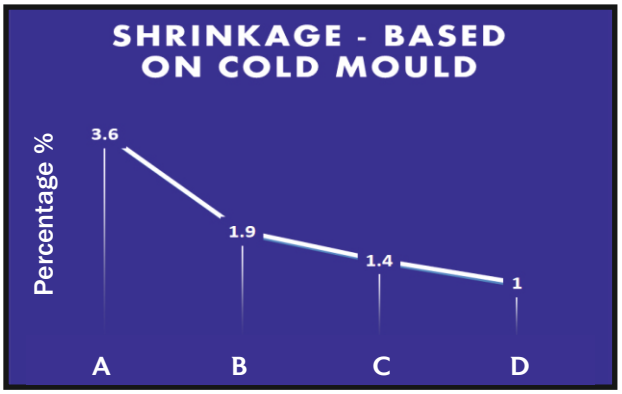
SWASAN CHEMICALS PVT. LTD.

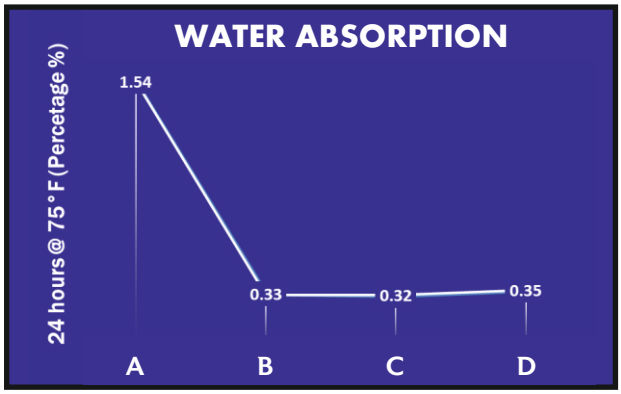
SWAMILL ULTRA - FINE POLYMER POWDERS

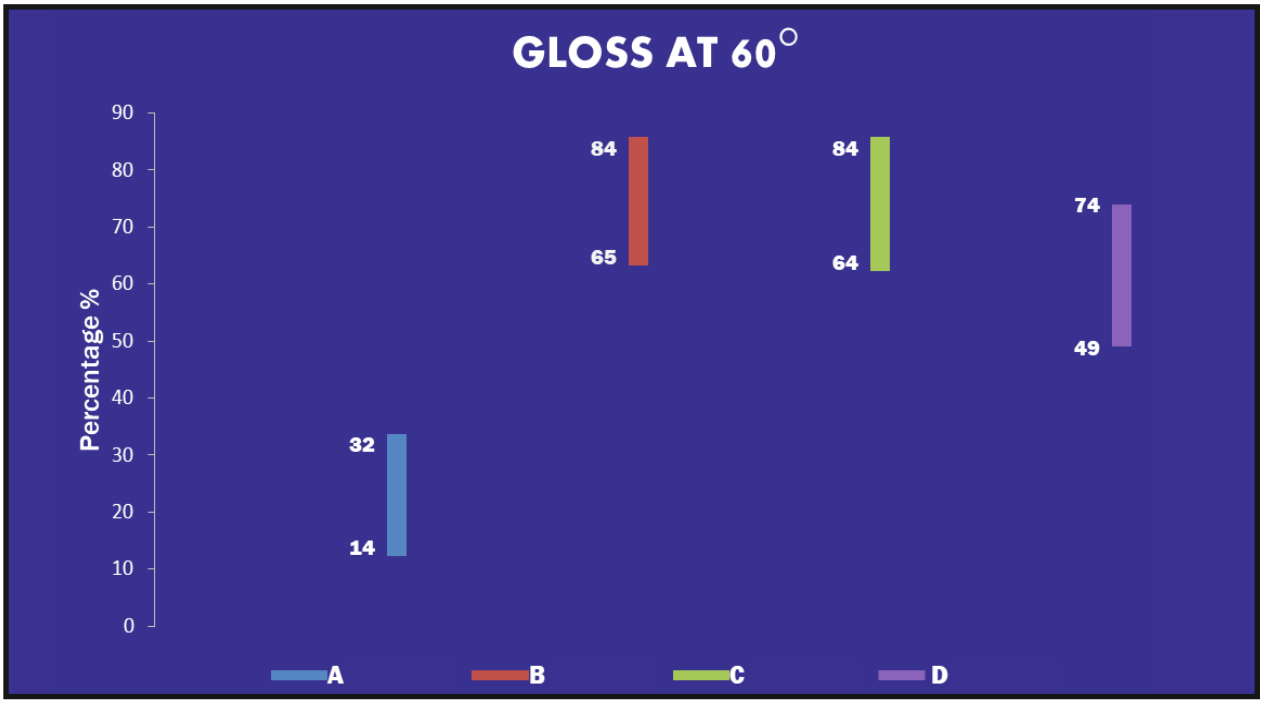
SWAMILL Ultra – Fine Polymer Powders are used as low-profile additives (LPA) in SMC and BMC Compounds to improve surface smoothness and control shrinkage resulting from moulding the finished part. **SWAMILL** Ultra – Fine Polymer Powders also improve dimensional stability and, in some cases, mechanical properties when used properly. Furthermore, **SWAMILL** Ultra – Fine Polymer Powders improve the dispersion of pigments throughout the compounds, yielding more uniform colour in the end products. Last, but not the least, **SWAMILL** Ultra – Fine Polymer Powders reduce the formation of micro cracks as well as reduce stress cracking when used as an LPA. Typically, **SWAMILL** Ultra – Fine Polymer Powders are added in the **2 wt. %** to **5 wt.%** range. The amount required for optimum performance depends on the total formulation of the moulding compound.

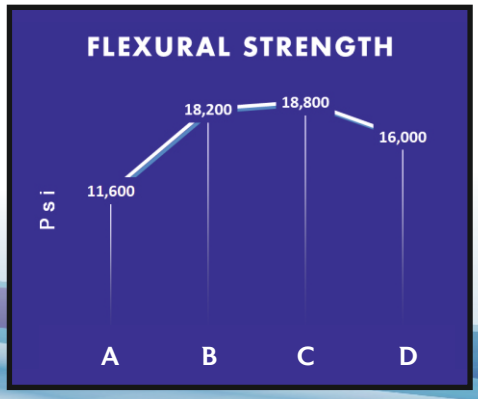
Effect of Swamill Ultra – Fine Polymer Powders in SMC / BMC Mouldings

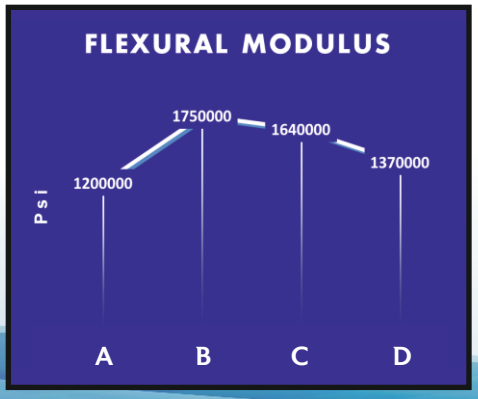
Formulations	A(0 wt.%)	B(2 wt.%)	C(4 wt.%)	D(6 wt.%)
Swamill Ultra – Fine Polymer Powders	0	2	4	6
Polyester Resin	20.5	20.25	20.25	20.25
Styrene Monomer	4.40	4.40	4.40	4.40
Tertiary Butyl per benzoate	0.21	0.21	0.21	0.21
Zinc Stearate	1.10	1.10	1.10	1.10
Calcium Carbonate	53.89	51.89	49.89	47.89
Modifier “m”	0.15	0.15	0.15	0.15
¼ Fiberglass	20	20	20	20

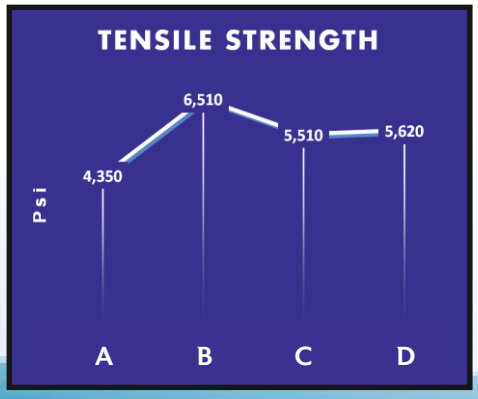












How do Swamill Ultra – Fine Polymer Powders Work?

At room temperature, the BMC or SMC premix consists of two phases, a thermoset phase, and a thermoplastic phase. The thermoset phase is mainly unsaturated polyester, styrene, additives, fillers, and a small amount of LPA. Most of the premix is in thermoset phase, also called the continuous phase. The thermo-plastic phase consists of mostly LPA, a small amount of unsaturated polyester, styrene, fillers, and additives.

As the premix is heated to 120°C:

- The crosslinking reaction begins in the continuous phase.
- Styrene monomer and the thermoplastic LPA expand thermally to counteract shrinkage from polymerization.
- The small amount of unsaturated material in the dispersed phase crosslinks to form micron-sized beads in chains throughout the dispersed phase.

On further heating to 140°C, the styrene continues to be consumed until it no longer acts, along with the LPA, to compensate for the polymerization shrinkage. Strain develops at the continuous phase/dispersed phase interface.

At 150°C, strain continues to increase, initiating stress cracking at the dispersed phase / continuous phase interface. The stress cracks propagate through the weak polymers bead network of the dispersed phase. This stress cracking relieves the increased strain at the interface and prevents catastrophic cracking in the part. Upon cooling, thermal contractions introduce more strain on the part. The strain is relieved by further stress cracking in the dispersed phase, thus reducing shrinkage. The just-described mechanism helps address the LPA function in relation to the processing variables, polymerization shrinkage and thermal contraction.

Pioneering in 2001 for the composite industry, we stand as the sole manufacturers of SWAMILL Ultra - Fine Polymer Powders in India.

Advantages of using SWAMILL Ultra - Fine Polymer Powders

- Controlled Polymerization Shrinkage
- Smooth Surface Finish
- Glossier Appearance
- Improved Processability
- No Need for Mold Release Agents
- Effective Pigment Dispersion
- Reduced formation of micro cracks
- Reduced Water Absorption

SWAMILL Ultra – Fine Polymer Powders also improve the surface finish of glass-reinforced-polyester structural shapes made by the pultrusion process. As little as one percent by weight of **SWAMILL** Ultra – Fine Polymer Powders added to the polyester compound greatly improves surface smoothness by lubricating the profile die and reducing friction.

SWASAN CHEMICALS PVT. LTD.

MUMBAI OFFICE:
"Polymer House", Plot Number 9/86, Jankidevi School Road,
MHADA, Lokhandwala, Andheri (West), Mumbai – 400053
Mob: +91 9820190165 / +91 9867622689

CHENNAI OFFICE:
9/32, Branson Garden Street, Near Uma Complex, Kilpauk, Chennai – 600010
Mob: +91 9840144961 / +91 9840144968

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EXCLUSIVE DISTRIBUTORS IN TURKEY:
MASKİM KOMPOZİT ÜRÜNLER SAN. VE. TİC. LTD. ŞTİ.
Velibaba Mahallesi, Fasıla Sokak, No:2, 34896, Pendik-İstanbul
Phone: +90 216 307 74 70/71 | Mob: +90 (533) 731 39 93
E-mail: maskim@maskim.com.tr / edin@maskim.com.tr
Website: www.maskim.com.tr

swasan@swasan.co.in
www.swasan.co.in