



VisiJet® M2S-HT90

Production Rigid

Rigid high-temperature plastic with translucent clear finish delivering a balance of strength and elongation with a high HDT

Projet MJP 2500

VisiJet M2S-HT90 was designed for high-temperature and high-strength prototyping and indirect manufacturing applications that require some elongation. It can withstand repeated high-compressive forces and high-cycle rate and has sufficient tensile elongation for pattern assembly and form removal needs.

Smooth and blemish free “molding quality” surface is optically clear and has high feature fidelity, sharp corners and edges. It is an excellent rapid prototyping and indirect manufacturing material for high-temperature molds, thermoforming and low-volume injection molds for standard thermoplastics. Small entrapped feature capability, with high fidelity and biocompatible USP Class VI, allow for unique and complex applications like bioreactors.

FEATURES

- High strength and stiffness, 90°C / 194°F with 6% elongation
- Able to make extremely small and complex internal structures
- High accuracy and watertight
- Functional optical clarity, with only a slight yellow tint—optically colorless in thin sections
- Biocompatible USP Class VI

Note: Not all products and materials are available in all countries — please consult your local sales representative for availability.

APPLICATIONS

- High-temperature thermoforming prototypes and low-volume production runs
- Low-volume injection molding tooling for traditional thermoplastics
- Thermal shielding and insulation for tools and fixtures
- Steam sterilization capable and long-term stability in an incubator
- With care, can be drilled, tapped and machined
- Functional printed assemblies and injection molded screw bosses
- Functional printed screw-threads and thin walls
- Medical/dental applications
- Translucent flow visualization and dye-tinted applications
- Optically clear sight windows in fixtures

BENEFITS

- High temperature and high compressive strength and toughness
- Precise control of air paths for vacuum forming
- High fidelity fine features, sharp edges and high accuracy
- Exceptional smooth and consistent surface finish with the ability to create complex surface textures
- Good optical clarity
- No surface cure inhibition of paints or silicones; no sanding required
- Excellent for painting or molding applications
- Easy cleaning of complex features, entrapped capillary and micro structures using wax supports

MATERIAL PROPERTIES

The full suite of mechanical properties is given per ASTM and ISO standards where applicable. Properties like flammability, dielectric properties and 24-hour water absorption are also provided for better understanding of material capabilities to help design decisions using the material. All parts are conditioned per ASTM recommended standards for a minimum of 40 hrs at 23°C, 50% RH.

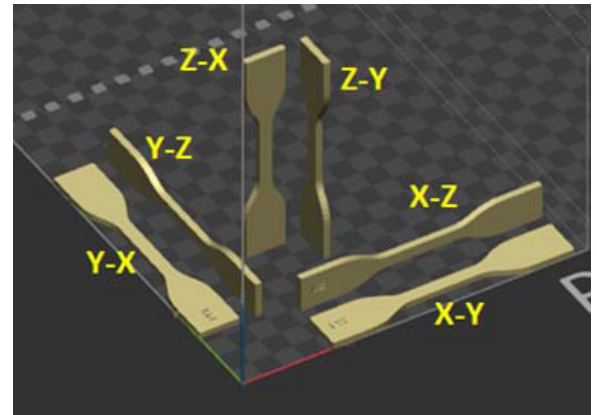
Solid material properties reported were printed along the vertical axis (ZX-orientation). As detailed in the Isotropic Properties section, Multijet Printing (MJP) material properties are relatively uniform across print orientations. Parts do not need to be oriented in a particular direction to exhibit these properties.

LIQUID MATERIAL						
MEASUREMENT	CONDITION/METHOD	METRIC		ENGLISH		
Color		Clear				
SOLID MATERIAL						
METRIC	ASTM METHOD	METRIC	ENGLISH	ISO METHOD	METRIC	ENGLISH
PHYSICAL				PHYSICAL		
Solid Density	ASTM D792	1.15 g/cm ³	0.042 lb/in ³	ISO 1183	1.15 g/cm ³	0.042 lb/in ³
24 Hour Water Absorption	ASTM D570	≤0.4 %	≤0.4 %	ISO 62	≤0.4 %	≤0.4 %
MECHANICAL				MECHANICAL		
Tensile Strength Ultimate	ASTM D638	76 MPa	11000 psi	ISO 527 -1/2	73 MPa	10500 psi
Tensile Strength at Yield	ASTM D638	N/A	N/A	ISO 527 -1/2	N/A	N/A
Tensile Modulus	ASTM D638	2900 MPa	430 ksi	ISO 527 -1/2	2800 MPa	402 ksi
Elongation at Break	ASTM D638	4.3 %	4.3 %	ISO 527 -1/2	4 %	4 %
Elongation at Yield	ASTM D638	N/A	N/A	ISO 527 -1/2	N/A	N/A
Flex Strength	ASTM D790	110 MPa	15700 psi	ISO 178	100 MPa	14600 psi
Flex Modulus	ASTM D790	3000 MPa	430 ksi	ISO 178	2900 MPa	426 ksi
Izod Notched Impact	ASTM D256	14 J/m	0.3 ft-lb/in	ISO 180-A	1.9 kJ/m ²	0.9 ft-lb/in ²
Izod Unnotched Impact	ASTM D4812	210 J/m	4 ft-lb/in	ISO 180-U		
Shore Hardness	ASTM D2240	82 D	82 D	ISO 7619	82 D	82 D
THERMAL				THERMAL		
Tg (DMA, E")	ASTM E1640 (E"at 1C/min)	90 °C	194 °F	ISO 6721-1/11 (E"at 1C/min)	90 °C	194 °F
HDT @ 0.455 MPa/66 PSI	ASTM D648	92 °C	198 °F	ISO 75- 1/2 B	88 °C	190 °F
HDT @ 1.82 MPa/264 PSI	ASTM D648	88 °C	190 °F	ISO 75-1/2 A	80 °C	176 °F
CTE below Tg	ASTM E831	61 ppm/°C	34 ppm/°F	ISO 11359-2	61 ppm/°K	34 ppm/°F
CTE above Tg	ASTM E831	143 ppm/°C	79 ppm/°F	ISO 11359-2	143 ppm/°K	79 ppm/°F
UL Flammability	UL94	HB	HB			
ELECTRICAL				ELECTRICAL		
Dielectric Strength (kV/mm) @ 3.0 mm thickness	ASTM D149	15				
Dielectric Constant @ 1 MHz	ASTM D150	2.98				
Dissipation Factor @ 1 MHz	ASTM D150	0.013				
Volume Resistivity (ohm-cm)	ASTM D257	7.09E+15				

ISOTROPIC PROPERTIES

MJP technology prints parts that are generally isotropic in mechanical properties meaning the parts printed along either the XYZ axis will give similar results.

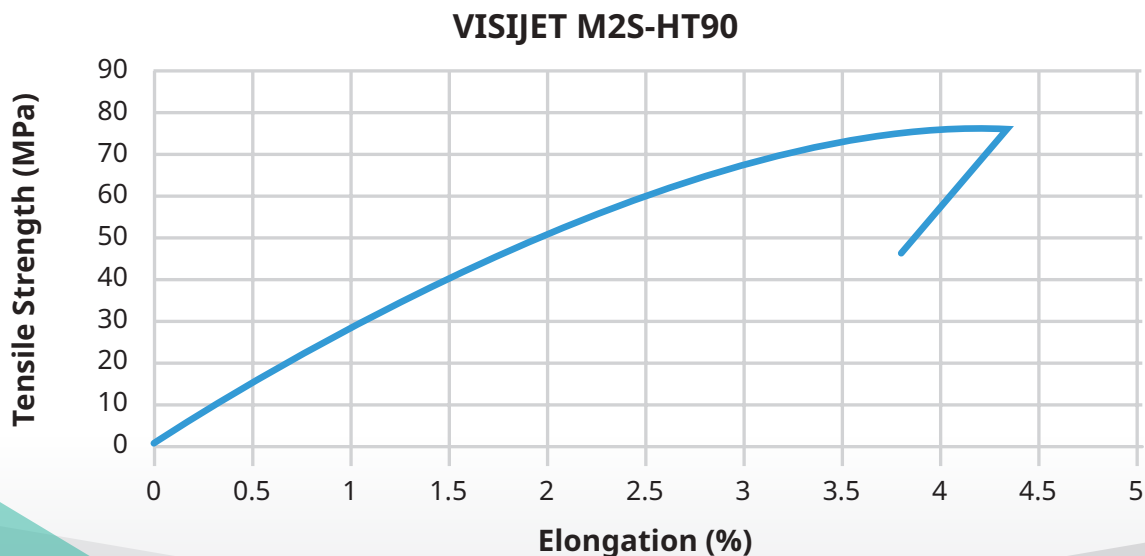
Parts do not need to be oriented to get the highest mechanical properties, further improving the degree of freedom for part orientation for mechanical properties.



SOLID MATERIAL								
METRIC	METHOD	METRIC						
MECHANICAL								
		XY	XZ	YX	YZ	Z45	ZX	ZY
Tensile Strength Ultimate	ASTM D638 Type IV	76 MPa	75 MPa	76 MPa	73 MPa	67 MPa	49 MPa	53 MPa
Tensile Strength at Yield	ASTM D638 Type IV	N/A	75 MPa	76 MPa	73 MPa	N/A	N/A	N/A
Tensile Modulus	ASTM D638 Type IV	2900 MPa	2800 MPa	2800 MPa	2700 MPa	2500 MPa	2700 MPa	2700 MPa
Elongation at Break	ASTM D638 Type IV	4.3 %	6.7 %	5.8 %	5.3 %	5.2 %	1.7 %	2.1 %
Elongation at Yield	ASTM D638 Type IV	N/A	4.7 %	4.7 %	4.5 %	N/A	N/A	N/A
Flex Strength	ASTM D790	110 MPa	99 MPa	105 MPa	94 MPa	92 MPa	62 MPa	76 MPa
Flex Modulus	ASTM D790	3000 MPa	2600 MPa	2800 MPa	2500 MPa	2700 MPa	2300 MPa	2400 MPa
Izod Notched Impact	ASTM D256	14 J/m	15 J/m	14 J/m	16 J/m	15 J/m	14 J/m	15 J/m
Izod Unnotched Impact	ASTM D4812	210 J/m	N/A	N/A	N/A	N/A	N/A	N/A
Shore Hardness	ASTM D2240	82 D	80 D	80 D	79 D	82 D	80 D	79 D

STRESS-STRAIN CURVE

The graph represents the stress-strain curve for Visijet M2S-HT90 per ASTM D638 testing.

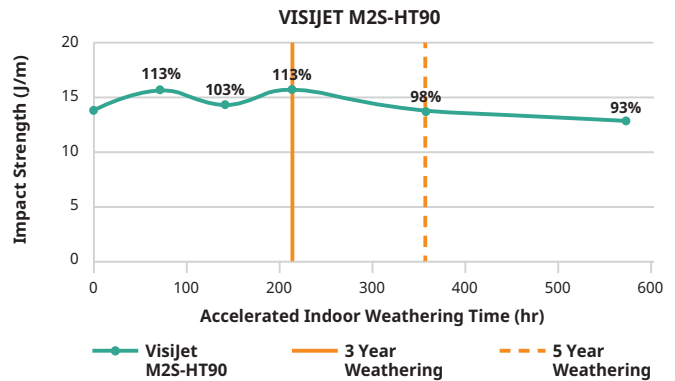
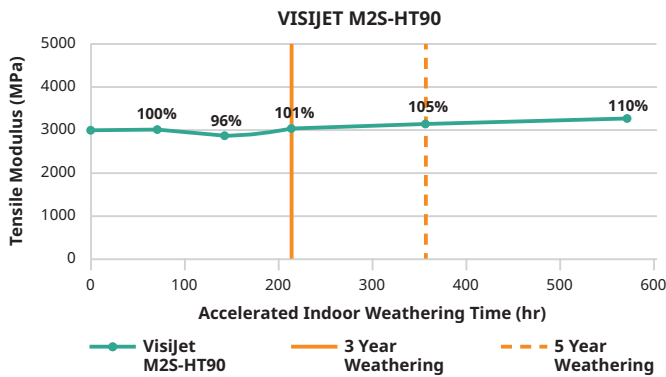
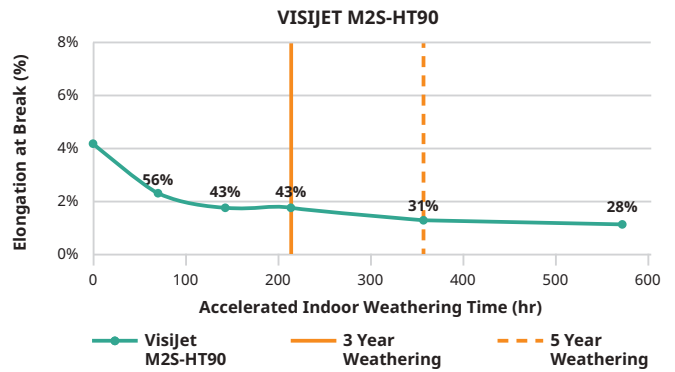
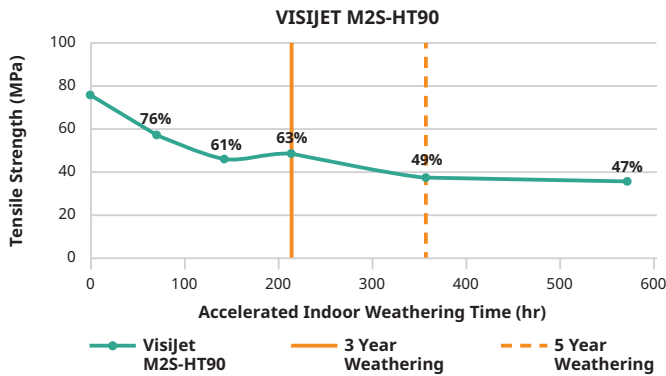


LONG TERM ENVIRONMENTAL STABILITY

Visijet M2S-HT90 is engineered to give long-term environmental UV and humidity stability. This means the material is tested for the ability to retain a high percent of the initial mechanical properties over a given period of time. **Actual data value is on Y-axis, and data points are % of initial value.**

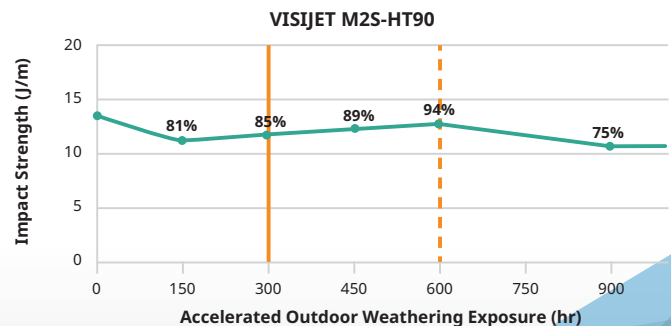
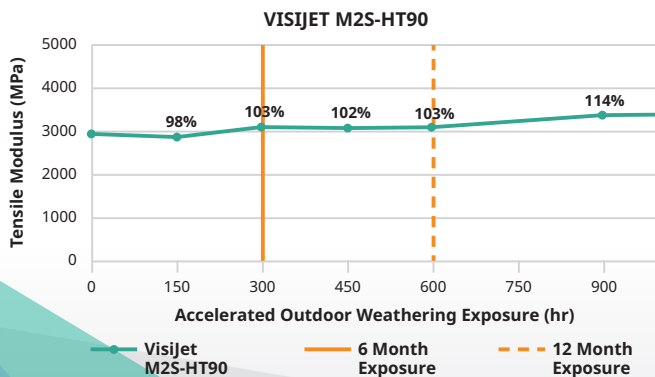
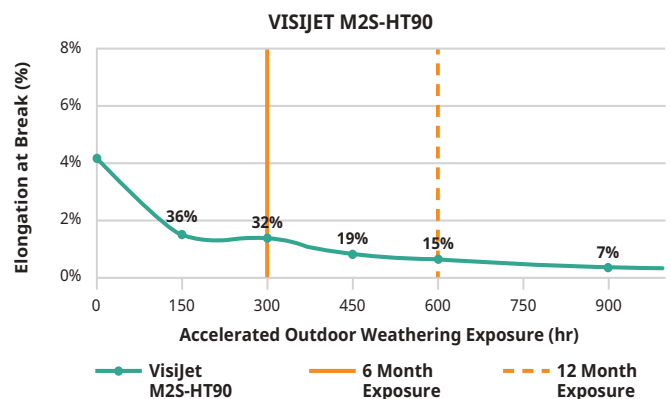
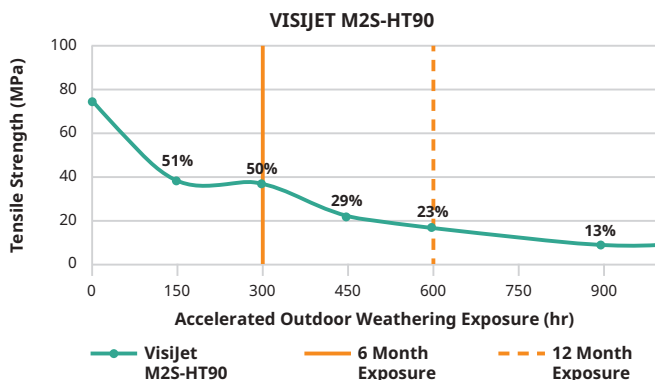
INDOOR STABILITY: Tested per ASTM D4329 standard method.

INDOOR STABILITY



OUTDOOR STABILITY: Tested per ASTM G154 standard method.

OUTDOOR STABILITY



AUTOMOTIVE FLUID COMPATIBILITY

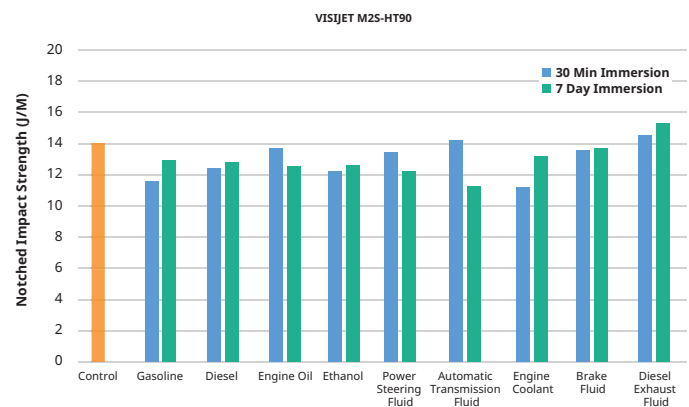
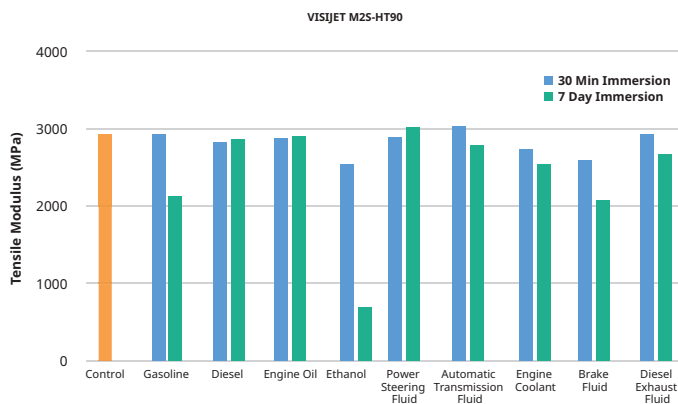
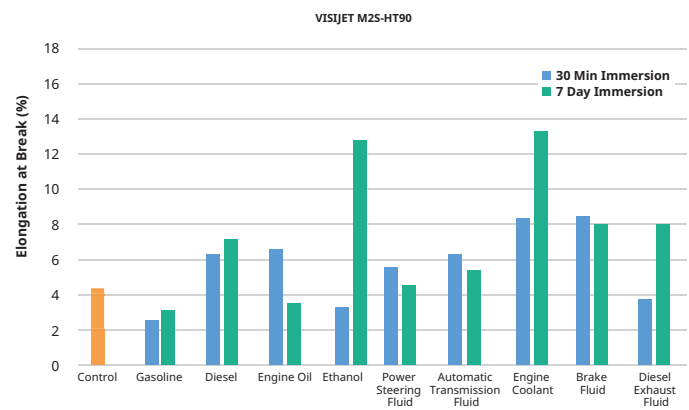
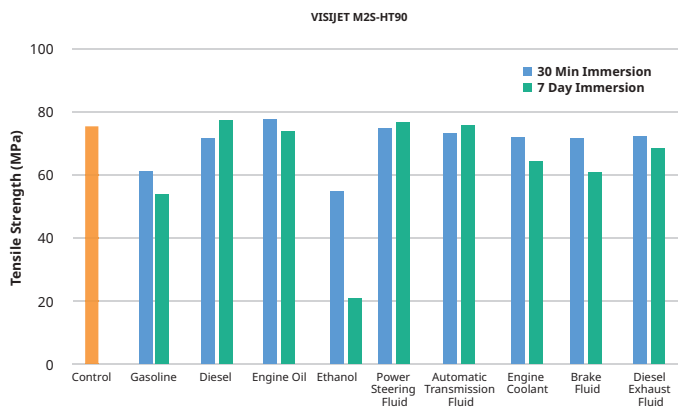
The compatibility of a material with hydrocarbons and cleaning chemicals is critical to part application. Visijet M2S-HT90 parts were tested for sealed and surface contact compatibility per USCAR2 test conditions. The fluids below were tested in two different ways per the specs:

- Immersed for 7-days, followed by mechanical property comparison.
- Immersed for 30-minutes, followed by mechanical property comparison to 7-day data.

Data reflects the measured value of properties over that period of time.

AUTOMOTIVE FLUIDS		
FLUID	SPECIFICATION	TEST TEMP °C
Gasoline	ISO 1817, liquid C	23 ± 5
Diesel Fuel	905 ISO 1817, Oil No. 3 + 10% p-xylene*	23 ± 5
Engine Oil	ISO 1817, Oil No. 2	50 ± 3
Ethanol	85% Ethanol + 15% ISO 1817 liquid C*	23 ± 5
Power Steering Fluid	ISO 1917, Oil No. 3	50 ± 3
Automotive Transmission Fluid	Dexron VI (North American specific material)	50 ± 3
Engine Coolant	50% ethylene glycol + 50% distilled water*	50 ± 3
Brake Fluid	SAE RM66xx (Use latest available fluid for xx)	50 ± 3
Diesel Exhaust Fluid (DEF)	API certified per ISO 22241	23 ± 5

*Solutions are determined as percent by volume



CHEMICAL COMPATIBILITY

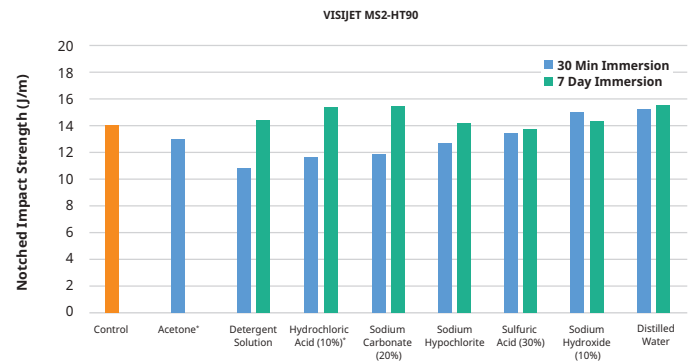
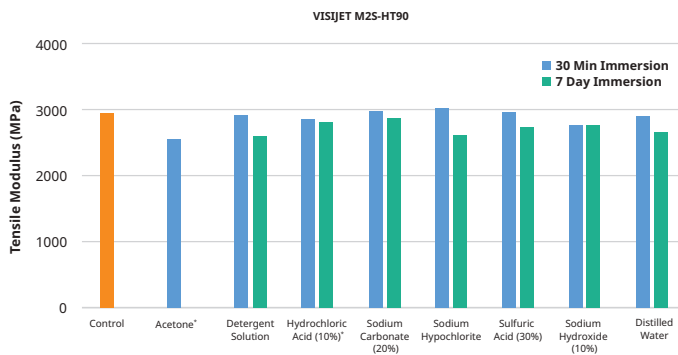
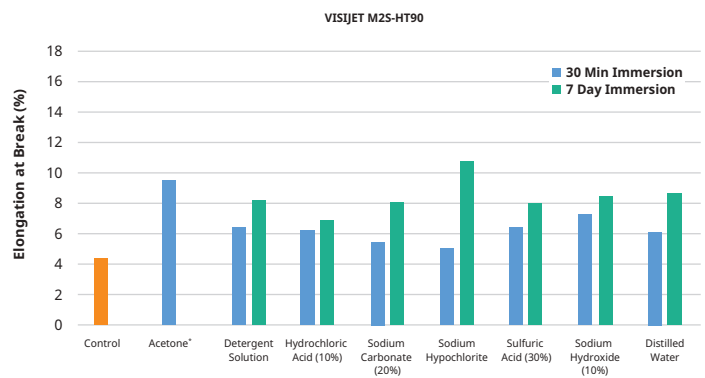
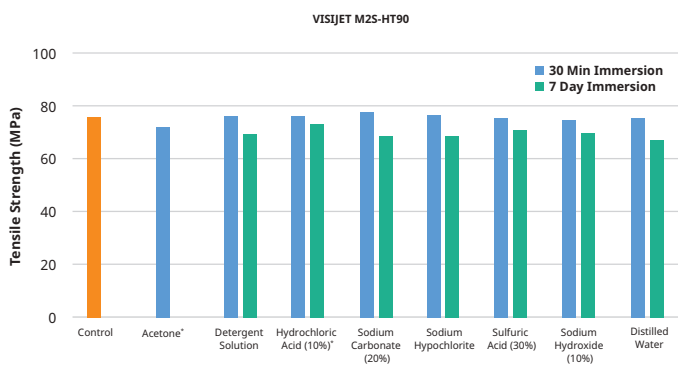
The compatibility of a material with cleaning chemicals is critical to part application. Visijet M2S-HT90 parts were tested for sealed and surface contact compatibility per ASTM D543 test conditions. The fluids below were tested in two different ways per the specs:

- Immersed for 7-days, followed by mechanical property comparison.
- Immersed for 30-minutes, followed by mechanical property comparison to 7-day data.

Data reflects the measured value of properties over that period of time.

*Denotes materials did not go through 7-day soak conditioning.

CHEMICAL COMPATIBILITY
6.3.3 Acetone
6.3.12 Detergent Solution, Heavy Duty
6.3.23 Hydrochloric Acid (10%)
6.3.38 Sodium Carbonate Solution (20%)
6.3.44 Sodium Hypochlorite Solution
6.3.46 Sulfuric Acid (30%)
6.3.42 Sodium Hydroxide Solution (10%)
6.3.15 Distilled Water



USP CLASS VI CERTIFICATION

Visijet M2S-HT90 material printed in a ProJet MJP 2500 has met the requirements of USP Class VI testing. Based on these results, 3D Systems expects that similar articles made from this material will meet the compliance requirements of USP Class VI when the produced parts are cleaned using the methods described in the attached Customer Information Bulletin.

It is the responsibility of each customer to independently determine that use of Visijet M2S-HT90 material for their specific application is safe, lawful and technically suitable. Customers should conduct their own testing to ensure compliance with any specific requirements. 3D Systems recommends that customers re-verify material suitability for applications requiring USP Class VI compliance no less frequently than every two years from the date of this publication due to potential changes in the law, regulations, material formulation or manufacturing methods.

For additional information about Visijet M2S-HT90 material, please contact your local sales representative.

