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3D printing of crack-free parts of non-weldable alloys: introducing an innovative method

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Additive manufacturing, especially 3D printing of metals, is a newly developed technology to reduce manufacturing cost and time for production of geometrically complex metallic parts. Most widely used conventional cast alloys cannot be 3-D printed because of cracking (hot tearing) formation during the solidification of the droplets. Recently, I introduced a robust hybrid method by using superimposed high-intensity ultrasonic vibration during metal 3D printing to resolve these issues. In this technique, the molten metal during 3D printing is subjected to high-frequency vibration. The several experiments were conducted on two types of soldering and aluminum alloys. The experimental observations showed that a non-dendritic structure, nearly equiaxed fined-grains and crack-free parts were attained. Additionally, the intersection layer of a three-layer additively fabricated part proved enhancing binding strength without delamination defect against traditional 3D printed part with separated layers. In this talk, by presenting a literature review on recent developments on innovations in metal 3D printing, I'll limitations and introduce our new method and benefits.

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