



## Cycletime Tips - Automotive

### Volume 42: Component Failure Analysis

With the advent of “certified” suppliers, many of the old practices of performing incoming resin inspection have been declared obsolete. One of those inspection techniques was Melt Index (ASTM D1238), which produced data that could be compared to the viscosity measured at the resin production location. Since then, much of the test equipment used has been considered obsolete and sold or placed in permanent storage. It might be more valuable than you first thought.

When we were confronted with failed parts in the past, we did research revolving around resin suitability, part appearance, and process appraisal. When nothing was revealed, we sent the parts out to the laboratory to check for things like contamination, improper molding techniques, or poor processing. If you had a reliable lab, we obtained data, determined the root-cause and moved on with the corrective action. Another step might be worth investigating and that is a rough molecular weight evaluation using your Melt Index apparatus.

This works very well with unfilled resins, provided we understand the polymer being tested. The whole concept revolves around the fact that smaller polymer molecules are less viscous when compared to larger ones. Armed with this information, we can perform our test. First, we need to obtain one or several failed parts and place them in a clean granulator. When we have the regrind, we perform the Melt Index test exactly as documented being mindful of the orifice size, temperature, and kilogram load. If we didn't retain a small sample of the virgin lot (suggested), we can compare the results to the material certification or compare this to data collected from material in inventory. Please remember that if the material/regrind in question is hygroscopic, both will need to be dried to precise moisture levels.

If the data collected shows a delta of >35% (regrind having higher output), we may have an issue with improper resin processing. If your customer/supplier is skeptical at that point, a laboratory can be brought into the mix. If regrind was used in molding of the suspect parts, the data is still very relevant revealing a potential heat history or drying issue (regrind requires more drying time). In rare cases, the viscosity of the regrind has been found to be higher than the pellets. That instance has revealed a filler that has either been extracted in application or a modifier having been “cross-linked” in the polymer (creating a more viscous melt). These viscosity tests are very valuable and represent a significantly lower cost versus Gel Permeation Chromatography, which quantifies the molecular weight distribution.

This test can also be performed with composite resins to detect filler/polymer destruction, but a history will need to be established to quantify the output target range. If you have any questions, please do not hesitate to contact me.

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