50 Cambridge Drive, Monroe CT 06468 USA
+1 203.590.2000 | +1 800.332.AXEL
www.axelplastics.com

Technical Guide

Focus On: **Internal Mold Releases (IMRs) Lubricants for Pultrusion**

When selecting or qualifying an IMR for pultrusion, several criteria should be used. We have listed 8 which we believe are most important, although you may require additional tests to satisfy a unique requirement. Rating the importance of each criterion to your pultrusion requirements will allow you to compare and contrast different performance values for various IMR's and select the lubricant that is best for you. With hundreds of products to choose from, and the ability to custom formulate, AXEL MoldWiz® can fully meet any pultrusion requirement.

1. **SPI Gel Time**: This is the first and most important test to perform. Resin which cures too fast or too slow can result in dramatic changes to physical properties, surface cosmetics and pull force. To adequately gauge the effect of an IMR SPI gel times should be measured on three samples of equal volume as described below. Each sample should maintain the same addition order for additives.

a. Control: Standard resin formulation with all additives except mold release.
b. Standard resin with all additives and 1.0% current IMR by resin weight added to resin side.
c. Standard resin with all additives and 1.0% MoldWiz IMR by resin weight added to resin side.

An IMR should not radically change the gel time. Minor alterations in gel time can be compensated for by modifying the cure and catalyst packages, however if major shifts are noted (sometimes the result of a reaction with color or filler) a different IMR should be considered.

2. **Color**: This is not always important, but easy to check. Observe the cured material in each of the three SPI gel studies. If variation is noted in the cured samples, it may be attributed to reactions between the IMR and colorants or fillers. This is often easy to remedy.

3. **Pull Force**: If an accurate measure can be done, measure and compare with the current IMR. When measuring pull force, remember that it takes a couple of hours for dies to stabilize and run smoothly. Increasing the percentage of IMR in the resin usually reduces pull force so remember to test at equal additive levels.

4. **Line Speed**: Same as above.

5. **Viscosity**: IMRs reduce resin viscosity which allows resin to flow better and improve wetout of glass and fillers. This contributes to stronger composite matrices. Lower viscosity as the result of an IMR can also reduce the amount of styrene and air release that needs to be added to the resin - reducing VOCs. Viscosity should be measured with a viscometer.

6. **Surface**: Examine the surface - it should be smooth and clean and consistent without any blotches, buildup, slough, or dry spots.

7. **Painting and Bonding**: If these are important considerations, a fast and effective test is the crosshatch tape test. Crosshatch a painted profile with a razor blade, apply masking tape over the hatched area and then pull off. Observe how much or how little paint is removed with the tape.

8. **Die Wear**: Can be a factor of both corrosion and wear from the friction of pulling. AXEL has conducted proprietary tests on various die materials to determine IMR effects on dies. MoldWiz internal lubricants for pultrusion are optimized to provide the longest resistance die wear possible. Testing for die wear can only be accomplished by observation of die surfaces over an extended run. Even though die wear is extremely important, it is usually the last criteria checked.