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Myth Busting for Rotomolding?

A wise man once told me that 'one good experiment was worth a thousand expert opinions'. It struck a chord but there is a necessary follow-on '...and make sure that you measure and record what you tried'. How many times have you encountered situations where people tell you that they have tested or tried something years ago but cannot provide data or facts to support what they are doing now? Rotomolding myths or fireside tales of things that worked or didn't work persist and there are many to choose from – but which are true? Some of the mysteries can be illuminated by simple bench tests and, while it's sometimes tough between travel and projects, I now have some very interesting tools for producing and analyzing materials including a bench-top extruder, a small rotomolder, and a rheometer for viscosity tests.

There are all sorts of questions to explore, try some of these for size; send me some more suggestions if you like.

We Never Grow Old While We Have New Toys to Play With!

Surface Enhancer: The drug of choice for rotomolding operators everywhere that makes everyone addicted to its apparent cure-all properties. The problem is that it is expensive and often used when it is not necessary – spray it on one insert, you may as well spray it on all of them! Try analyzing problems from a more fundamental perspective before adding a band-aid – improving heat flow, powder flow, and part design will usually form the basis of a solution. Help operators to break the habit!

Bubbles in the Cross-Section: Is the classic guide used by molders since the 60s and 70s to make sure that you don't err on the side of overcure still valid? Well the truth is that rotomolding materials are far more stable than ever and that the process window is wider than it was for those first delicate grades of polyethylene. With the advent of process control where we can measure internal temperatures, we should be aiming squarely for the mid-point of the process window: bubble free and with best physical properties. Bubbles in the inside 1/3 of the cross-section is an old fashioned notion – let's determine cycles through temperature like all other major plastics processes.

Humidity: Often cited as a culprit for all sorts of molding ills – has anyone produced a definitive study connecting humidity with porosity, lumpiness, or bad cure? There is an effect to be sure (although dry air may actually be more dramatic). Perhaps swirling is affected but I'd love to see a well conducted study or at least some good quality long-term data vs. properties.

High Initial Process Temperature: Does this really reduce external surface porosity? It might reduce cycle time a little but does it also promote greater variation in wall thickness due to larger differentials across the mold surface? A two step process can have benefits for controlling your process but look to the end of the process when the material is molten and/or reacting for that touch of finesse.

Faster is Better: And while speaking about high oven temperatures, is it really ideal to go as fast as you can? The legend of 1000°F cycles at toy makers endures but was never more than a number on the control panel and you may find that you do more harm than good to your molds, grease, and operators. A balanced approach that considers part strength, equipment longevity, and overall productivity will usually produce better results, but I could be wrong...

Pinholes on Threads: Do we have to live with this or is there a permanent solution? Even with super high flow cross-link materials this can still be a problem: is there more to it? Of course, and molders everywhere know the answer to be a combination of powder quality (flow and particle size), flow properties of the resin, whether heat reaches the right area, design of the profile, and how much release agent is used. A simple matter which everyone knows how to fix, right?

Foaming Control: Perhaps this is an oxymoron if ever there was one. Adding blowing agent creates a complex interaction during a molding cycle where you are making the material more fluid by heating it and forcing it to expand at the same time while trying to stop the process before it goes too far and collapses back on itself. Fun if you can see the reaction (temperature control vs. rheology anyone?) and can understand the effect of material selection vs. your blowing agent activation profile. Sound complicated? Maybe, but it doesn't have to be if you can observe the reaction on a small scale and set the necessary parameters.

Crosslinking is Easy: Not. As many molders have recently found out, the search for a better cross-link formula which is healthier and more environmentally friendly is not so easy. Polyethylene powder may look simple but there are more additives and interactions going on than meet the eye of the rotomolder. However, it is possible to run tests that can compare the effectiveness and reactivity of different materials – even help you to identify ideal processing conditions before you have ever molded a part.

Batch-to-Batch Variation: Ever been told by a material supplier that the grade you are using hasn't changed but you are looking a growing pile of scrap and wondering if they really know what they are doing? You are not alone. A simple comparison of basic material properties such as viscosity and elasticity can show so much and it is amazing how different some batches can be from others. Let me know if you need data to confirm what you can see with your own eyes...

Oh, the joys of rotomolding.