

Chemical resistance test on

Ultracur3D® FL 300

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® FL 300. 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

75 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 D412 Type C

Mechanical testing

The elastic mechanical properties show improvement after immersed in cooling fluid, multipurpose fat and engine oil, which become more obvious with a longer time. The variation of immersion in hydraulic oil and brake fluid are complicated as the values first decrease in 30 min and then rise after 7 days. As for transmission oil, the strength and elongation have opposite variation compared to the former one while the elastic modulus keeps dropping. The specimens showed serious deterioration in contact with acetone and were therefore not further tested.

30 minutes

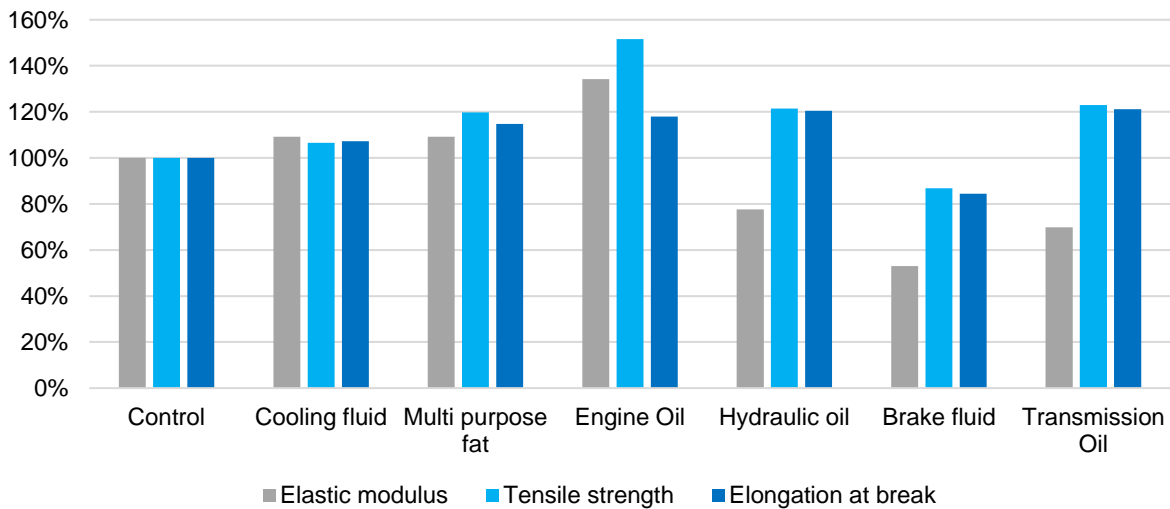


Figure 2 Change in mechanical properties in chemical fluid for 30 minutes

7 days

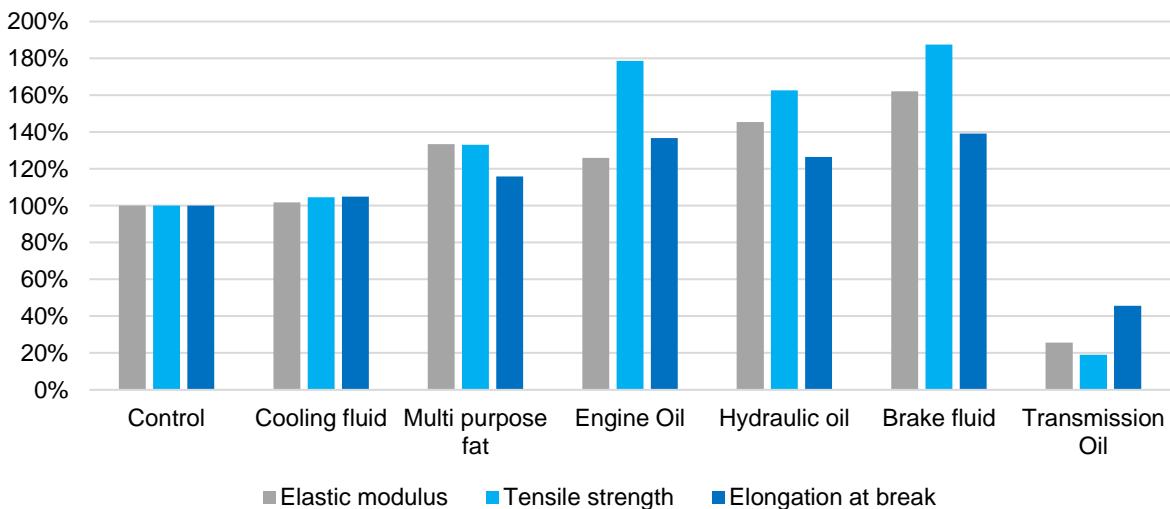


Figure 3 Change in mechanical properties in chemical fluid for 7 days

Weight

The weight is stable in all solvents for both periods, except an increase around 20% in brake fluid for 7 days. The specimens broke into small pieces after the time in acetone. The weight of the specimens immersed in acetone for 30 min is shown below.

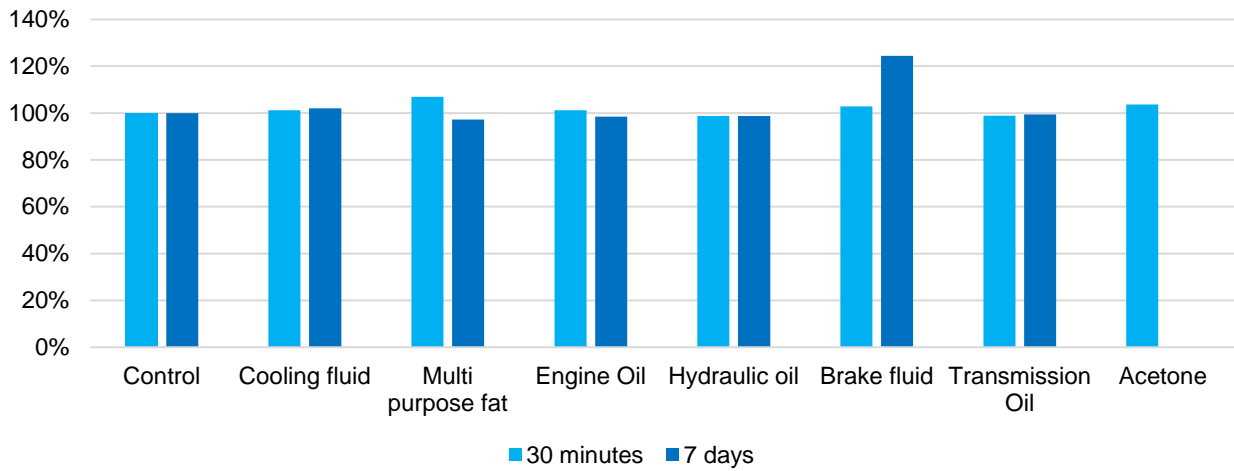


Figure 4 Change in weight in chemical fluid

Conclusion

The results of the performed tests (30 minutes and 7 days) on **Ultracur3D® FL 300** can be summarized in the table below.

Legend:

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

Ultracur3D® FL 300	30 minutes			
	Elastic modulus	Tensile strength	Elongation at break	Weight
Control	=	=	=	=
Cooling fluid	=	=	=	=
Multipurpose fat	=	↑	↑	=
Engine oil	↑	↑	↑	=
Hydraulic oil	↓	↑	↑	=
Brake fluid	↓	↓	↓	=
Transmission oil	↓	↑	↑	=
Acetone	NA	NA	NA	=

Ultracur3D® FL 300	7 days			
	Elastic modulus	Tensile strength	Elongation at break	Weight
Control	=	=	=	=
Cooling fluid	=	=	=	=
Multipurpose fat	↑	↑	↑	=
Engine oil	↑	↑	↑	=
Hydraulic oil	↑	↑	↑	=
Brake fluid	↑	↑	↑	↑
Transmission oil	↓	↓	↓	=

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Version 1.2