fooled. This is rarely the case. It is strongly encouraged to have a backup material identified that you have full confidence in. At the very least, begin to review your most critical parts/resins and begin the “what if” scenario.