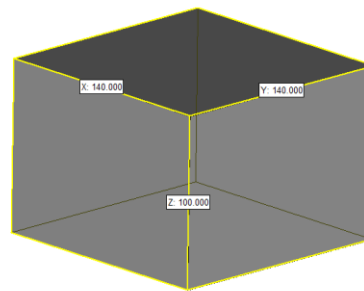


# Rapid 3D Metal Sintering (DMP/DMLS)

## 3D systems ProX200



**Build Volume 140x140x100mm**



### Machine Properties:

Laser	300W
Build volume	140 x 140 x 100 mm
Accuracy	80 $\mu$ m
Repeatability	X=20 $\mu$ m , Y=20 $\mu$ m , Z=20 $\mu$ m
Current powder	Maraging Steel (1.2709)
Surface roughness (Ra)	3 – 5 $\mu$ m

Available Materials: **Maraging Steel.**

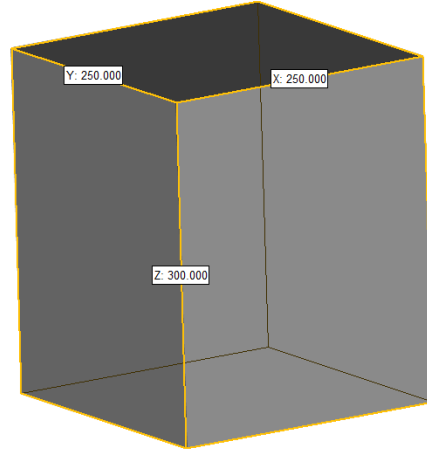
### Mechanical Properties<sup>1</sup>

	CONDITION	AS-BUILT <sup>2</sup>	AFTER POST HEAT TREATMENT <sup>3</sup>
Ultimate Tensile Strength, MPa	ASTM E8	1110 $\pm$ 50	
Yield Strength, MPa	ASTM E8	860 $\pm$ 50	
Elongation at break, %	ASTM E8	11 $\pm$ 3	
Hardness		37 $\pm$ 2 HRC	55 $\pm$ 2 HRC
Density		approx. 100%	

## Renishaw AM250



**Build Volume 250x250x300mm**



### Machine Properties:

Laser	200W
Build volume	250 x 250 x 300 mm
Accuracy	80 $\mu\text{m}$
Repeatability	X=20 $\mu\text{m}$ , Y=20 $\mu\text{m}$ , Z=20 $\mu\text{m}$
Current powder	Maraging Steel (1.2709)
Surface roughness (Ra)	3 – 5 $\mu\text{m}$

Available Materials: **Maraging Steel.**

### Mechanical properties of additively manufactured parts

	As built	Standard deviation ( $\pm 1\sigma$ )	Age hardened (See note 1)	Standard deviation ( $\pm 1\sigma$ )
<b>Tensile strength (UTS)</b> (See note 2)				
Horizontal direction (XY)	1141 MPa	7 MPa	1806 MPa	6 MPa
Vertical direction (Z)	1122 MPa	14 MPa	1794 MPa	9 MPa
<b>Yield strength</b> (see note 2)				
Horizontal direction (XY)	1016 MPa	8 MPa	1753 MPa	20 MPa
Vertical direction (Z)	999 MPa	20 MPa	1730 MPa	20 MPa
<b>Elongation at break</b> (see note 2)				
Horizontal direction (XY)	7.3%	1%	5.5%	1%
Vertical direction (Z)	7.5%	1%	7%	1%
<b>Modulus of elasticity</b> (see note 2)				
Horizontal direction (XY)	160 GPa	5 GPa	170 GPa	8 GPa
Vertical direction (Z)	162 GPa	10 GPa	175 GPa	11 GPa
<b>Hardness (Vickers)</b> (see note 3)				
Horizontal direction (XY)	363 HV0.5	5 HV0.5	542 HV0.5	7 HV0.5
Vertical direction (Z)	355 HV0.5	7 HV0.5	543 HV0.5	8 HV0.5
<b>Surface roughness (<math>R_a</math>)</b> (See note 4)				
Horizontal direction (XY)	3.5 $\mu\text{m}$ to 5 $\mu\text{m}$			
Vertical direction (Z)	4 $\mu\text{m}$ to 6 $\mu\text{m}$			

Density of additively manufactured maraging steel M300 is typically 99.8%, measured optically on a 10 mm x 10 mm x 10 mm sample at 75x magnification.