USUKI LAB.

LExtending cutting tool life using ultra-high pressure coolant]



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Research assignment of cutting titanium alloy and superalloy

First step of adhesion between work material and tool is fine crystallization of adhered material

Surface of chip changes _{chip}

chip flow

Surface of chip changes

Adhesion by interatomic force progresses tool wear



TEM image of interface between adhered material and TiN coating



Wear processes of TiN coated tool when cutting Ti-6Al-4V and Alloy 718

Fabrication of prototype end mill for ultra-high pressure coolant supplying from flank surface

Key point are decrease cooling velocity of work material and cutting heat at edge

of tool, to prevent fine crystallization

 \Rightarrow As one solution, we prototype a tool that can be supplying ultra-high pressure coolant from the flank side and verify its effect.





3D design model of cutting tool



Appearance of the manufactured tool Ejection from the coolant hole built into the tool



Work

material