FastForm™ – A Next Generation Pattern Wax for Today's Wax Press Technology

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In an effort to keep up with the development of pattern waxes and the pace of advances in automation and digital process controls found in today's wax injection presses, REMET PIC, has developed the FastForm™ series of pattern waxes which were specifically designed to set up quickly to take advantage of reduced cycle time afforded by automated wax injectors while maintaining dimensional stability and good surface finish quality.

Rheological studies conducted at the REMET UK R&D laboratories demonstrated the low filled FastForm wax to behave like a high filled wax.[1] This is due to the about the fact that FastForm exhibits a markedly low congealing point given its melting point that allows lower injection temperatures to be achieved with excellent flow. The end result is minimal cavitation, sink, and shrink rates similar to that of highly filled waxes without the tackiness, softness, or lower modulus often associated with low melting point pattern waxes. Furthermore, toughness and elasticity can be dialed in to meet customer specific needs while maintaining good strength. These attributes, combined with low fill, reduces the propensity for core breakage and shell cracking during dewaxing.

In the wax room, the limiting process step is often the dwell time, that is, the time required to fill the die and for the injected pattern to cool sufficiently under pressure before being extracted and the tool re-used. This is especially true with large parts having thick sections where the dwell time might actually be defined from the heat capacity and the inherent low thermal conductivity of the wax rather than the efficiency with which the tool can be cooled.

REMET recently completed a project at a customer's foundry that pours precision steel investment castings used in the oil and gas drilling industry. For this project, several wax patterns were selected that were bulky and, consequently had long cycle times. These were injected with FastForm and compared to that of an existing 30% filled the filler wax.

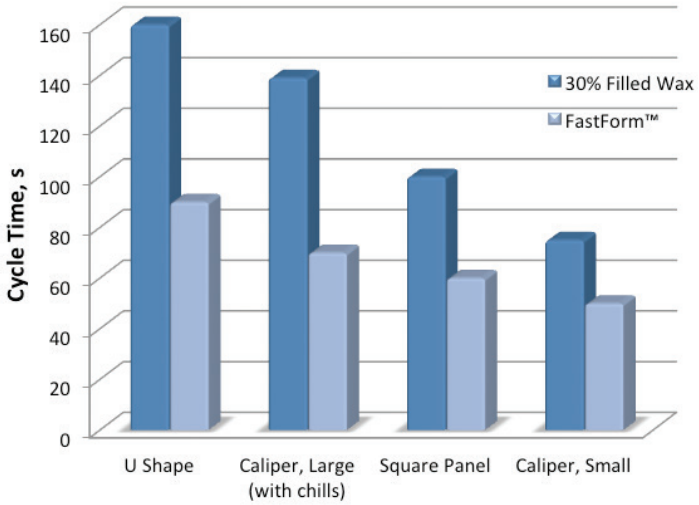

Figure 1: Faster cycle time achieved with FastForm™ due to excellent flow and fast set up.

Table 1 presents nominal dimensions and the total cycle times before patterns could be pulled from tooling. As exemplified in **Figure 1**, significant reduced cycle times of 44% and 50%, respectively, for the U Shape and Large Caliper patterns, are attributed to rapid fill due to the low viscosity near the congealing point and rapid setup of FastForm. This project proved so successful in the customer's wax room that they went to a larger capacity melter to keep up with the increased throughput of the wax injection presses!

FastForm, the latest addition to REMET's line up of high performance pattern waxes, enables the precision investment caster to fully utilize today's generation of wax injection presses. For further information on the FastForm series of pattern waxes, please contact Maggie Reed at 315-797-8700 or by email at mreed@remet.com.

Table 1: Reduction in Cycle Time with FastForm™ Compared to 30% Filled Wax

Part Type	Nominal Dimension (in.)	Cycle Time (s) 30% Filled Wax	Cycle Time (s) FastForm™	% Decrease in Dwell Time
U Shape	8.6 x 5.9 x 2.0	160	90	44%
Caliper, Large (with chills)	11.8 x 7.8 x 6.0	139	70	50%
Square Panel	11.8 x 11.8 x 2	100	60	40%
Caliper, Small		75	50	33%

Endnotes

[1] Grant Bradley, Ph.D., Randy E. Morss, and Joseph J. Stanco, "Application of Dynamical Mechanical Analysis and Rheometry for Measuring Dwell Time in FastForm Pattern Wax," Presented at the Investment Casting Institute 60th Technical Conference and Expo 2013, Pittsburgh, PA, USA.