Chemical resistance test on

Ultracur3D® ST 80

This document is intended to provide guidance for manufacturers regarding the compatibility of the 3D printed materials with hydrocarbons and cleaning chemicals. BASF 3D Printing Solutions GmbH has performed specific chemical test for the material Ultracur3D® ST 80. Indications on material changes that can occur during the chemical test were studied. It remains the responsibility of the device manufacturers and/or end-users to determine the suitability of all printed parts for their respective application.

Used hydrocarbons and cleaning chemicals

Fluid
Cooling fluid
Multipurpose fat
Engine oil
Hydraulic oil
Brake fluid
Transmission oil
Acetone

Test method and specimens

85 tensile bars were printed with the material and were soaked in each fluid, one set for 30 minutes and one set for 7 days. After the soaking time the parts were removed from the test fluid and were dried to measure the weight and the mechanical properties like E modulus, Tensile strength and Elongation at break.

Figure 1 Tensile bar ASTM D638 IV

Mechanical testing

The performance of the material is stable in most tested chemicals. A noticeable drop can be observed in Elongation at break after the immersion in cooling fluid, engine oil, hydraulic oil and the brake fluid.

30 minutes

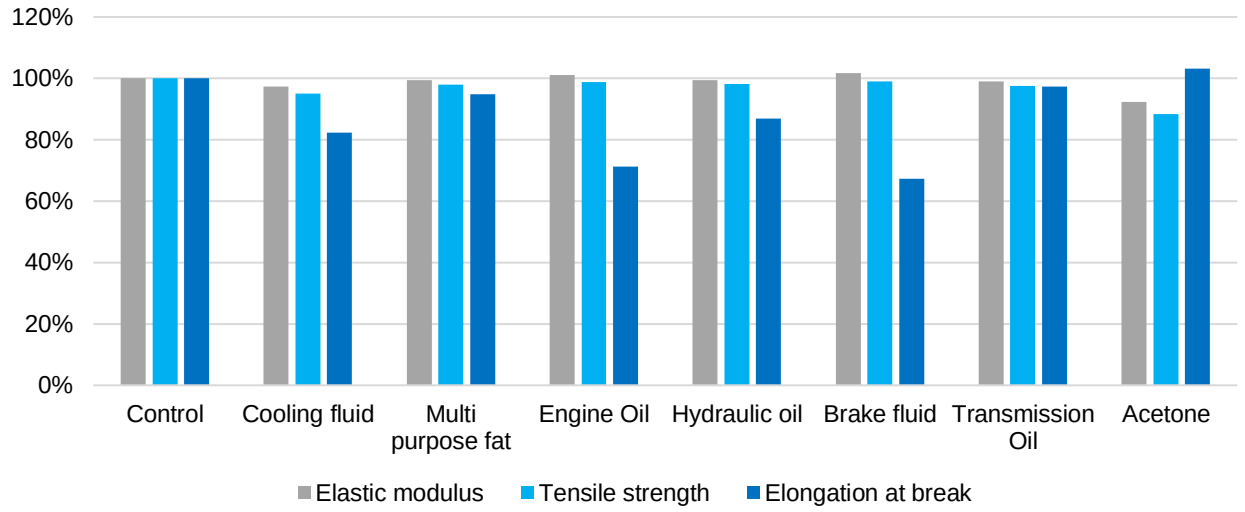

Figure 2 Change in mechanical properties in chemical fluid for 30 minutes

The mechanical properties of the material proves slight improvement after the immersion in multipurpose fat, engine oil, hydraulic oil and transmission oil. Elastic modulus and Tensile strength show decrease in cooling fluid while the elongation remains stable. A decrease in the Elongation at break is observed for the specimens immersed inside the brake fluid. The specimens showed serious deterioration in contact with acetone when tested for 7days. Hence no further test was carried out.

7 days

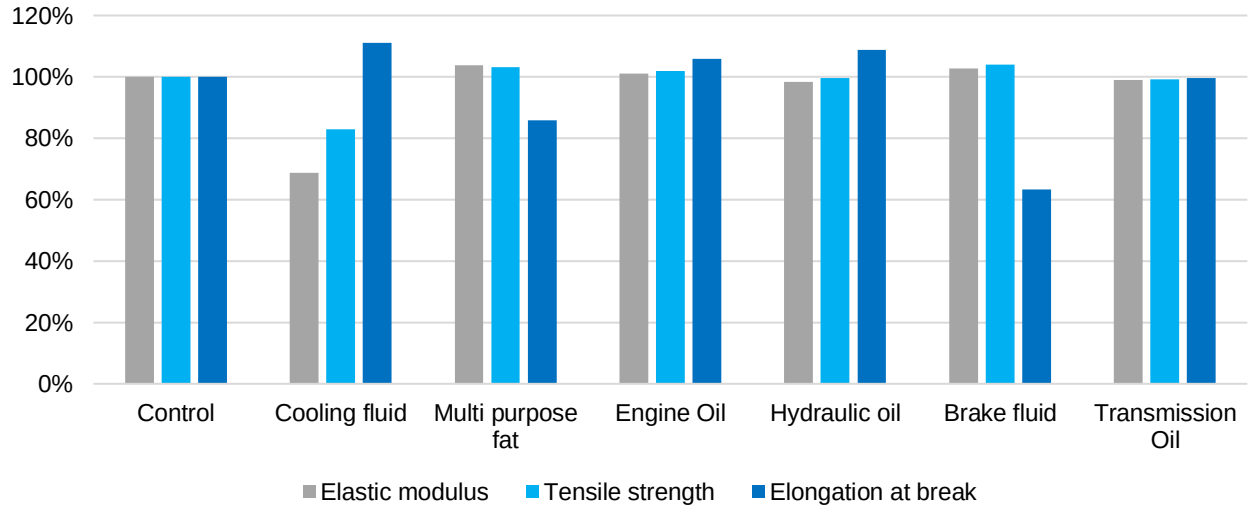

Figure 3 Change in mechanical properties in chemical fluid for 7 days

Weight

The weight remains constant throughout all the chemical fluids in the 30min time frame. An increase in weight can be seen in the case of acetone when tested for 7 days.

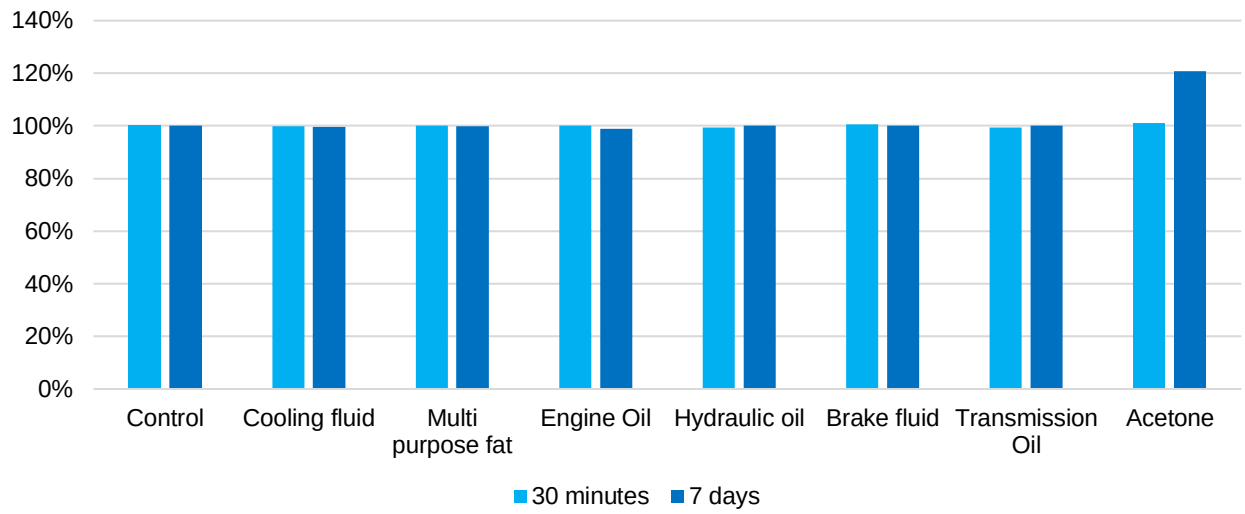

Figure 4 Change in weight in chemical fluid

Conclusion

The results of the performed tests (30 minutes and 7 days) on **Ultracur3D® ST 80** can be summarized in the table below.

Legend

= Change less than 10%; ↑↓ Change between 10%- 30%; ↑↓ Change higher than 30%

Ultracur3D® ST 80	30 minutes			
	Elastic modulus	Tensile strength	Elongation at break	Weight
Control	=	=	=	=
Cooling fluid	=	=	↓	=
Multipurpose fat	=	=	=	=
Engine oil	=	=	↓	=
Hydraulic oil	=	=	↓	=
Brake fluid	=	=	↓	=
Transmission oil	=	=	=	=
Acetone	=	↓	=	=

Ultracur3D® ST 80	7 days			
	Elastic modulus	Tensile strength	Elongation at break	Weight
Control	=	=	=	=
Cooling fluid	↓	↓	↑	=
Multipurpose fat	=	=	↓	=
Engine oil	=	=	=	=
Hydraulic oil	=	=	=	=
Brake fluid	=	=	↓	=
Transmission oil	=	=	=	=
Acetone				↑