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SYSTEM TO INCREASE THE SAFETY AND PREVENT THE LOSS OF 3D PRINTED JOBS DUE TO MISHANDLING OF THE COOLING FRAME

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System to increase the safety and prevent the loss of 3D printed jobs due to mishandling of the cooling frame

Overview of the system

Currently, safety during the handling of powder and printed jobs is a critical step for 3D printing systems and workflows.

Below is explained how the system is used to avoid the misuse of the cooling frame when a printed job is inside to prevent the loss of powder or damage of the printed parts.

The new system would automatically detect and lock the guillotine, which acts as base of the cooling frame, when a partial or full printed job was inside the it.

Which are the problems that this system solves?

Currently the guillotine can be removed at any time or location which could cause the issues listed below, the current solution would help to prevent them:

- Not meeting the safety and powder free printing system requirements.
- Human error or lack of knowledge about how to use the system properly.
- Avoid the exposure of the user to hot powder which could cause burns.
- The loss of full or partial jobs by being dropped on the floor (or where the cooling frame is placed at that time) when the guillotine is removed by a user that is not aware that there is a job inside the frame.
- Powder clouds formed at the user facility due to dropping a printed job.

How does the systems work?

The cooling frame performance and safety depends highly on the user knowledge of the system and on her/his experience of how to use it and the steps that need to be followed. This makes the probability of misuse and consequently the loss of good printed parts and powder very high.
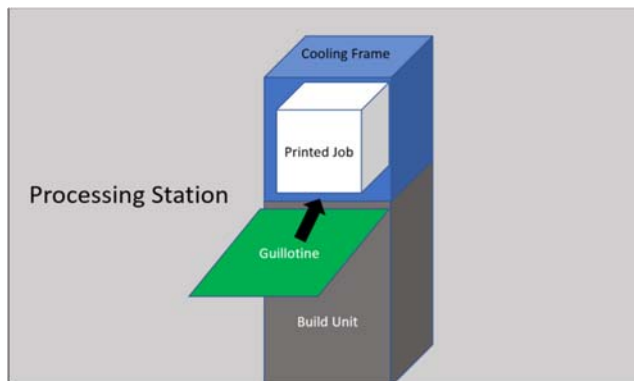
Currently the user is supposed to:

1) Place the cooling frame on top of the build unit while this is inside the processing station
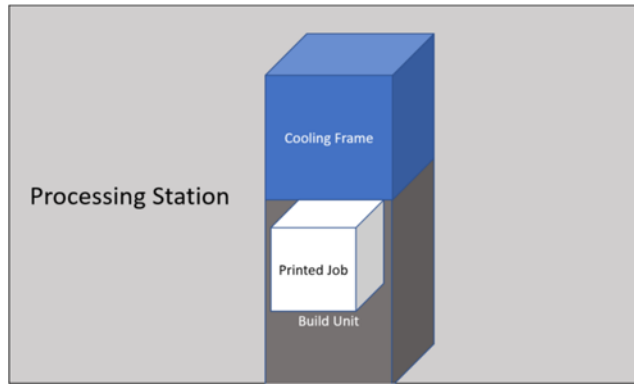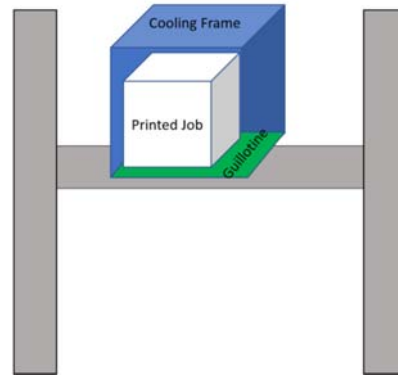
2) Then the cake is fully lifted using the build unit motors
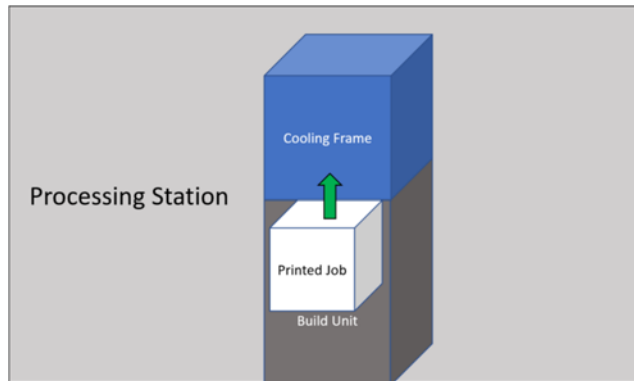
3) After that, when the cake is within the cooling frame walls, the guillotine is inserted at the base of the frame where it will act as the floor and support of the printed job

4) The cooling frame is then lifted using an eternal tool and stored to do the cooling

5) After the printed job is cool, the cooling frame is transported to a powder processing station, where the top cover is removed and the uncaking is performed to recover the parts and powder
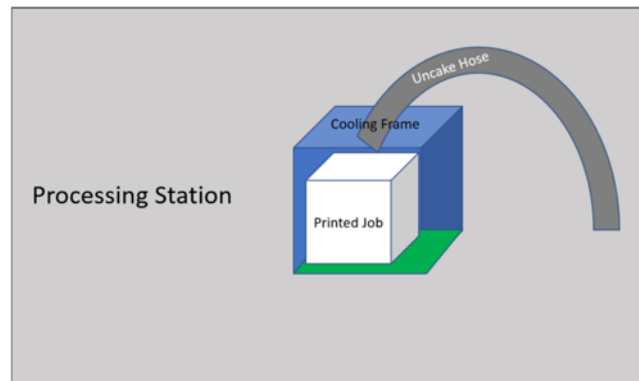

6) Then when the cooling frame is empty, the guillotine can be removed, and the process can start again

At any point after the guillotine is inserted, it could be removed by accident and the printed job and the loose powder would be lost, and this powder could still be hot and would end up spreading everywhere. This goal of this system is to eliminate these possibilities

The Proposed System Solution:

Here is a representation of the New System that could be implemented to prevent the accidental extraction of the guillotine if there was any weight on top of the guillotine
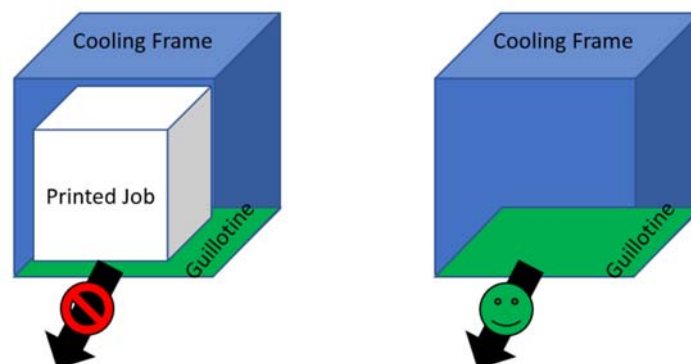
Below we can find an example of a 100% mechanical system (no electric power sources, or PCAs needed) that would use springs to lock the guillotine when there was weight on top of it:
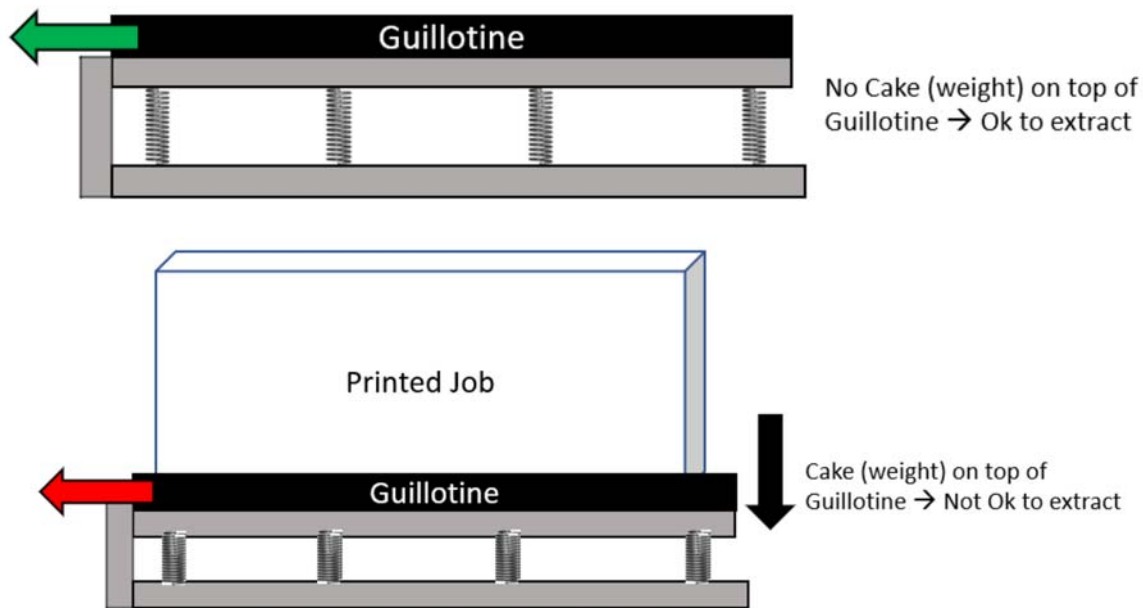
Which are the advantages on doing in this way?

- The safety of the system no longer depends on the user knowledge or her/his experience using it
- The possibility of a printed job being dropped on the ground or where the cooling frame is sitting is eliminated
- No powder clouds created from dropping the job
- The system does not require any electrical circuits or power sources

Are in the market other kind of solutions?

This solution could be applied to all 3D printers as a method to increase the overall safety of the system and prevent losing fully printed jobs.

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