Comparison of crack resistance in 3D printing between DAP™-AM series, SKD61 and maraging steel

The crack resistance of as-3D printed DAP™-AM series, SKD61 and maraging steel printed by our own Concept Laser M2 were compared.

Table 1 3D printing conditions.

Laser power	300W
Scanning speed	600mm/s
Hatching distance	0.13mm
Laser spot diameter	180μm
Powder layer thickness	50μm
Preheating temperature	200℃ （120℃ for maraging steel)
3D printing atmosphere	N2(O2<0.1%)

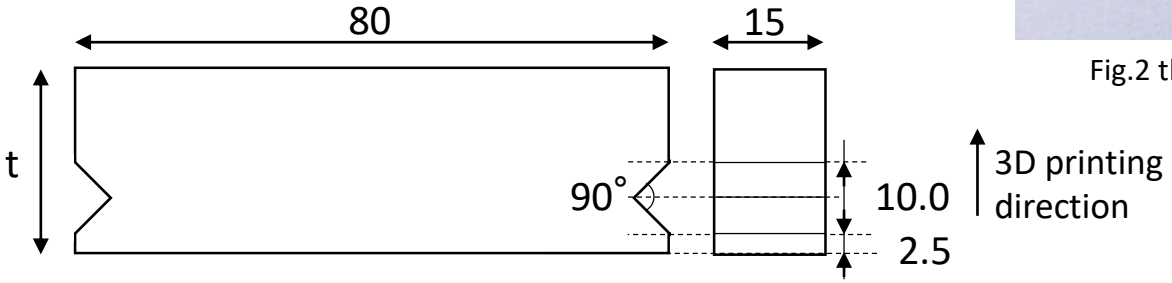


Fig.1 The shape of the crack evaluation specimen.(t=15~35)

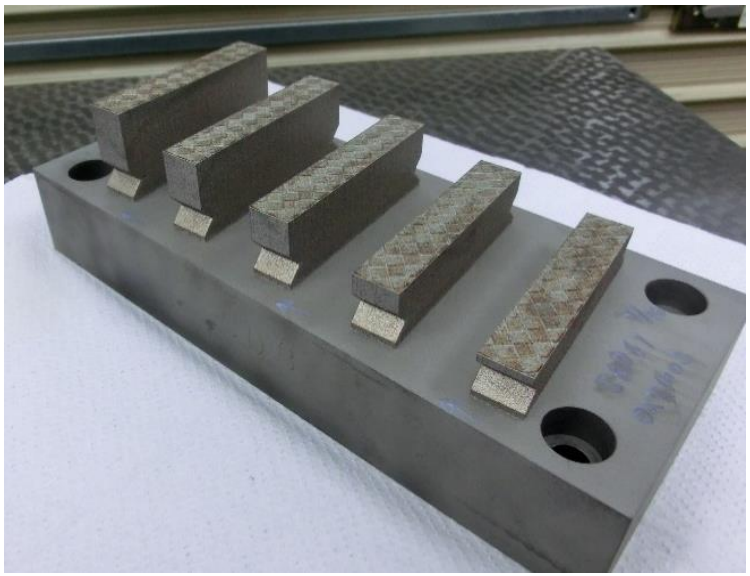
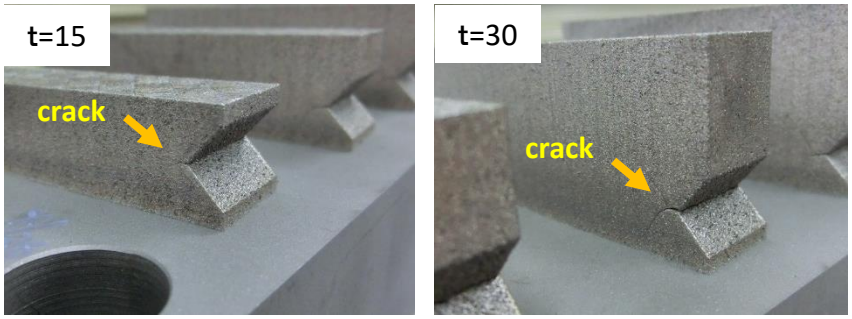
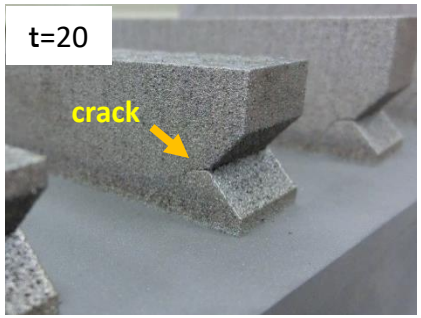
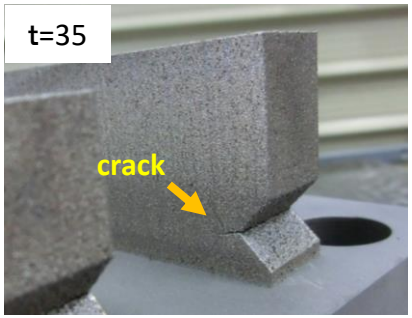


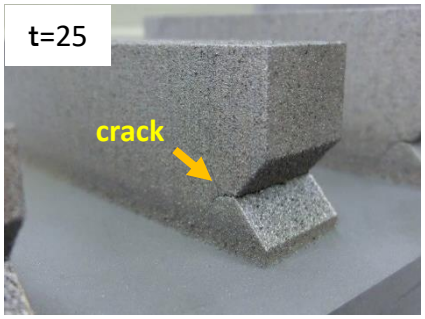
Fig.2 the specimens' placement in 3D printing.

SKD61（Preheated at 200℃）

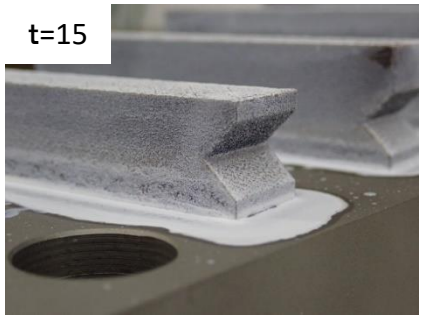


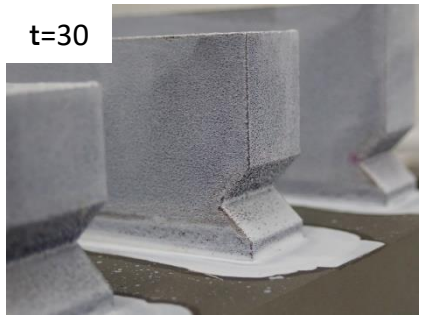






DAP™-AM HTC45（Preheated at 200℃）





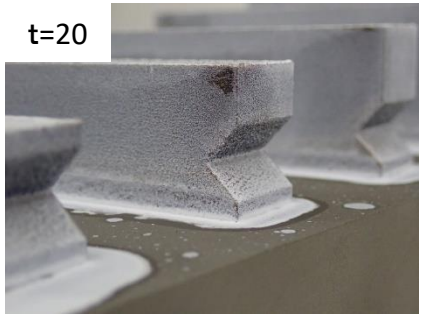
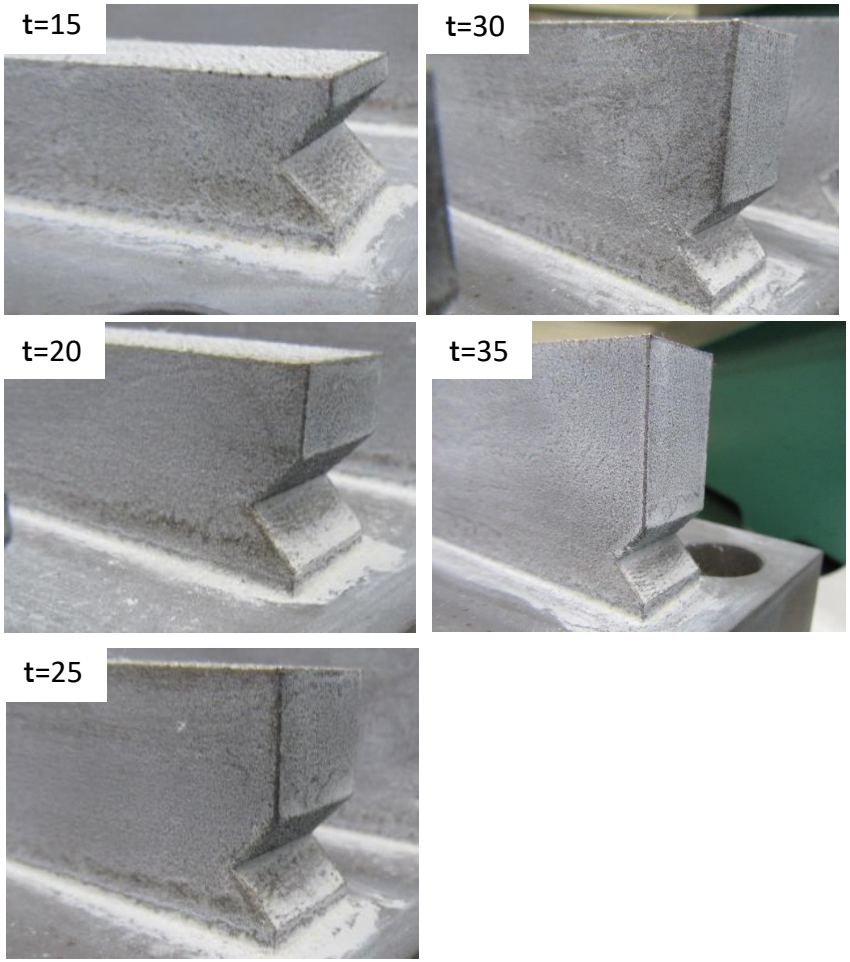


Fig.3 Comparison of crack during 3D printing between DAP™-AM HTC45 and SKD61.

DAP™-AM HTC45 achieves less cracks than SKD61 even for thicker specimen.
So DAP™-AM HTC45 has high crack resistance during 3D printing.

DAP™-AM HTC40（Preheated at 200℃）



Maraging steel（ Preheated at 120℃ ）

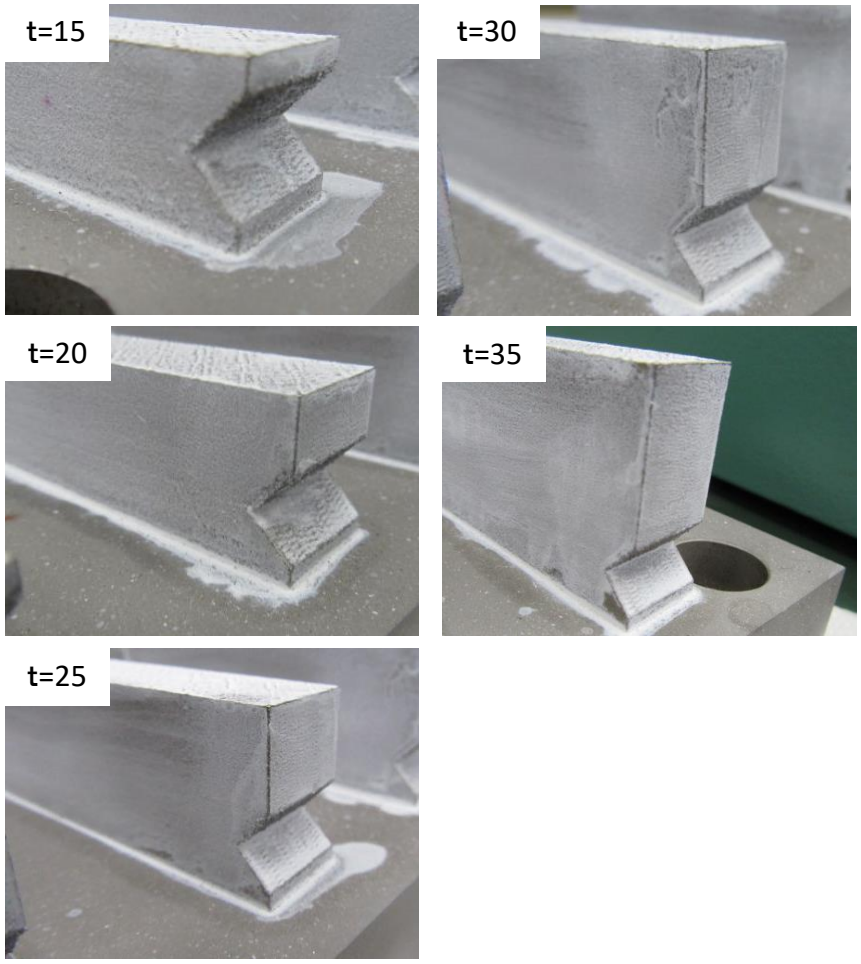


Fig.4 Comparison of crack during 3D printing between DAP™-AM HTC40 and maraging steel.

No cracks are observed for DAP™-AM HTC40 or maraging steel at the test condition.