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MSS CAPPING STATION CONFIGURATION DETECTION USING STAIN GAUGE PRINTHEAD CIRCUIT SENSOR

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MSS capping station configuration detection using Stain Gauge printhead circuit sensor

Abstract

Configurable slot system allows the user to configure the printhead layout according to different print modes (color in symmetry, adding white ink, spot colors,...).

The process involves several steps performed by the customer, not only configuring the carriage layout, but also the capping station to match the required printhead configuration in the carriage.

The purpose of the capping station is to properly seal all around the printhead nozzles when the carriage moves to the capping station. If the capping station is not properly configured, the printheads would not be protected when the carriage is in parking position, on the capping station and may lead to a printhead failure.



Figure 1. MSS capping station

There is the inherent risk of not properly configuring the capping station layout during the MSS (Movable Slot System) change configuration workflow since it implies several manual steps.

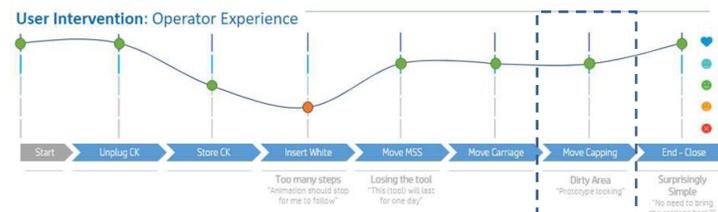


Figure 2. MSS workflow: customer experience feedback

This invention proposes a solution to verify that the capping station has been properly configured during the MSS change configuration workflow using the Stain Gauge Circuit (SGC), without adding extra sensors on the capping station.

Invention

The solution proposed uses the technology already included in the SGC, which includes a resistor in some resistor to form a Wheatstone bridge that allows to detect a force applied on the nozzles area.

Note that the invention reuses the strain gauges sensors in the die described in the patent US20210078320A1 (<https://patents.google.com/patent/US20210078320A1>)

The solution includes a check during the MSS configuration workflow to ensure that the capping configuration matches the carriage configuration by monitoring the signal read from the SGC. When the customer finishes the MSS configuration workflow, the carriage moves to the parking position, on the capping station while monitoring the force read by the printhead.

If the capping position matches the carriage configuration, the caps will apply a force on the printhead nozzles area that will be read by the sensor.

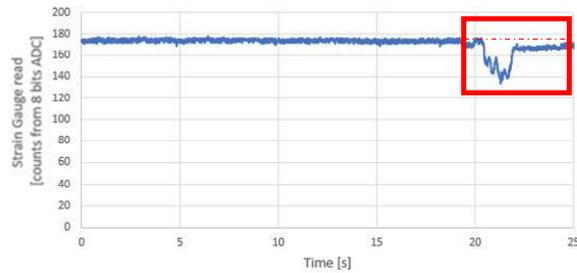


Figure 3. Capping station is properly configured

Whereas, if the capping station is not properly configured and the caps does not apply a pressure on the nozzles area, there would not be a difference on the signal read by the printhead, detecting that the capping station does not matches the carriage configuration and sending a message to the customer to check the capping station.

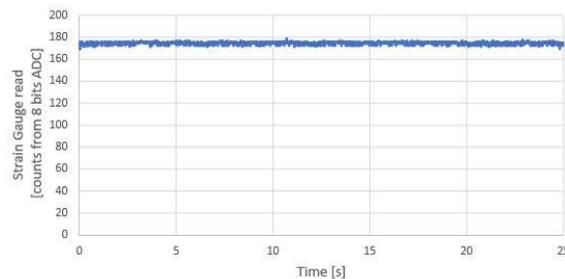


Figure 4. Capping station not properly configured

In some carriage designs, it could happen that MSS positions are slightly overlapped. Having a single sensor could lead to an uncertainty. However, since the printhead has several sensors, there would be a higher resolution, detecting properly the MSS configuration.

1. All dies interact with the capping rubber: MSS configuration matches carriage configuration. The signal would be like *figure 3* for all dies.
2. None of the dies interacts with the capping rubber: MSS configuration does not matches carriage configuration. The signal would be like *figure 4* for all dies.
3. Some dies interact with the capping rubber: MSS configuration does not matches carriage configuration. This would happen in MSS configuration in which both configurations are slightly overlapped. Some dies would have a signal like *figure 3*, others to *figure 4*.

The advantages that provide the invention are:

- Printhead failure: ensuring that the capping station is properly configured, it avoids printhead failure related to not properly sealing the nozzles area when the carriage is in the parking position on the capping station.
- Robustness: includes a check to ensure that the capping station is properly configured, not relying only on the user.
- Automatic process: the process does not require additional actions to be performed by the customer. The detection is done using the SGC in the printhead.
- Customer experience: providing feedback during the MSS change configuration to alert the user if the capping station is not properly configured improves the overall experience of the process.
- Cost: It reuses the current hardware of the printer and no additional electronic element (EE board, cables, ...) or mechanical parts are required.

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