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A Method for Improving Machinability of Metals

Coating annealed metal surfaces with a thin layer of ink substantially reduces cutting forces and chip size, leading to improved surface finish and extended tool life for structural metals like stainless steel and aluminum.

Annealed metals are notoriously difficult to cut. Machining such metals involves high forces, an unusually thick chip, and a side-flow of material transverse to the cutting direction. These factors lead to diminished tool-life, poor surface finish, and deafening tool chatter. The qualities of annealed metals have earned them an unfortunate reputation for poor machinability.

Researchers at Purdue University have developed a method to suppress the nucleation of the chips. By coating the surface of the metals with a thin layer of ink, cutting forces may be reduced by up to 50 percent and chip size substantially reduced. This coating process could be used to cut structural metals such as stainless steel or aluminum. This technique can be added onto existing machining units with the addition of a suitably positioned nozzle or brush.

Advantages:

-Avoids chatter instability

-Improved surface finish

-Increased tool life

Potential Applications:

-Aircraft manufacturing

-Micromachining

-Commercial machining

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Authors
Srinivasan Chandrasekar
W. Dale Compton
Koushik Viswanathan
Ho Yeung

Further information
Will Buchanan
wdbuchanan@prf.org

View online

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