

Lubricious Compounds for Surface Friction Management

Compounding Solutions has made significant progress in the field of lubrication as it relates to medical device technology. We are glad to bring Mobilize to the industry! This unique and proprietary additive is a blend which our team researched and tested to provide our customers with the ability to reduce friction in various thermoplastics without altering their bulk properties.

Features of Mobilize:

- Lowers coefficient of friction
- Improves extrusion process stability
- Biocompatible
- Does not migrate, bloom, or leach over time
- Low-cost alternative to multi-layer devices
- No adverse effects on bonding or printing
- Thermally stable
- Compatible with radiopaque fillers
- Can be custom colored
- Can be sterilized



The thermal stability and inertness of Mobilize lend to its compatibility with a wide range of thermoplastics. Several benefits are gained by adding Mobilize to thermoplastic compounds. It acts as an extrusion process aid for many materials by reducing motor torque and die pressure. Tubing extruders have reported better process stability and faster production rates using compounds with Mobilize. It reduces the coefficient of friction of extruded and molded surfaces, which improves handling for physicians by reducing the force required to insert or retract devices. Mobilize reduces friction against both hydrophilic surfaces, like bodily tissues, and hydrophobic materials, like other polymeric device components. Mobilize can also improve handling during manufacturing processes by preventing parts from sticking or blocking, particularly with some softer thermoplastic elastomers common in the medical device industry.

Surface Friction Management Technology

What is Mobilize?

Lubricious solutions in:

- Polyolefins
 - LLDPE
 - LDPE
 - HDPE
 - PP
- Styrenics
 - CPS
 - HIPS
 - SAN
 - ABS
- Polyesters
 - PET
 - PBT
- Polycarbonates
- Polyamides
 - 6
 - 6/6
 - 6/10
 - 12
 - 6/12
- Thermoplastic Elastomers
 - Hytrel
 - Pebax
 - SBCs
 - TPUs

Mobilize is a high molecular weight polymeric additive with a high degree of chain mobility that is compounded into various thermoplastics.

How does it work?

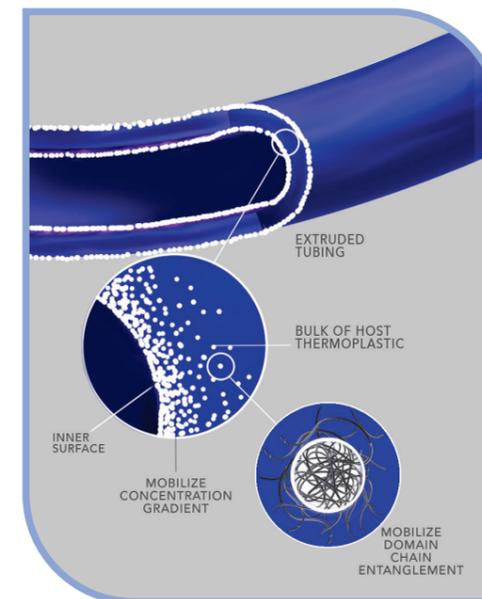
• Mobilize is immiscible with host thermoplastics. During compounding, it forms a stable morphology of small droplets dispersed throughout the host thermoplastic.

• During extrusion or molding in the melt state, Mobilize migrates towards surfaces creating a concentration gradient with more Mobilize active near the surface and minimal Mobilize in the bulk of the article.

• In extruded tubing, Mobilize activates both the inner and outer surfaces.

• A small fraction of Mobilize is required for surface activation, leaving bulk properties of the thermoplastic unchanged.

• Once the thermoplastic melt has cooled and solidified, Mobilize is firmly anchored in place. Unlike low molecular weight oils, Mobilize does not migrate, bloom, leach or rub off from parts under normal operating conditions. Its high molecular weight nature allows chain entanglement with the host thermoplastic.



Surface Friction Management in PEBA

Compounding Solutions evaluated the physical and mechanical properties of Pebax compounded with Mobilize lubricious additives. The results, shown below in Tables 1 and 2, indicate Mobilize has minimal effect on the bulk properties of Pebax but improves its lubricity by significantly reducing the force required to insert and retract tubing through a 90° bend of PFA conduit immersed in water at 37°C.

Table 1. Physical and mechanical property comparison of Pebax with and without Mobilize.

	ASTM Standard	Units	Pebax 6333 SA01 MED	Pebax 6333 SA01 MED Mobilize
Melt Flow Index	D1238	g/10min	14.4	19.6
Density	D792	g/cc	1.02	1.02
Hardness	D2240	Shore D	62	60
Tensile Strength	D638	psi	5070	4000
Elongation at Break	D638	%	430	370
Flexural Modulus	D790	kpsi	45.2	41.4
Tear Strength	D624	lbf/in	1060	1030
Peel Test	Internal Method	lbf/ft	7.43	7.6

Table 2. Pushability and retractability of Pebax tubing with and without Mobilize.

Sample Description	Max Insertion Force (N)	Average Insertion Force (N)	Max Retraction Force (N)	Average Retraction Force (N)
Pebax 6333 SA01 MED, Mobilize	0.382	0.093	-0.194	-0.142
Pebax 6333 SA01 MED, Natural	0.495	0.163	-0.319	-0.172
HDPE	0.740	0.325	-0.515	-0.253