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## TUNING THE MOMENT OF INERTIA BY FLOWABLE POWDER AND ROTATABLE SOLIDS WITH 3D PRINTING

HP INC

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## Tuning the Moment of Inertia by Flowable Powder and Rotatable Solids with 3D Printing

The moment of inertia of a part is usually controlled by the density of its build material and geometry. With powder bed-based 3D printing processes, such as Multi-Jet Fusion (MJF) and Selective Laser Sintering (SLS), solidified internal parts and embedded powder can be created inside a 3D printed object.

A method of tuning the moment of inertia using embedded powder and solid materials is proposed. In this method, an object is 3D printed with embedded powder and internal rotatable components. By optimizing the internal structures, the flowability of the powder and densities of the solid components, the moment of inertia of the object can be optimized without changing its boundary geometry. Furthermore, the flowability of the embedded powder can be tuned by the particle size and geometry. In addition, the density of a rotatable component can be locally controlled by its degree of solidification, such as degree of fusion in MJF and SLS.

An example is shown in Figure 1. In this example, the solid core has a fixed relative position but rotatable with respect to the shell of the object. Because of the flowability of the powder and inertia of the core, the core and the shell may have different speeds of rotation. Therefore, the object has a smaller moment of inertia than the same object with a fixed core.

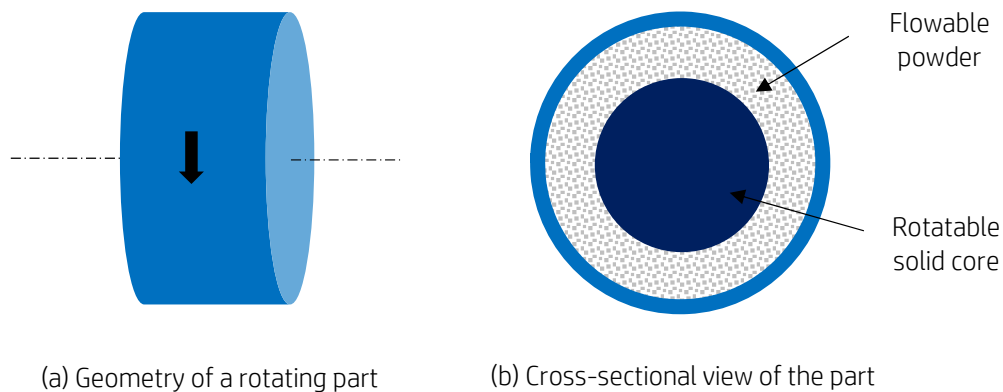


Figure 1. Tuning the moment of inertia by embedded flowable powder and rotatable solid core

*Disclosed by Wei Huang, Gary Dispoto, HP Inc.*