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Direct, Large-Scale Production of Bulk Forms of Metal Alloys by Machining-Based Processes

A new hybrid, single-stage machining process radically reduces the cost, energy consumption, and emissions associated with producing lightweight alloy foil sheets, improving the workability of materials like Ti and Mg alloys.

Researchers at Purdue University have developed a new class of machining-based deformation processes for producing foil sheets directly from cast ingot in a single stage of deformation. This technology is built on early findings that hybrid-cutting extrusion based on constrained chip formation offers a fundamentally transformative approach for effecting large process energy savings, lower capital investments, and superior mechanical properties. This approach is radically different from conventional multistage deformation processes, e.g., rolling, drawing, currently used to produce foil sheets.

This new hybrid process will enable foil sheet production with significant reductions in energy consumption, cost, and emissions compared to conventional rolling. The machining-based approach also has important advantages for processing materials of low workability such as Ti and Mg alloys. This will provide critical technology for creating foil sheets from these lightweight alloys at a lower cost, a key enabling step for their widespread application.

Advantages:

-Reduced energy consumption and emissions

-Easier processing of low workability materials

-Lower production cost for sheets of lightweight alloys

Potential Applications:

-Materials

Technology ID

65748

Category

GreenTech/Carbon Management
Materials Science & Nanotechnology/Advanced Functional Materials
Chemicals & Advanced Materials/Materials Processing & Manufacturing Technologies

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