

USING NEW DEGREES OF FREEDOM

PTFE as an engineering material: Moldflon expands the range of fluoropolymers Conventionally, seals, valve seats and other functional components exposed to high temperatures and high pressure loads have not been manufactured from fluorinated high-performance plastics. A new fluoropolymer now marks the beginning of the fluorine era for such applications as well.

In terms of its chemical composition and properties, Moldflon equals conventional PTFE but, unlike PTFE, it can be melt-processed. Due to its high temperature resistance the material expands the range of applications for standard PTFE and opens up new potentials for shaping components by means of injection molding. Complex assembly component geometries, which could be achieved by machining only to a limited extent, can now be realized for large-volume production series using injection molding.

Generating new system solutions

The ability to produce molded parts at high levels of quality in a cost-effective manner required extensive preliminary investigations involving the material, process control and tooling technology. Depending on the starting base, Moldflon-based applications can be approached from various directions: While complex geometries used to be created from PTFE, using very extensive and expensive machining techniques, the same parts can now be fabricated by injection molding in a one-step process. In addition, the material waste that used to be generated during machining processes can be reduced to a minimum. The biggest advantage of the new melt-processible material, however, is the possibility to generate completely new system solutions, which previously could not be realized with fluoropolymers,



The material is suitable for functional components exposed to high temperatures and high pressure loads.

FACT SHEET FOR DECISION MAKERS

For users

- Moldflon is primarily suited for components simultaneously exposed to high pressure loads and high temperatures.
- The material is harder and more pressure-resistant than PTFE.
- The material is CIP (cleaning in place)- and SIP (sterilization in place)-capable.
- The effect of abrasion-reducing fillers is clearly higher than with PTFE-based compounds.

For planners

- In terms of its chemical composition and properties, Moldflon equates to PTFE, but can be processed from the melt.
- Complex component geometries, which could be achieved by machining only to a limited extent, can now be realized by injection molding.
- The material waste previously generated during machining processes can be reduced to a minimum.
- The cost benefits of changing from cutting to injection molding increase with the complexity of the component to be manufactured.

particularly PTFE. Meanwhile, the injection molding process, which enables high levels of economy to be achieved in large-volume production, can be transferred to PTFE products as well.

The economic benefit of changing from machining to injection molding increases with the complexity of the component to be manufactured. For a simple geometry that can also be fabricated by injection molding, machining is the more cost-effective solution for volumes of up to 1,000 units. By contrast, for complex geometries requiring a very complex machining process, a conversion to injection molding already provides cost benefits at volumes of less than 100 units.

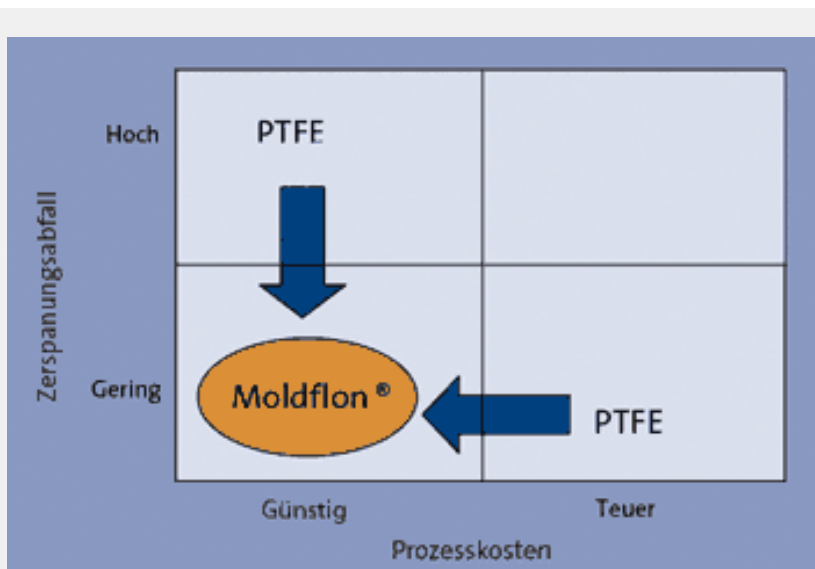
Rapid Prototyping – the fast track to regular production

With cut or machined components, joining techniques often require the fitting of snap-in joints to enable the component to be fixed to its mating part. The possibility of molding in such parts eliminates complex assembly processes, which is another cost reduction factor. When injection-molding Moldflon it must be assured that all parts coming into contact with the melt are made of high-corrosion-resistant steel. By performing respective preliminary work – without using injection-molded parts – development cycles and development costs can be reduced dramatically. For material tests, e.g. for temperature or chemical resistance, as well as for fine-tuning the component geometry, prototypes fabricated by machining should be used. Since Moldflon is a modified variant of PTFE all conventional machining techniques used for processing PTFE are suitable for this purpose. Material properties which are independent of the manufacturing process can thus be subjected to low-cost preliminary testing. Only after clarifying these prerequisites should the process of injection-molding be adopted.

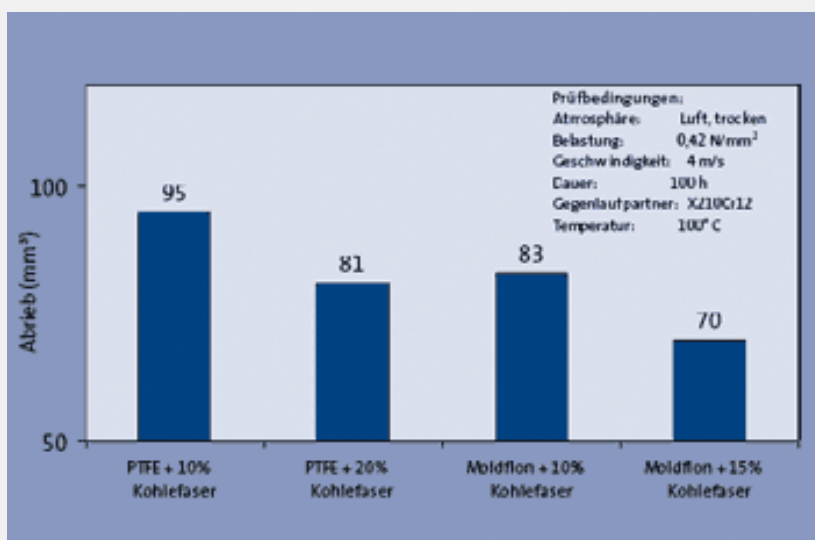
Low cold flow is the prerequisite for new application potentials

Unfilled Moldflon expands the traditionally known range of applications for PTFE or modified PTFE in various directions and enables a breakthrough into areas previously reserved to non-fluorinated high-performance plastics with higher strength values. In particular, these include applications in which components are simultaneously exposed to high pressure loads and high temperatures such as seals and valve seats.

These new application potentials are based on the low cold flow of the new material, which amounts to merely a fourth of the cold flow of PTFE. Even in comparison with highly filled compounds based on modified PTFE Moldflon has a higher hardness



Moldflon generates less machining waste and involves lower process costs than conventional PTFE



Long-term wear in no-lube operation: Moldflon compounds show a better abrasion behavior than typical PTFE compounds

Die Autoren:

Katja Widmann,
 Technical Sales,
 ElringKlinger
 Kunststofftechnik



Dr. Michael Schlipf,
 Head of R&D,
 ElringKlinger
 Kunststofftechnik



and pressure stability. This advantage can be used while the disadvantages typically encountered with fillers are absent. Consequently, Moldflon is used in applications involving contact with foodstuffs and drinking water or the presence of gaseous or liquid oxygen. Particularly in the food, pharmaceutical and biotech industries, end users demand easy on-site cleanability without prior dismantling of equipment in order to increase the availability of machinery and plant. Due to its smooth surfaces, the material's high-level anti-adhesivity and high resistance to water, steam and cleaning chemicals, components made of Moldflon are CIP (cleaning in place)- and SIP (sterilization in place)-capable.

Improved abrasion behavior

Moldflon's inherently low cold flow can be optimized further by adding suitable fillers. In addition to a further increase of pressure stability, this improves abrasion behavior. The example of carbon fiber compounds serves to illustrate that the abrasion-reducing effect of the filler is clearly higher than with respective PTFE-based compounds.

The special aspect of thermoplastic processing enables the development engineer to produce very homogenous PTFE compounds in terms of filler distribution. Since, in addition, the increased reactivity between the matrix material and the filler known from other fluoro-thermoplastics has been reduced significantly, it is now possible, as well, to manufacture compounds which could not be previously produced on the basis of fluoro-polymers suitable for thermoplastic processing.

ElringKlinger Kunststofftechnik GmbH

Tel: +49-(0)7142-583-0

Etzelstraße 10

Fax: +49-(0)7142-583-200

D-74321 Bietigheim - Bissingen, Germany

Email: info@elringklinger-kunststoff.de