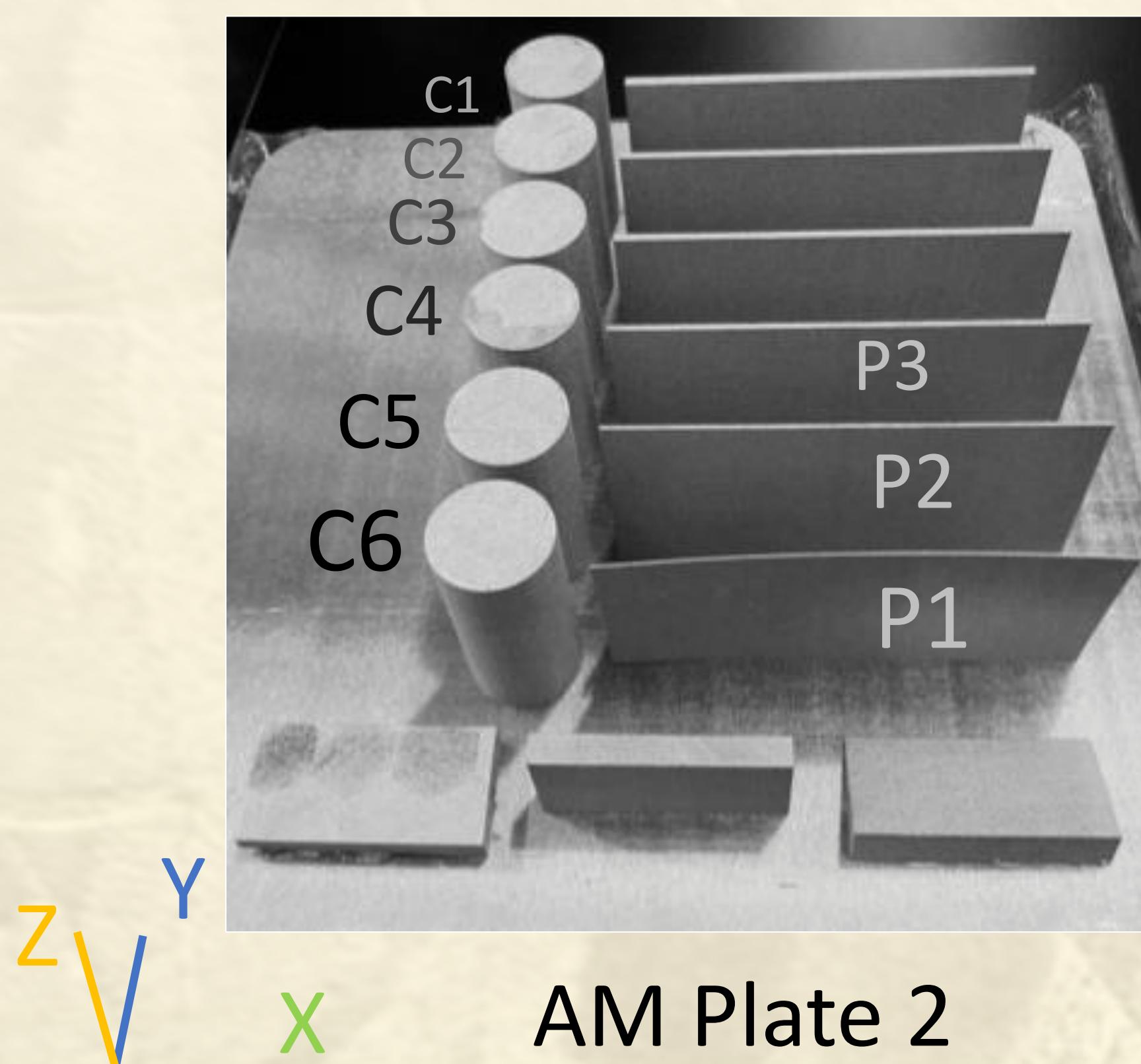


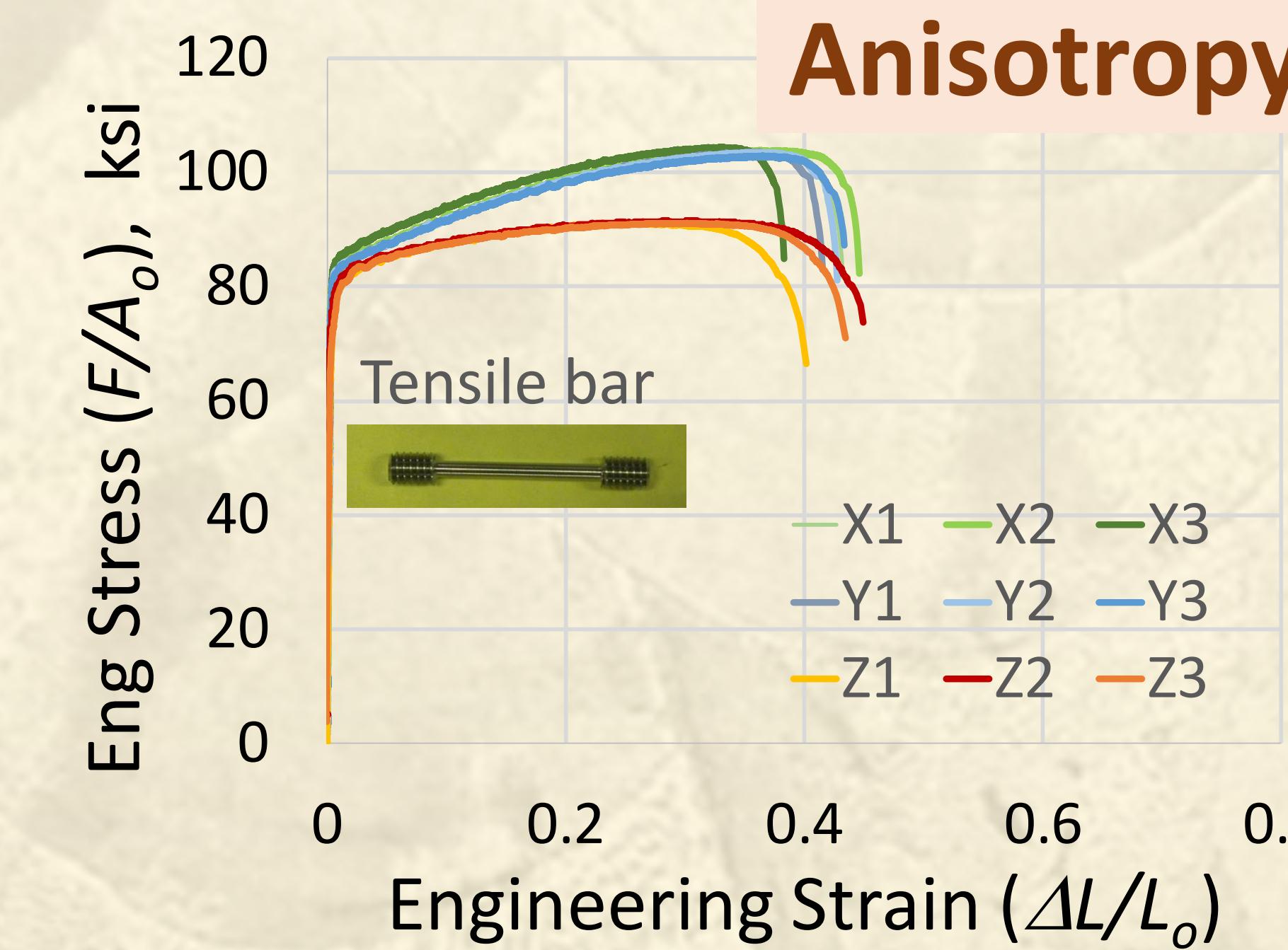
# Mechanical properties of Additively Manufactured SS316L

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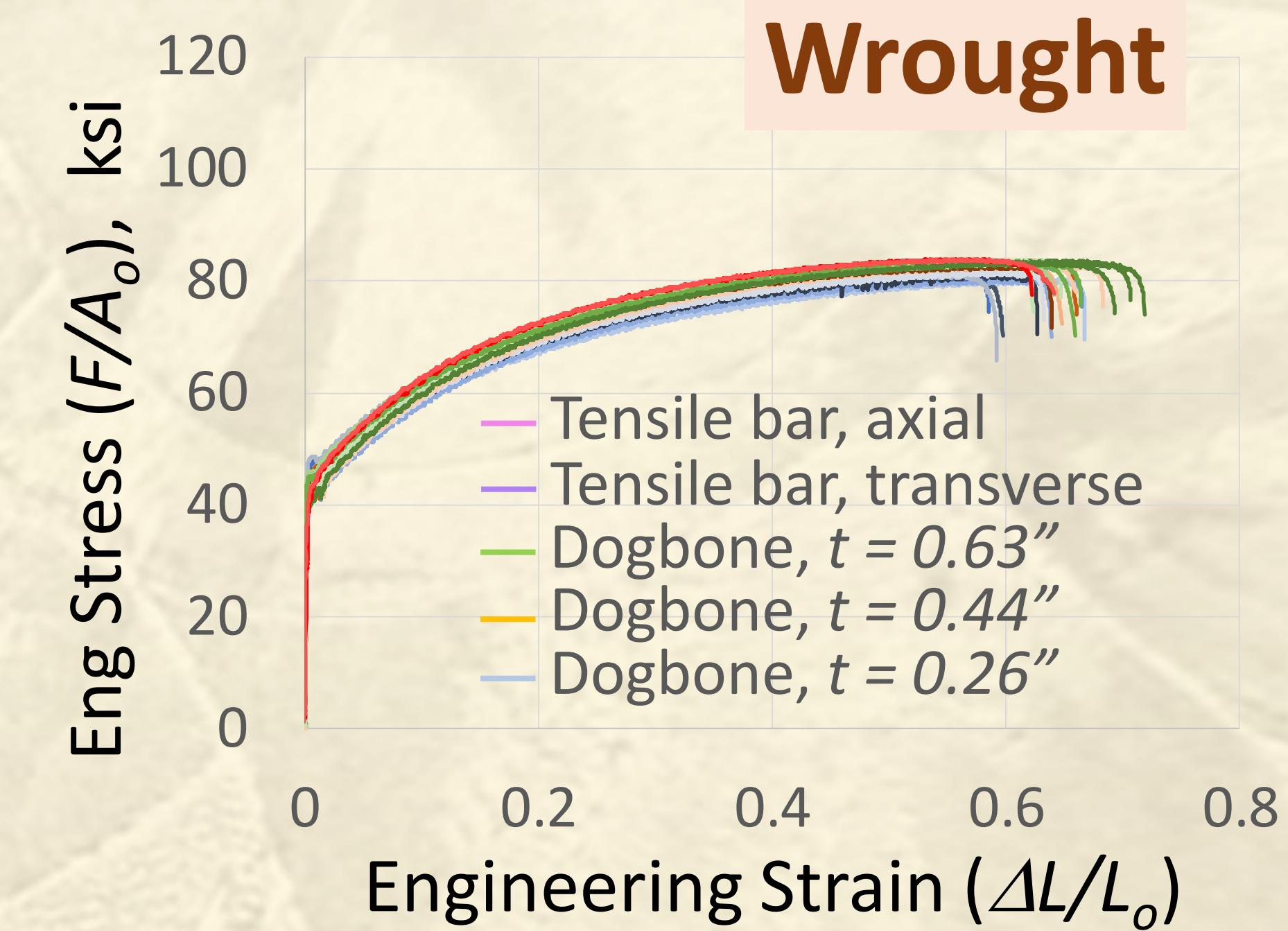
Tensile Specimens are made from prototypes on Plate 1 and 2 to study the effects of location, batch, surface roughness, and aging.



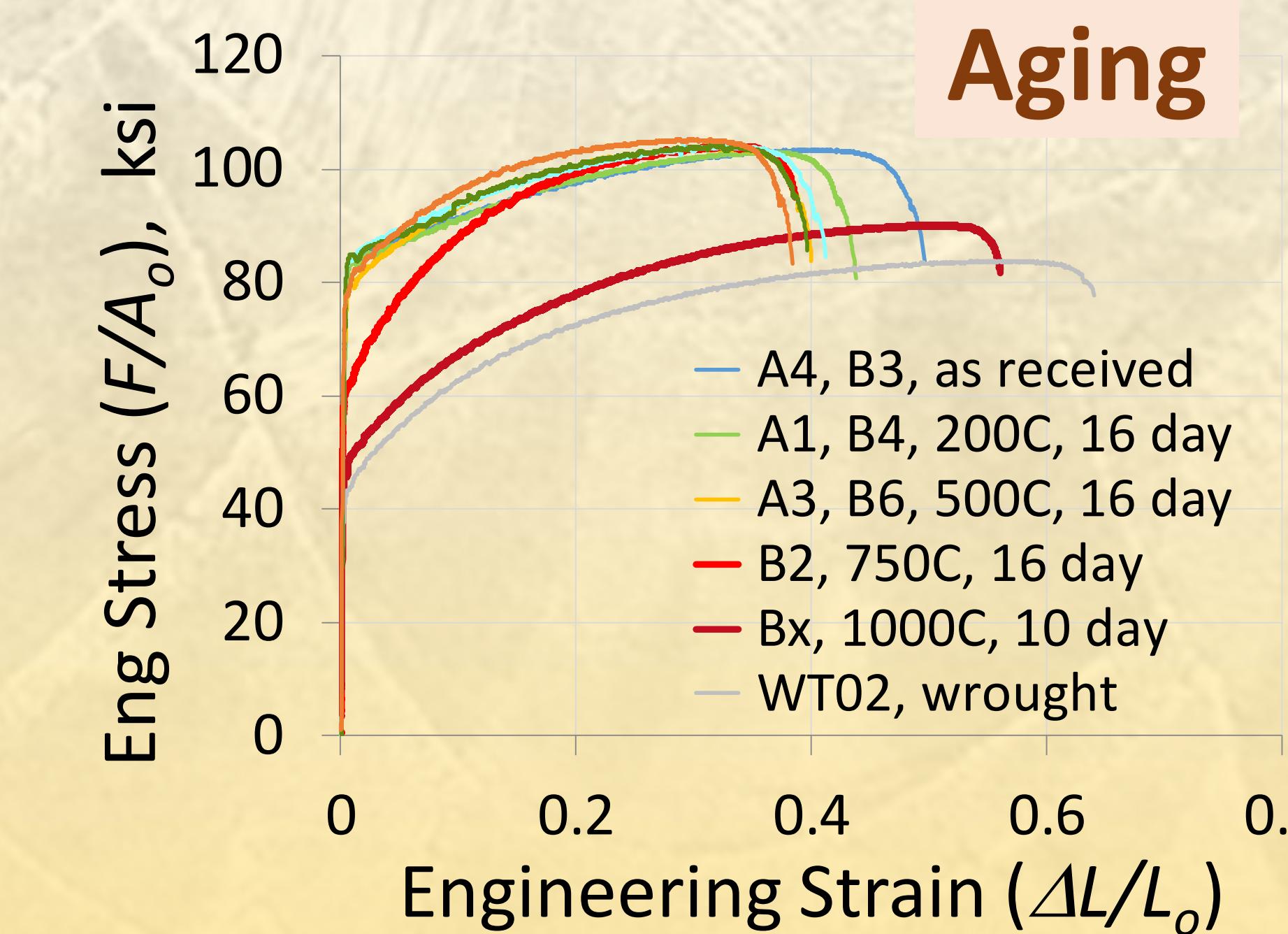
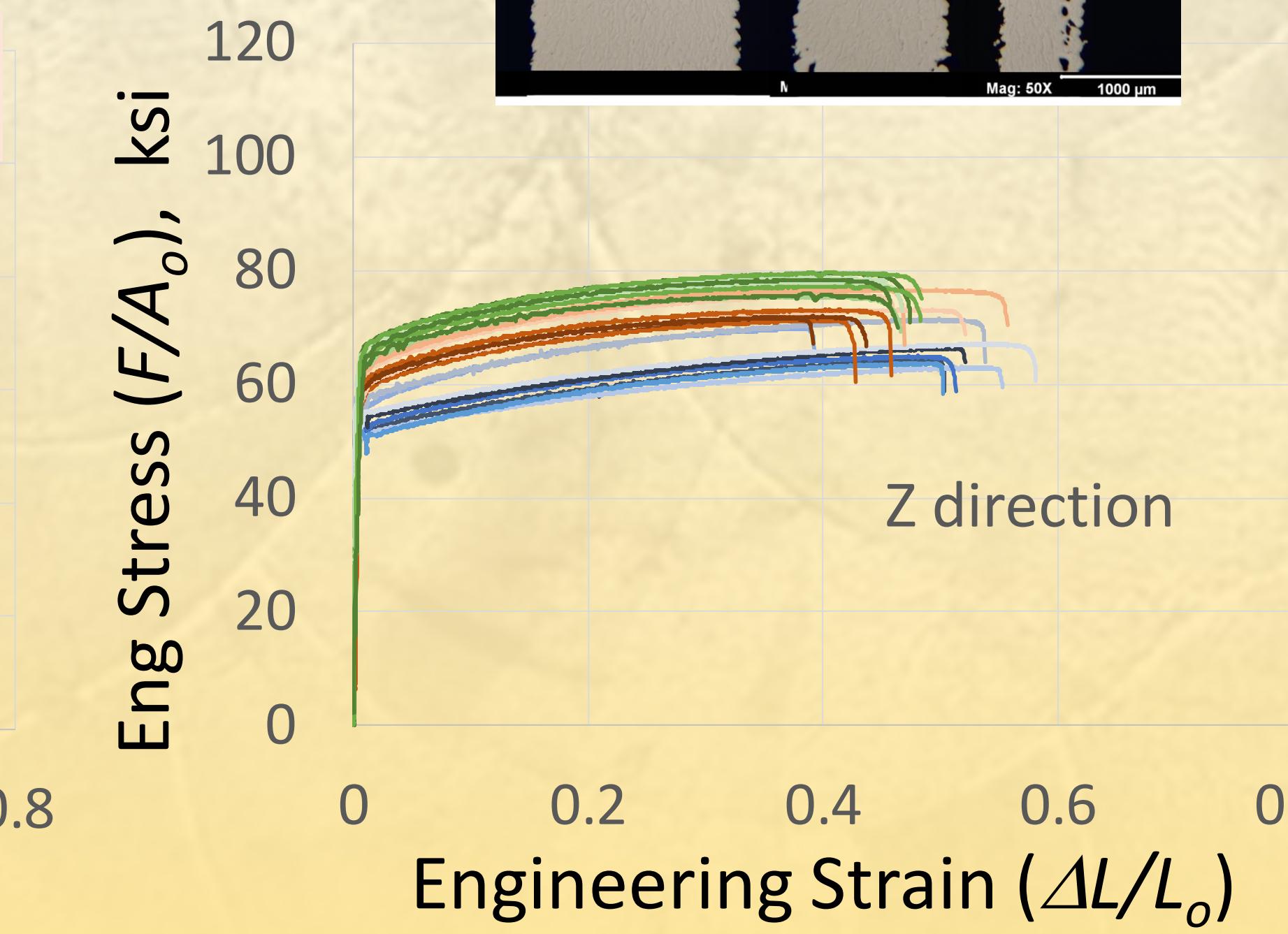
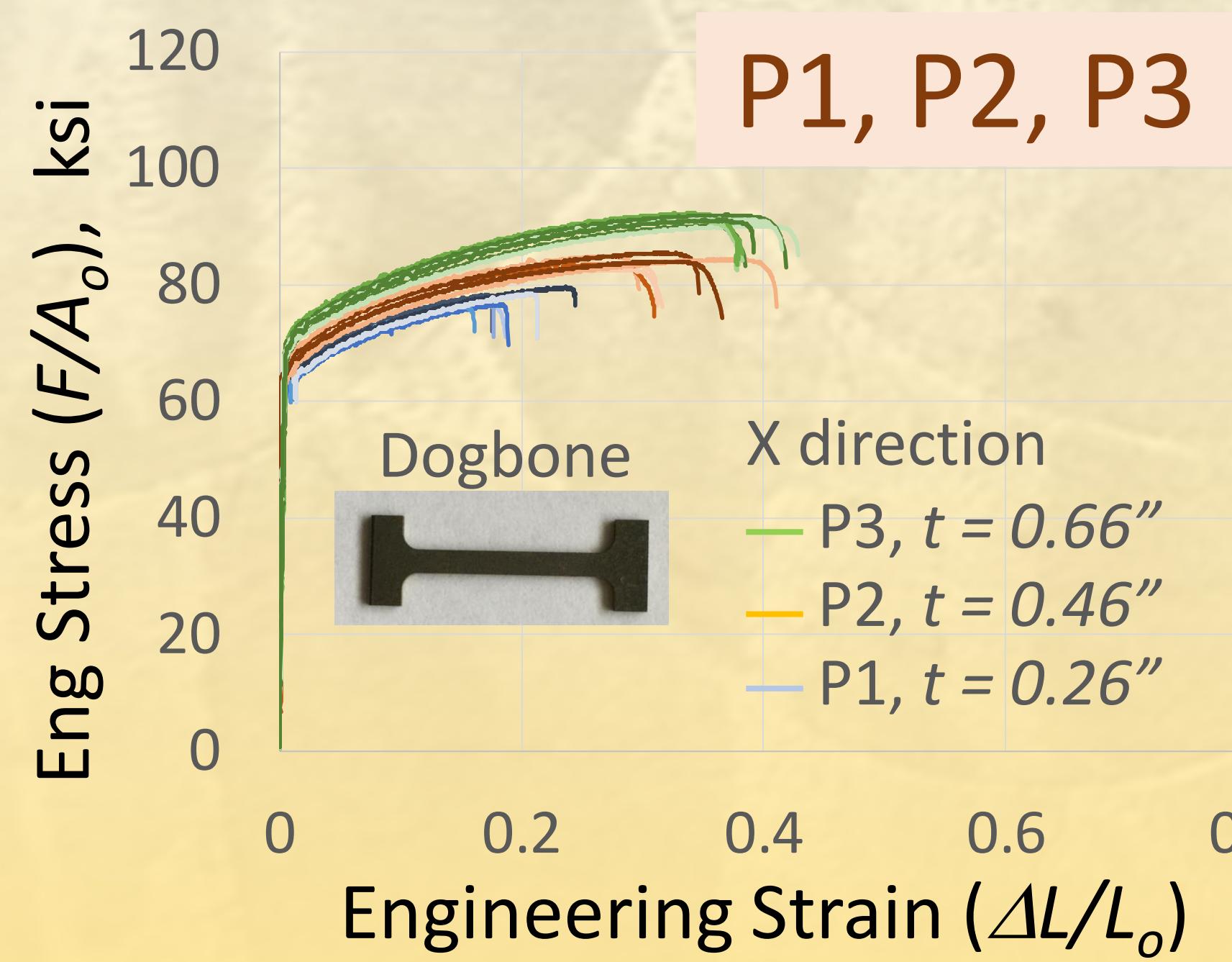
Material		X - direction			Y - direction			Z - direction		
AM Plate	Cylinder	YS, ksi	UTS, ksi	Elongation	YS, ksi	UTS, ksi	Elongation	YS, ksi	UTS, ksi	Elongation
1		80.7	102.8	0.49	80.8	103.0	0.40	64.6	89.3	0.38
2	1	77.9	95.5	0.29	78.4	95.8	0.30	72.8	88.1	0.31
2	2	81.8	101.0	0.37	81.4	100.9	0.43	76.4	90.7	0.39
2	3	82.6	103.3	0.41	81.3	101.9	0.40	77.6	92.2	0.45
2	4	82.5	103.9	0.42	81.9	103.4	0.43	76.6	91.3	0.43
2	5	85.0	104.6	0.41	85.8	105.5	0.41	77.7	93.5	0.52
2	6	80.1	102.4	0.45	81.2	104.6	0.44	75.5	89.5	0.41
Wrought		39.1	83.9	0.59				36.6	83.0	0.68



C1 (near edge) values are outliers. All other cylinders on Plate 1 and 2 are consistent. The uncertainties of UTS and Elongation are  $< 2$  ksi and  $< 5\%$ , respectively.



The effect of **surface roughness** on engineering property increases as the thickness decreases.



The properties of PBF SS316L are consistent up to 500°C for several weeks; at 750°C and beyond, YS and UTS become lower.