SHELL PROCESS OILS

THE POWER OF INNOVATION

SO.F.TER. GROUP leverages Shell's gas to liquids (GTL) technology to develop high-performance thermoplastic elastomer (TPE) compounds

So.FteR.

LEVERAGING SHELL RISELLA X TO DEVELOP HIGH-PERFORMANCE TPE COMPOUNDS

THE GLOBAL COMPOUND MANUFACTURER SO.F.TER. GROUP HAS DEVELOPED NEW, HIGH-PERFORMANCE TPE COMPOUNDS THAT OFFER UP TO 60% LESS FOGGING THAN CONVENTIONAL COMPOUNDS.

Fogging, which usually refers to the volatile components that are released under specific conditions, including temperature, and deposited on vehicles' interior glass, is an extremely important parameter in the automotive industry.

The key ingredient that has enabled this performance increase is Shell Risella X 430, a high-quality technical white oil that is based on gas to liquids (GTL) technology. Dr Leonardo Bellomo, R&D and RA Manager, SO.F.TER. GROUP, says that this is helping to create competitive advantage for SO.F.TER.

THE SHELL RISELLA X BASED SAMPLE HAS FANTASTIC FOGGING CHARACTERISTICS: SOME 60% BETTER THAN THE SAMPLES THAT USE CONVENTIONAL PARAFFINIC MEDICAL WHITE OILS. THIS IS A BIG AND EXTREMELY SIGNIFICANT IMPROVEMENT. IN ADDITION, ITS UV STABILITY IS COMPARABLE TO THE MEDICAL WHITE OIL BASED SAMPLE.

DR LEONARDO BELLOMO
R&D AND RA MANAGER,
SO.F.TER. GROUP.

The company has used Shell Catenex T, a paraffinic process oil, for many years. But when Dr Bellomo first heard about Shell Risella X, he immediately saw opportunities. For instance, its low volatility, high viscosity index and outstanding UV and thermal colour stability meant that it had the potential to be an excellent fit for automotive dashboard applications.

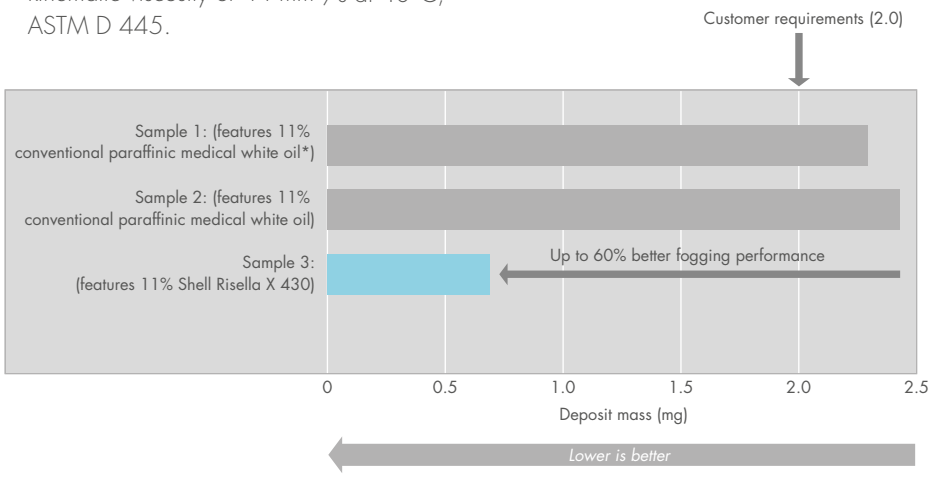
Scientists at SO.F.TER. worked quickly to create three TPE compounds for automotive interior applications. The elastic phase comprises styrene ethylene butylene styrene (SEBS) rubber, and the plastic phase has a polyolefinic nature.

Key details about the three samples:

- Sample 1: 11% conventional paraffinic medical white oil with a kinematic viscosity of 70 mm^2/s at 40°C, ASTM D 445
- Sample 2: 11% conventional paraffinic medical white oil designed for low fogging, which has a kinematic viscosity of 70 mm^2/s at 40°C, ASTM D 445
- Sample 3: 11% Shell Risella X 430 with a kinematic viscosity of 44 mm^2/s at 40°C, ASTM D 445.

SO.F.TER. sent these samples to a third-party laboratory, where they were evaluated according to the Volkswagen® 50180 test method. The results are shown in Figure 1. The Volkswagen® 50180 test specifies requirements regarding the emission behaviour of car interior parts. It refers to the test protocols PV 3341 (organic compound emissions), PV 3015 (fogging), PV 3900 (odour) and PV 3925 (formaldehyde emissions).

The Shell Risella X-based sample (Sample 3) has fogging characteristics that are some 60% better than the samples that use conventional paraffinic medical white oils. Dr Bellomo comments, "This is a big and extremely significant improvement. Automotive OEMs' fogging requirements are extremely stringent, and even compounds that comply are usually close to the limit. But these new compounds are substantially below the limit."



Volkswagen® PV 3015 fogging test.
*Kinematic viscosity @ 40°C, mm^2/s, ASTM D 445: 70

Figure 1: Results from a third-party certification laboratory show that the Shell Risella X based sample offers 60% better fogging performance.

SO.F.TER. performed in-house tests on the samples' UV stability properties, using the Volkswagen® PV 3929 "Kalahari desert" test (Figure 2).

This specification applies to the testing of plastics and elastomers that are used in exterior automotive applications such as convertible tops. It determines the degree of ageing, such as colour changes, that occurs in dry, hot climates.

According to Dr Bellomo, this test showed that the UV stability of the Shell Risella X based sample was comparable to that of a conventional mineral oil based medical white oil.

Dr Bellomo adds that there are minimal differences in the mechanical properties for relative tensile strength and elongation in the three samples, although the melt flow index is marginally higher in Sample 3 owing to the oil's lower viscosity.

The company is investigating leveraging Shell Risella X to increase the range of products that it offers to the automotive sector and other industries too. More research and development is required before SO.F.TER. is ready to commercialise Shell Risella X based compounds. However, Dr Bellomo says, they are already generating interest. "I showed the results to one of our automotive OEM customers," he says. "Fogging is high on their agenda and this opens new opportunities for them. They were extremely excited."

Material	PV 3929				Grey scale
	DL*	Da*	Db*	DE*	
Sample 1 (features 11% conventional paraffinic medical white oil)	0.4	0.22	1.35	1.43	4/5
Sample 2 (features 11% conventional paraffinic medival white oil)	0.35	0.20	1.31	1.35	4/5
Sample 3 (features 11% Shell Risella X 430)	0.66	0.33	1.38	1.5	4/5

Figure 2: SO.F.TER. in-house testing (Ci4000 Xenotest) show that the UV stability performance of the Shell Risella X based sample is comparable to that of a medical white oil.

PROCESS OILS PLAY A CRITICAL ROLE IN THE FORMULATION OF POLYMER COMPOUNDS AND RUBBER BLENDS. THEY TYPICALLY REPRESENT UP TO 60% OF A POLYMER COMPOUND SUCH AS TPE AND UP TO 100% IN RUBBER BLENDS SUCH AS EPDM. THE PROCESS OIL FUNCTIONS AS AN EXTENDER OIL AND IT IS IMPORTANT THAT IT HAS GOOD PERFORMANCE AND COMPATIBILITY WITH THE POLYMER, AS THIS INFLUENCES THE TPE'S AND RUBBER'S SOFTNESS, ELASTICITY AND COLOUR STABILITY.

ABOUT SO.F.TER. GROUP

SO.F.TER. develops and produces thermoplastic compounds for a wide range of industry sectors, including automobiles, appliances, construction and footwear. It has a global presence and a strong track record in technological innovation and applied research.

As well as a wide range of engineering plastics, SO.F.TER.'s product portfolio also includes various types of elastomers based on TPE-S, TPV, TPO, and TPC. These include materials capable of withstanding extreme working conditions and grades that offer versatility for hard and soft applications.

ABOUT SHELL RISELLA X

Shell Risella X is a range of top-tier process oils based on GTL technology. It offers several advantages over conventional process oils, including extra purity and excellent performance in selected applications.

Extra purity

Shell Risella X oils contain a high proportion of paraffinic hydrocarbons and are very pure, which provides qualities that are key in many applications. For instance, they

- are colourless
- are almost odourless
- contain virtually no sulphur, nitrogen or aromatics
- have an extremely narrow hydrocarbon distribution range.

Excellent performance in selected applications

Shell Risella X oils are synthetic process oils offering an outstanding combination of characteristics that can facilitate enhanced performance in the applications in which they are used. These properties include

- low volatility
- low pour point
- high flash point
- high viscosity index
- outstanding UV and thermal colour stability.

Few other process oils can offer the same combination of properties.

ABOUT SHELL PROCESS OILS

Shell is one of the leading process oil manufacturers and has more than 25 years' experience in the process oils business. We recognise the crucial role that process oils play in your products and operations.

We also understand that the quality of these vital oils is paramount and that using a process oil that has a highly consistent quality can have a major bearing on the success of your business.

Whatever your needs and applications, Shell can provide a full range of process oils; customers in a wide range of industries have unlocked value by using Shell process oils. In addition, Shell offers expert consultation and technical advice to support your business needs.

FIND OUT MORE: TALK TO SHELL PROCESS OILS

If you are interested in unlocking valuable performance advantages, talk to us about the benefits that Shell Risella X could have for your business.

www.shell.com/processoils