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Surface Mechanical Grinding Treatment Setup and Tools for Processing Bulk Metallic Materials

A cost-efficient surface grinding technique doubles metal mechanical strength while maintaining material ductility for critical applications in automotive and oil and gas industries.

Researchers at Purdue University have developed a new surface grinding technique to enhance mechanical properties of metals. Currently, efforts to increase grain size ensure material strengthening, but cost materials ductility. Sometimes ductility can be added back to materials, but this process requires expensive equipment and is not often successful. Purdue researchers have been able to achieve double the mechanical strength of traditional techniques while maintaining ductility in metals by introducing a surface gradient and only using tungsten carbon and cobalt (WC/Co) sphere tips to grind metals thereafter. A mechanical test was conducted with dog-bone shaped samples of twinning-induced plasticity (TWIP) steel and yield strength was found to be over 600 MPa with ten passes as compared to current methods which give TWIP yield strength of just 350 MPa. In addition, microscopy has been used to verify surface parameters including microhardness, height-to-diameter aspect ratio, percent strain by compression, and loading time. Metals processed using the method fine-tuned by Purdue researchers offer an advantage for in a myriad of applications in automotive and oil and gas industries.

Advantages:

-Cost-efficient

-Enhances Mechanical Strength

-Maintains Ductility

Potential Applications:

-Metallurgy

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Category

Automotive & Mobility Tech/Internal Combustion Engine Optimization

Materials Science & Nanotechnology/Advanced Functional Materials

Chemicals & Advanced Materials/Materials Processing & Manufacturing Technologies

Authors

Jie Ding

Qiang Li

Zhongxia Shang

Xinghang Zhang

Further information

Parag Vasekar

psvasekar@prf.org

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-Automotive

-Oil and Gas

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