PRELIMINARY

Somos® WeatherX™ 100

Environmentally durable DLP photopolymer for functional testing and end-use parts that need to retain performance properties over time.

Somos WeatherX 100 is an environmentally durable DLP photopolymer developed for 3D printing functional testing prototypes and end-use parts. It produces parts repeatedly and predictably, with the right set of performance properties that last over time. Tested against the most stringent SAE industry specifications, Somos WeatherX 100 demonstrates the optimized balance of weather- and chemical resistance and dimensional stability. In addition, it shows robust material behavior in printing and post-processing.

Somos WeatherX 100 is the first DLP material that comes with reliable testing data on material weatherability and durability and dimensional accuracy using SAE industry standards similar to those used for thermoplastics. These tests show that Somos WeatherX 100 retains its properties better than other commercial DLP materials positioned as durable.

Key Features

- Lasting mechanical and functional properties & dimensional stability, even compared to UV-stabilized thermoplastics.
- Optimal balance of temperature resistance and toughness
- UV, chemical & temperature resistance
- Good print resolution, suitable for challenging geometries
- Easy and fast post-processing
- Black color consistently across the print
- Isotropic properties throughout the printed part

Industries & Applications

- Transportation / outdoor vehicles: housings, switches, trim pieces
- Industrial equipment: irrigation components, instrumentation, filters, etc.
- Consumer goods: sports & leisure: backpack clips, binding straps, etc.
- Applications exposed to UV and/or humid environments – interior and exterior.

Data Sheet

Liquid Properties

PROPERTY	VALUE
Viscosity (25°C)	~950 MPa s
Liquid density at 25°C	~1.1 g/cm3
Ec	5.15 mJ/cm2
Dp	0.17 mm

Mechanical Properties

Tensile bars (type IV) were printed at 100 micron per layer and pulled at 5 mm / minute.

ASTM	PROPERTY	VALUE (Z-DIRECTION)
D638	Young's Modulus	2128 ± 154 MPa
D638	Ultimate Tensile Strength	60 ± 0.3 MPa
D638	Elongation at Yield	5.5 ± 0.1%
D638	Elongation at Break	26 ± 6.0%
D256	Izod Impact (Notched)	25 ± 2.5 J/m

Water Absorption

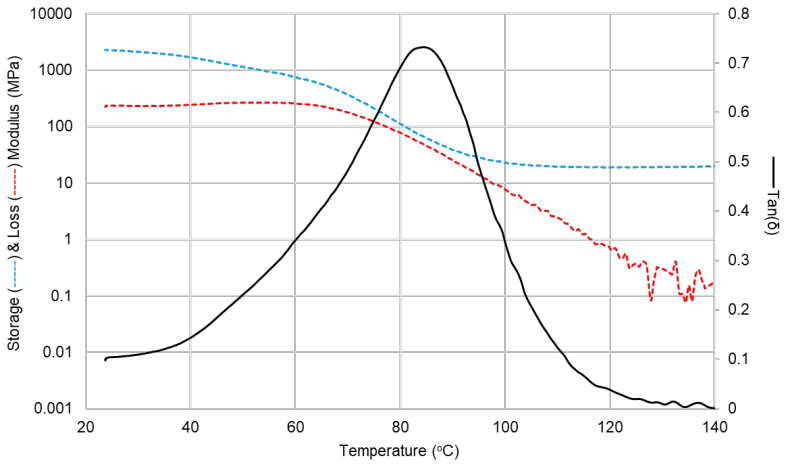
Another important characteristic of Somos® WeatherX 100 is its low water absorption. The table below shows the mass gained after printed parts (per ASTM D570) were immersed in water for up to 7 days at 25oC. Even after one week in water, the parts absorb less than 1% of water which is significantly better than other photopolymers. It's worth mentioning that this property is an important factor to maintain dimensional integrity and properties during weathering as hydrolysis and physical stresses will have minimal effects on the 3D printed polymer network.

	1 DAY	2 DAYS	3 DAYS	7 DAYS
WATER ABSORPTION	0.40%	0.55%	0.66%	0.91%

STANDARD	PROPERTY	VALUE
ASTM D648	HDT (0.455 MPa)	67°C
ASTM E1545	Tg (Tan δ peak)	85°C

Dynamic Mechanical Analysis (DMA)

Storage/Loss modulus and tan(δ) behavior as a function of temperature.



Improved Weatherability Performance

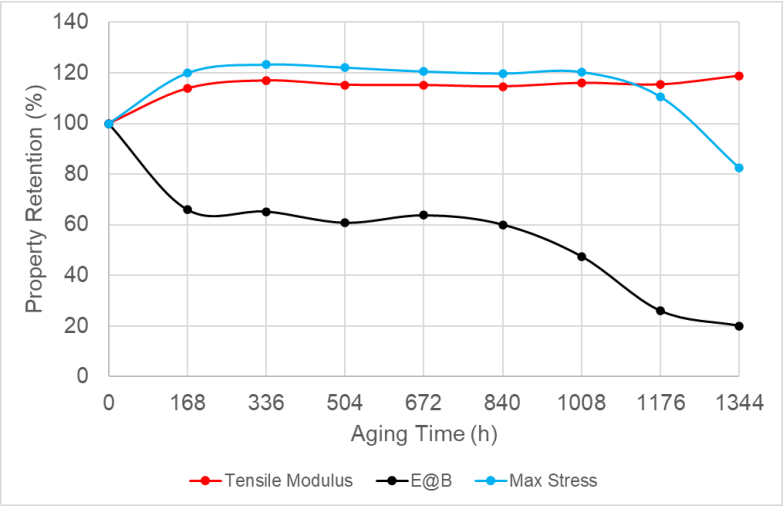
Somos WeatherX 100 has been tested according to SAE J252, a standard test developed for the automotive industry for exterior exposure which is more stringent than the often-used ASTM D4329 or G154. Since materials respond differently to the combination of conditions of irradiation, heat and moisture, the overall aging performance of the material - and not just UV performance – is heavily influenced by the choice of the aging test.

The SAEJ2527 standard more holistically represents natural weather than ASTM D4329/G154 because it includes UV/Vis exposure, humidity and water spray, and temperature variations.

	SAEJ2527	ASTM D4329 (CYCLE A) OR G154
Light Source	Xenon	UVA fluorescent lamp
Spectra output wavelength	300-800 nm (actual sunlight spectra)	300-400 nm
Test cycles	4	2
1	60 min dark at 38°C, 95% RH, water spray on front and back of specimen	8h light exposure at 60°C
2	40 min light at 70°C, 50% RH	4h condensation at 50°C
3	20 in light at 70°C, water spray on front and back of specimen	
4	60 min light at 70°C, 50% RH	

Property Retention of Somos WeatherX 100

The next graph shows the performance of Somos WeatherX 100 during accelerated weathering per SAE J2527 standard. The material shows a high level of property retention for an extended period, after which performance goes down slowly, stabilizing at a point that is higher than alternative resins.

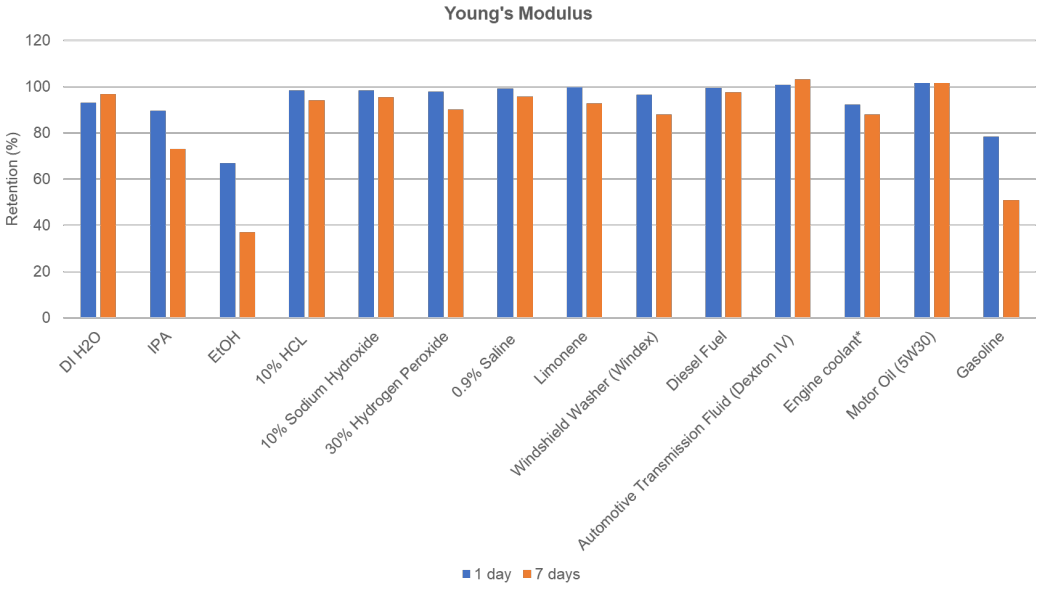


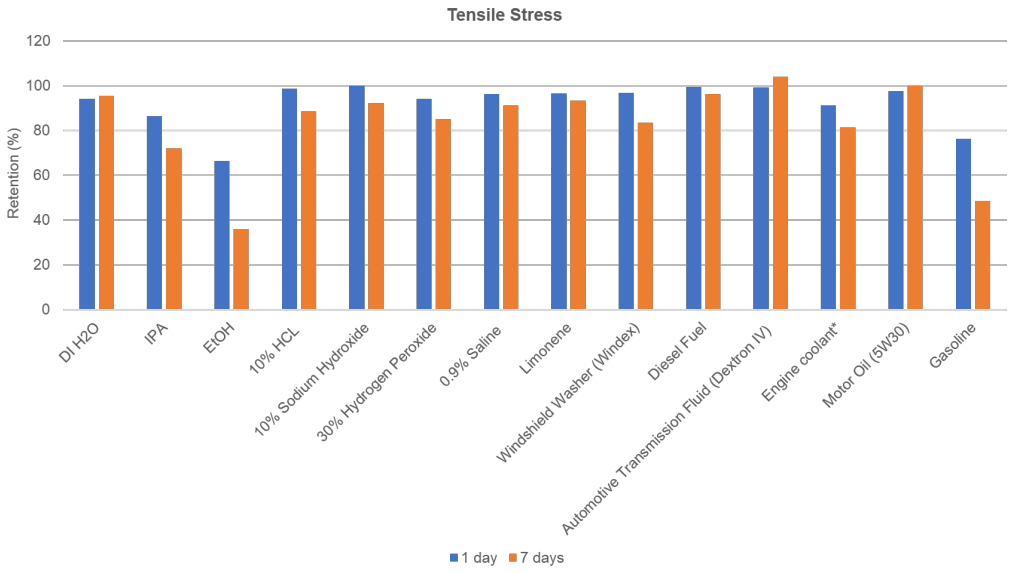
Chemical Resistance

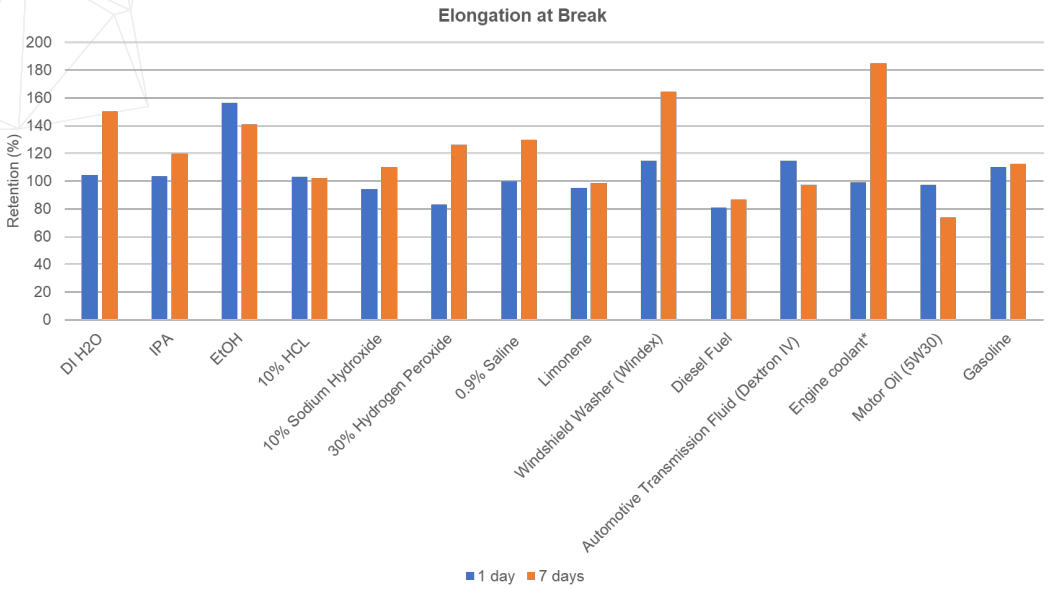
The ability of materials to withstand exposure to chemicals, solvents, and various substances is a critical factor in the selection process for many industrial applications. The overall chemical resistance of a material is influenced by factors such as duration of exposure, temperature, amount, and nature/concentration of the chemical agent involved. When subjected to industrial chemicals, photopolymer materials may deteriorate or fracture, resulting in alterations to their mechanical and functional properties.

Test Method

Data for chemical resistance were collected in accordance with ASTM D543 test method. Test specimens were completely immersed in various chemicals for both 1 day and 7 days at 23oC (except Engine coolant which was exposed at 50oC). Upon completion of each exposure, parts were removed from the solvent, wiped of excess fluids, and conditioned for 24h at standard laboratory conditions. Thereafter, the tensile bars were tested in accordance with procedures of ASTM D648 and benchmarked against samples not exposed to chemicals.







Thermal/Electrical Properties

Testing in progress

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