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MECHANISM TO AVOID MISPLACEMENT OF DE-CAKING BOX IN 3D PRINTING MACHINES

HP INC

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Mechanism to avoid misplacement of de-caking box in 3D Printing Machines

Performing the de-caking process of a powder-based 3D printer in a separate independent box enables a 3D printer to operate with high throughput.

The independent box mentioned above is a box that is placed on top of a build unit to receive the full printed cake in it. Once it is inside it, the box can be moved to cool down separately from the build unit and this last one become available for the following job.

Once the cooling is done, the box will be moved for de-caking to the post processing station, this is currently planned to be done by a forklift and there is the risk that the box instead of being placed on the designed supports, the box could be accidentally placed on top of the current flaps if those are not folded upwards (see Figure 1 and Figure 2). This could lead to powder spills.

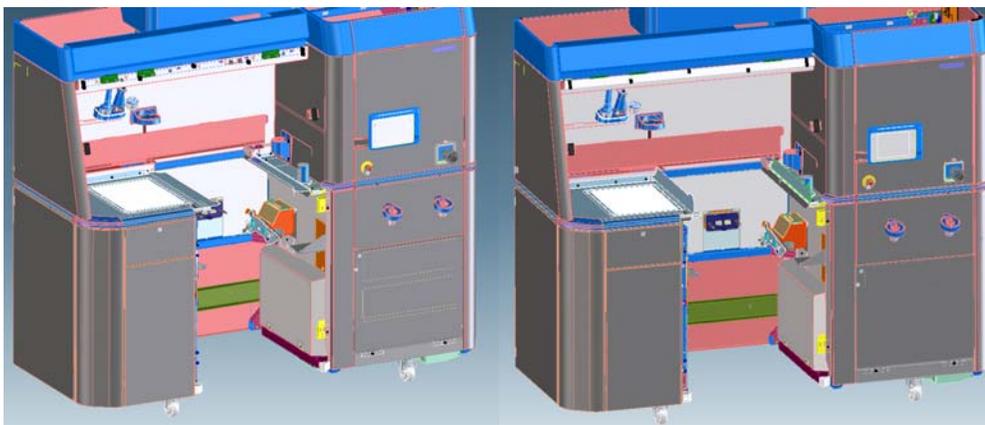


Figure 1: Post processing station with flaps on horizontal (left) and vertical position (right)

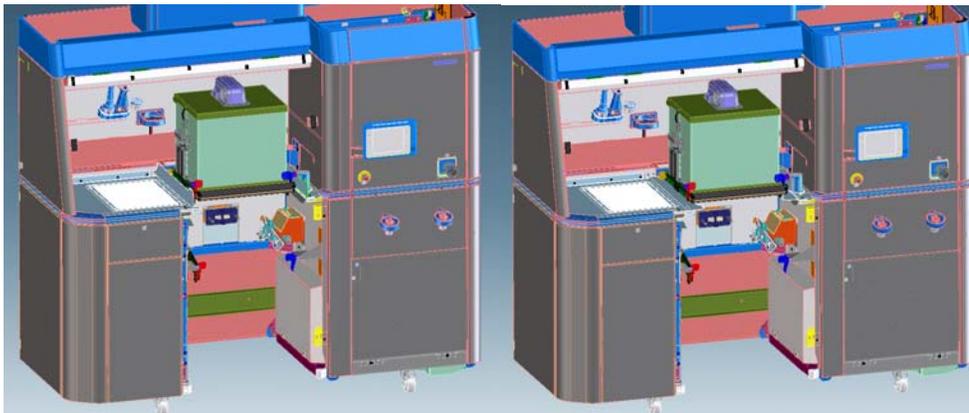


Figure 2: Post processing station with box going down with flaps on vertical (left) and horizontal position (right)

The independent box is placed inside the postprocessing unit using a forklift or similar device (see Figure 3). It has a travel down to ensure it is positioned on the structural brackets intended for its support (see Figure 4). Depending on the height the box enters the post processing station, the box could be over the flaps (like in Figure 3) and if those are on horizontal position, due to short width the box would lay on the flaps as soon as the device lowers the box looking for the supports. This could lead to the user to thinking that it is already placed in the proper position, when it is

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not, and then removing the forklift. The box could fall from the flaps as these are not strong enough causing a powder spill.

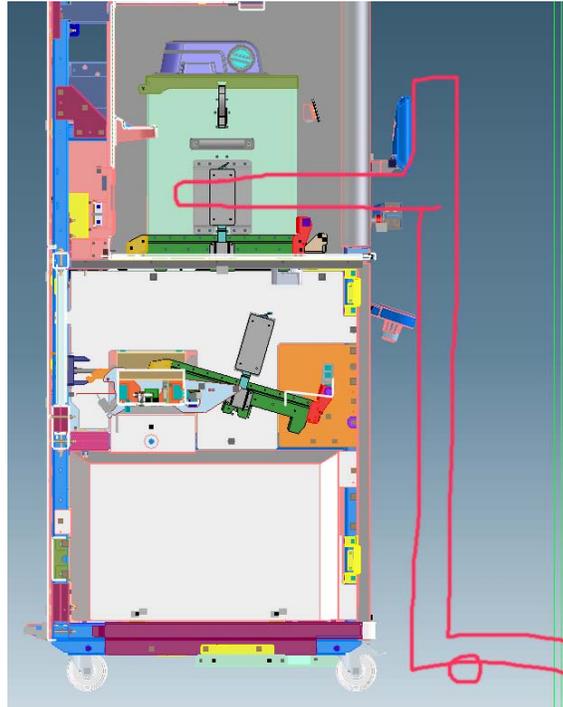


Figure 3: Forklift sketch placing the independent box on the post processing station

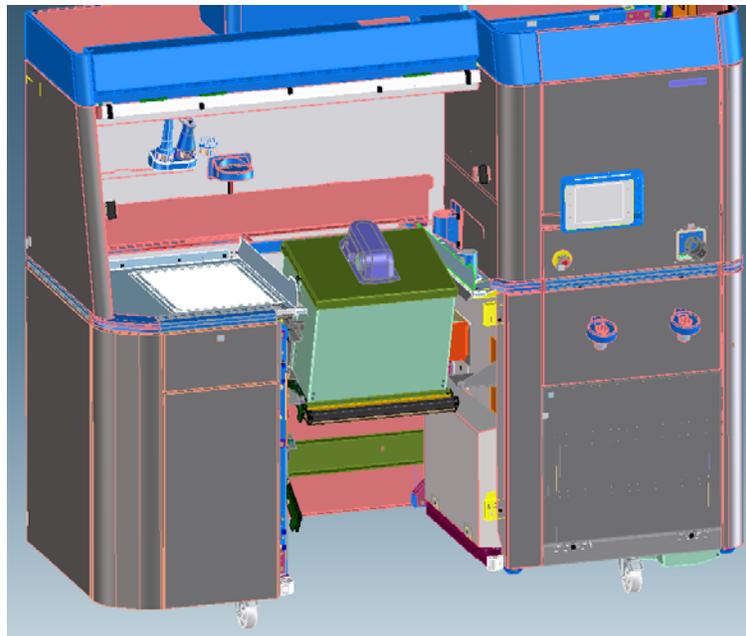


Figure 4: Post processing station with box on the structural supports

The mechanism consists of 2 to 4 small brackets that keep the flaps horizontal with the load of a spring (see Figure 5). As soon as a small weight is placed on top of them, they fold down so the path for the box towards the supports becomes free.

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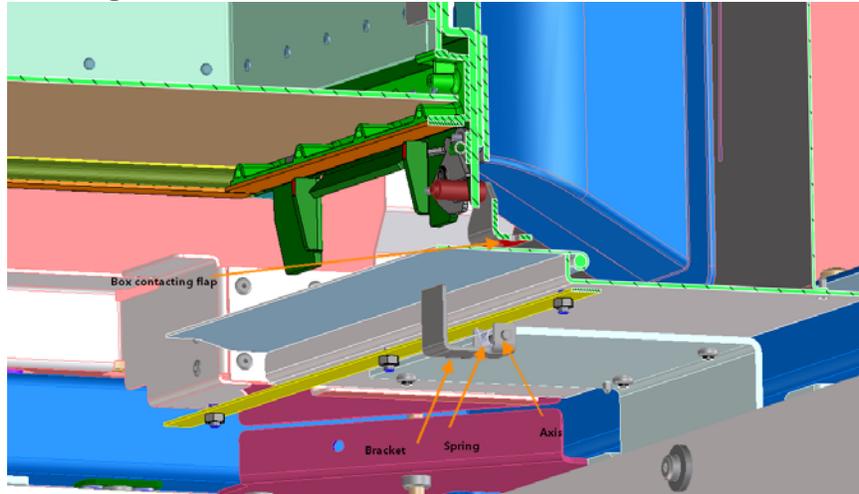


Figure 5: Flap on horizontal position and box just before contacting the flap

Once, the box is lowered and contacts the flap, this one folds down as the force on the flap is bigger than the torsion spring on it (see Figure 6).

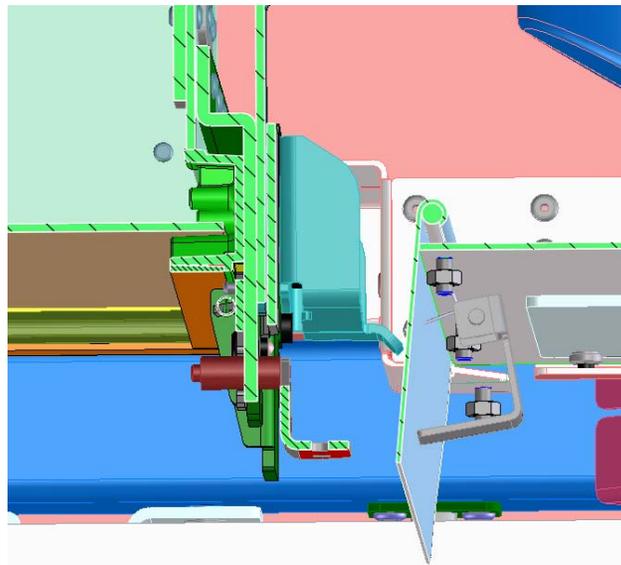


Figure 6: Flap folding down due to the force from the box

The spring could also be linear if redefining the concept or even thinking on another type of dampering. The concept advantages are:

- Simple and cheap
- Avoids misspositioning the box so reduces the possibility of needing to lift again the box to position it on the proper place

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