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CAMERA TEST STATION AND PALLET DESIGN FOR MEASURING 3D PRINT POWDER

HP INC

Camera Test Station and Pallet Design for Measuring 3D Print Powder

Abstract: A text fixture for 3D print powder receives a pallet with multiple powder wells for assessment of whether the various powders are suitable for recycling for use in producing high quality 3D-printed parts.

This disclosure relates to the field of 3D printers.

A hardware test fixture is disclosed that supports the evaluation of powder used in 3D printers to determine whether aged powder is suitable for reuse to produce high quality 3D-printed parts.

3D print technologies, specifically those that employ binder jetting approaches, take unused powder from previous build cycles for reuse in a subsequent build. Each time the powder is recycled, its molecular structure changes since it is exposed to the same elevated temperatures as the fused powder.

To date, a spectrophotometer has been used for characterizing powder color. It measures light absorption to determine color in various color spaces. In recyclability tests, users have to mix all the generations and measure the color one by one, which is time-consuming and requires a lot of resources. Spectrophotometers are expensive and can only measure a small sample of powder, roughly a few millimeters in diameter. If that sample has a small contaminant from dust or other matter, the results will be greatly skewed.

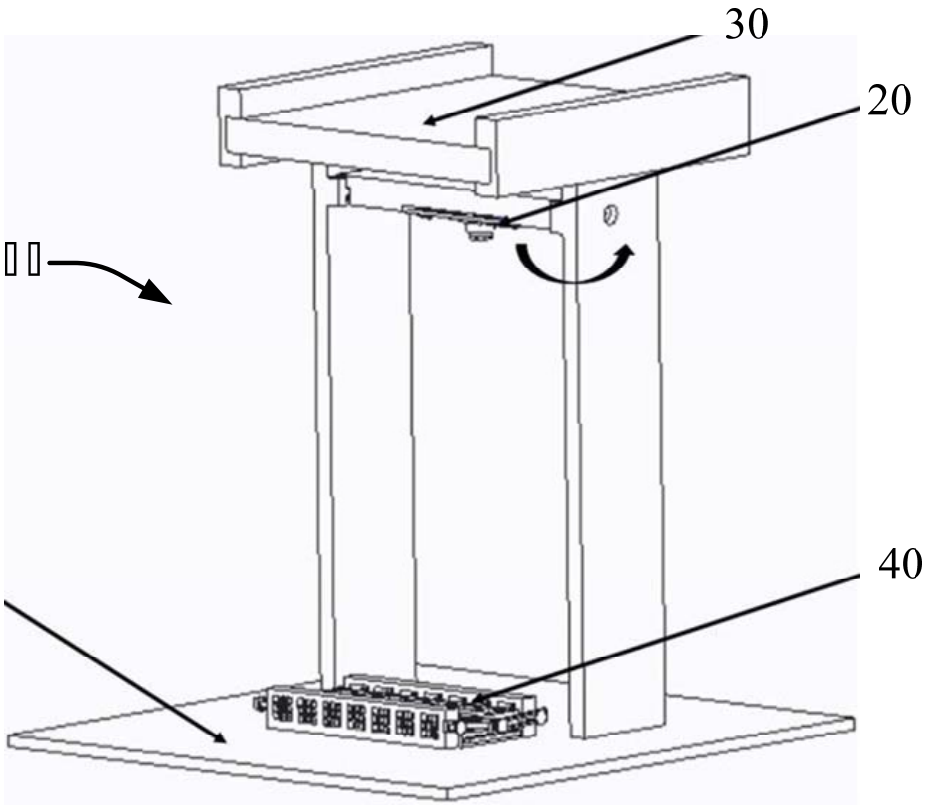
According to the present disclosure, and as understood with reference to the Figure, a hardware fixture 10 that supports the evaluation of 3D print powder mounts a camera or imaging device 20 and a light source 30 that are used for calibration, and a powder container or pallet 40 is used for calibration validation as well as testing various samples of recycled powder.

In order to overcome the variation in hardware, including imaging devices and additional illumination sources, prior to characterizing powder formulations, each test setup is calibrated in a dark room or booth that blocks out incoming ambient light. The light source 30, which may be LEDs, provide neutral and uniform illumination to the palette within the field of view of the camera 20. The camera 20 rotates up to view the light source 30, and then is subsequently rotated down to view a known optical target at the base 50 to validate the results. The calibration process can be performed quickly and easily by a customer who desired to test aged powders for recycling. Once the calibration has been validated, the powder recyclability test can begin.

The pallet 40 includes a number of powder wells 60 for holding different samples of powder. One of the wells 60A, instead of receiving powder, provides a uniform, neutral surface for white balance calibration and validation. The pallet 40 is configured to easily prepare powder for measurements and ensure accurate results. The pallet 40 has grates 70 on top of two swinging arms to prevent large clumps of powder from entering the well 60 and prevent contaminating other samples in nearby wells 60. Swinging arms load powder accurately into the wells 60 and scrape excess powder from the surface. A removable tray allows easily remove of the powder in each well 60 to expedite the cleaning process for analysis of additional powder samples.

The test fixture 10 and pallet 40 advantageously reduce sample preparation time, provide portability to operate in many locations, and increase productivity by testing multiple powder samples at the same time rather than just one. The integrated neutral target enable camera calibration, validation and material powder determination in a single setup, rather than requiring a separate setup for calibration.

Disclosed by Emily Ann Miginnis, Frank Cheng, Erica Fung, and Jesiska Tandy, HP Inc.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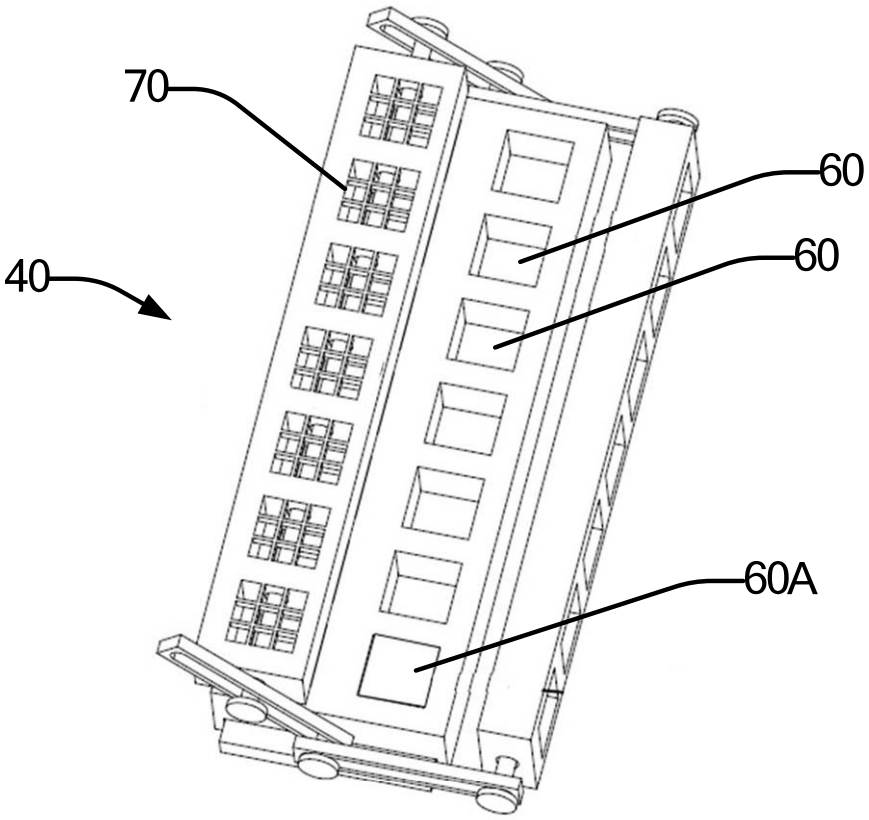
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