Is Grilamid TR90 capable with RHCM? I have one new product which will be using your TR90. But I’m concerned there will be stress mark due to uneven wall thickness and the parts are black.

I’ve reviewed all my data and reached out to EMS as well. I haven’t received a response yet, and I don’t anticipate much additional insight as they lack extensive experience.

RHCM is utilized for certain auto parts in the interior to ensure high-gloss parts with perfect optics. However, Grilamid XE 4139 is used due to its high scratch resistance. Despite its higher Tg, TR XE 4139 is stiffer, absorbs much more humidity, and has the same HDT as TR 90. Although it appears promising on paper, it lacks the ductility of Grilamid TR 90.

In my opinion, the main factors to consider for RHCM are:

* The glass transition temperature and HDT *(TR 90 = Tg 155ºC / HDT 135ºC)*
* Surface hardness at elevated temperatures. A common problem with RHCM is sticking.

The maximum tool temperature will likely be around 140ºC, possibly only 135ºC. If the tool is hotter, the part will take longer to solidify enough for demoulding, and it may stick to the tool. Based on my experience, 135ºC is around this turning point. We can use a mould release agent *(Master batch like MB5032 LS or MB 3680)*, which will improve flow and demoulding, but around this “critical temperature”, the effectiveness of the MB is significantly reduced.

In response to your specific question:

* The main issue is that once the mould temperature reaches approximately 135ºC *(high enough to eliminate stress marks or welding lines)*, the parts might stick in the tool.
* The Master batch improves the flow of Grilamid TR 90 and demoulding. However, we have observed that at temperatures around 130ºC to 140ºC, the demoulding effect is minimal.
* To the best of my knowledge, no RHCM is currently used for any Grilamid TR 90 part.
* The recommended maximum tool temperature is 135ºC; however, 140ºC could also work.
* Consider adding a demoulding Master Batch.

You mentioned considering RHCM due to uneven wall thickness. The general recommendation is to maintain uniform wall thickness to avoid cooling rate differences that can lead to defects like warping or sink marks.

Support: Uneven wall thickness should be avoided as it can cause various problems. However, often it’s not even the main problem; most of the time small gates, inadequate runners or incorrect gate locations are responsible for issues. Traditionally, a lot of time is spent on design *(optics and integrity)* but the gate system is usually neglected because it’s not part of the design. The gate and runner system are crucial elements to maximize part performance, improve yield and reduce cost.

I understand that your projects are confidential, but I can offer you a mould flow analysis *(although I believe you do this in-house),* or I can review the design and provide suggestions for improvements. I like to compare the gat issue with water flood gates. As you can see below, the left picture has much more power is more violent while the right side is a more gentle discharge.

**Small Gate Large gate**



I’ve compared some other EMS grades, and if you’re interested, we can test them to gain more insights. For instance, TR HT 200 looks promising, but I lack sufficient information about its chemical resistance or whether it breaks in a brittle or ductile manner. However, it certainly has a high Tg and HDT.

I’m more familiar with Grilamid TR 60. It’s an interesting product but poses more challenges in processing and is more sensitive to design and gate issues. As I mentioned earlier, XE 4139 isn’t my favourite, but I included it since I mentioned it earlier.

