Chemical resistance test on

Ultracur3D® EL 4000

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® EL 4000. 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
Isopropanol

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 D412 Type C

Mechanical testing

When the material is kept in these solvents for 30 mins, the mechanical properties reduce significantly for Acetone and up to 50% in case of Isopropanol. For the rest of the solvents, the mechanical properties are stable.

30 minutes

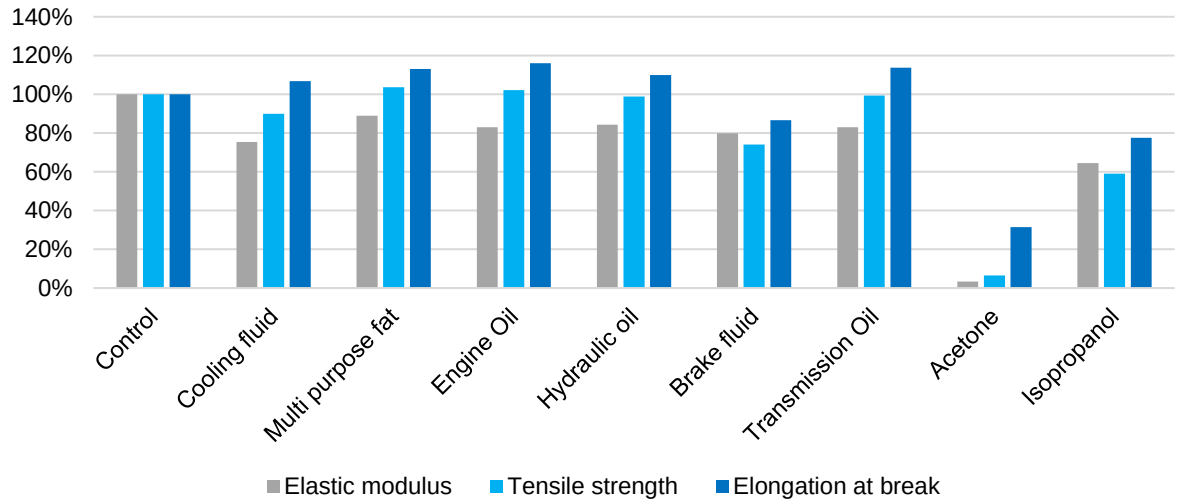

Figure 2 Change in mechanical properties in chemical fluid for 30 minutes

The material could not sustain 7 days in Acetone and the mechanical properties reduce drastically in case of Cooling fluid, Brake fluid and Isopropanol.

7 days

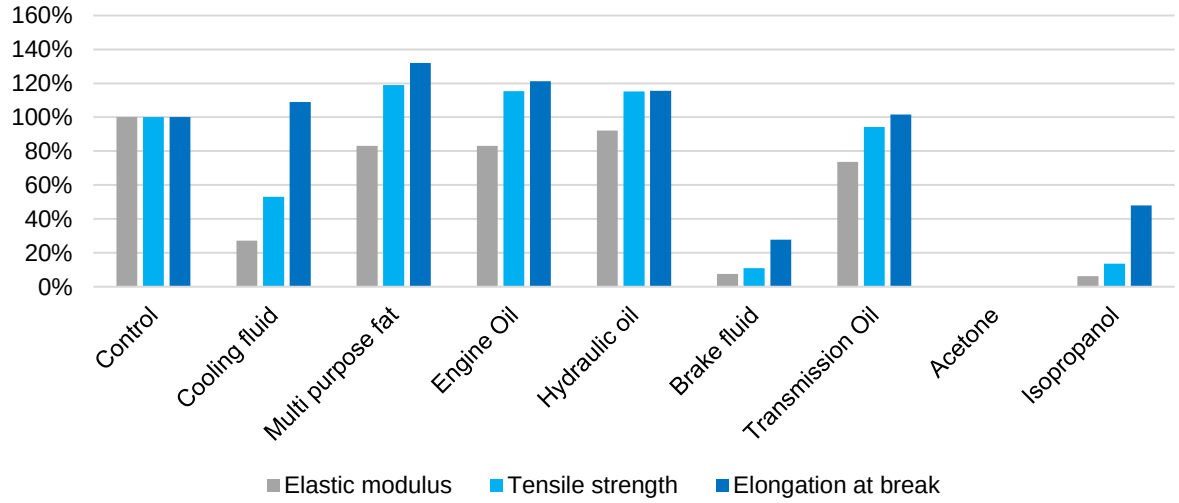

Figure 3 Change in mechanical properties in chemical fluid for 7 days

Weight

The weight of the specimens increased slightly in case of brake fluid and isopropanol for 7 days and acetone for 30 mins.

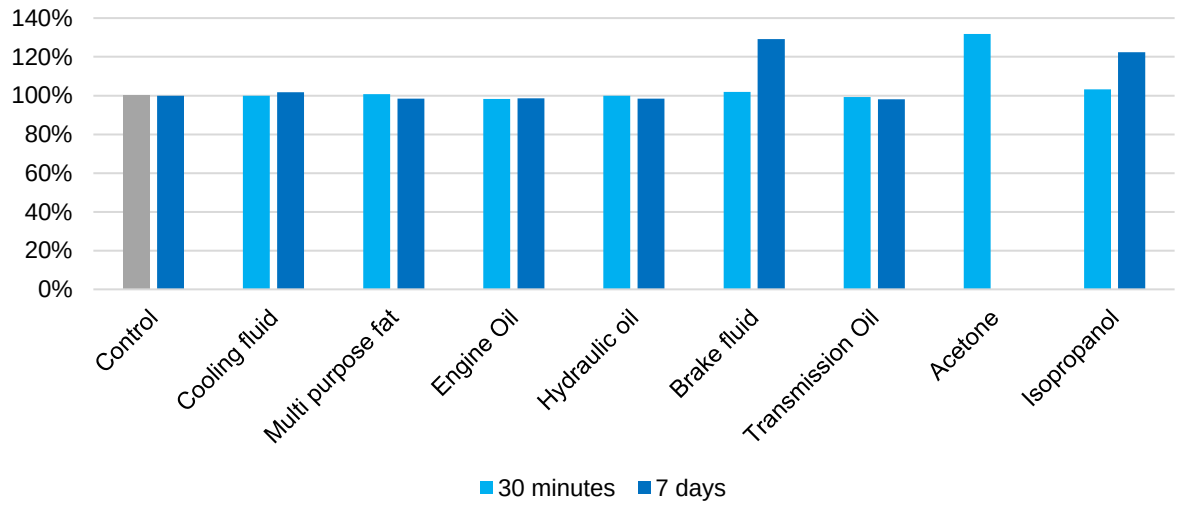

Figure 4 Change in weight in chemical fluid

Conclusion

The results of the performed tests (30 minutes and 7 days) on **Ultracur3D® EL 4000** can be summarized in the table below.

Legend

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

Ultracur3D® EL 4000	30 minutes			
	Elastic modulus	Tensile strength	Elongation at break	Weight
Control	=	=	=	=
Cooling fluid	↓	=	=	=
Multipurpose fat	↓	=	=	=
Engine oil	↓	=	=	=
Hydraulic oil	↓	=	=	=
Brake fluid	↓	↓	↓	=
Transmission oil	↓	=	=	=
Acetone	↓	↓	↓	=
Isopropanol	↓	↓	↓	=

Ultracur3D® EL 4000	7 days			
	Elastic modulus	Tensile strength	Elongation at break	Weight
Control	=	=	=	=
Cooling fluid	↓	↓	=	=
Multipurpose fat	↓	=	=	=
Engine oil	↓	=	=	=
Hydraulic oil	↓	=	=	=
Brake fluid	↓	↓	↓	=
Transmission oil	↓	=	=	=
Acetone				
Isopropanol	↓	↓	↓	=

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