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INK FLOW CHANNEL ON CAP LIPTO RESOLVE PEN HEALTH ISSUES

HP INC

Ink Flow Channel on Cap Lip to resolve Pen Health Issues

Many inkjet printers use an elastomer cap to form a hermetic seal around the printhead while also providing a mechanism for venting, such as to prevent pressure spikes when capping and also to prevent pressure differentials such as due to environmental swings in temperature and pressure. The present paper describes a method for guiding ink flow out of a printhead through capping lips of the elastomer cap. The purpose of capping system is to reduce the rate of vehicle loss from the pen's nozzles. For instance, capping may help prevent the pen from falling out of PQ spec due to vehicle loss.

The compliant elastomer cap is designed to have a flexible lip surface that can conform to irregularities in the pen headland surfaces or mis-alignment of the cap to the pen body. It has been determined that color pens (e.g., containing dye-based ink) does not handle venting well. For instance, it can be difficult to return a color pen to working condition if it was stored in an uncapped state. On the other hand, black pens (e.g., containing pigment inks) respond well to venting. For this reason, a double notch in the capping lips was selected for the black pen cap. To achieve the notches in the capping lips, a small portion of the sealing lip surface is molded and/or formed to be discontinuous--that is, to have a "notch" missing from that sealing surface on black color compliant elastomer cap. The cross-sectional area of this notch is controlled to give the desired vent path from the capped volume to ambient surrounding air. This paper describes the utilization of cap notches design to lead the ink puddle flow down from printhead (e.g., rather than allowing ink to flow towards a center of the pen orifice plate, potentially creating pen health issues like pigment build up, color mixing etc.).

In current cap design and referring to Figure 2, ink tends to accumulate at Zone B as the wiper blade is not long enough to reach. Further, the wiper cannot be made long enough to cover Zone B because such wiper lengthening may compromise end nozzle health if the waste ink flows to and interacts with printhead encaps. This can happen as the compliant elastomer cap contacts this ink puddle, some ink will be wicked and flow around the cap lip, until the cap lip is saturated. While this cap lip saturation may not present an immediate problem, it may not be ideal because the amount of waste ink on the headland may be too significant for the wiper to handle. And any remaining amount of ink not cleaned by the wiper can eventually be pulled towards (and make contact with) Zone A due at least in part to the negative pressure of the nozzles, eventually mixing waste ink with ejected ink. To resolve these issues, the present paper proposes channeling ink away from Zone B to a waste disposal area. Specifically, the present paper proposes the following design features: notched cap lips (with notches near to the end of wiper) and a wicking channel (on the external wall of cap).

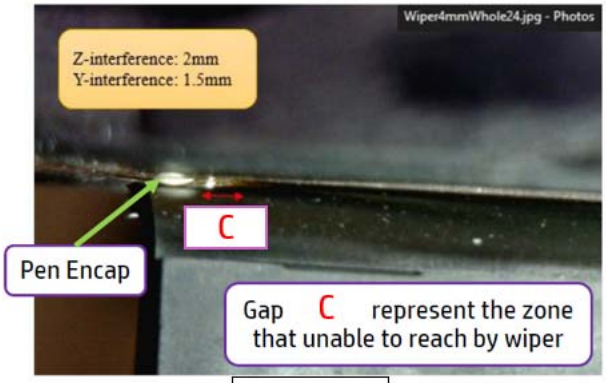

Figure 1

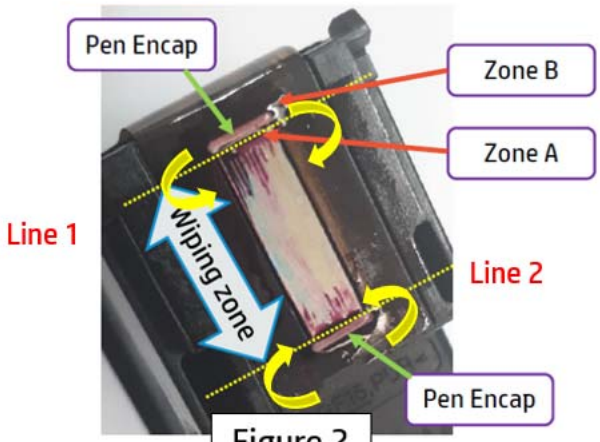

Figure 2

The current cap lips design uses 2 notches located on the top (Edge I) and bottom (Edge II), as shown in Figure 4. This paper proposes the addition of 2 more notches and positioning the notches to the left and right sides (as shown in Figure 5). The exact position is to be determined based on the particular design of the printhead, but in the example illustrated in Figure 5 the notches need to be aligned with Line 1 and Line 2.

By relocating the position of notches, cap lips in Zone B (Figure 6) will form wicking path and ink puddle can flow out from printhead surface through the opening at the notches on cap lips every time carriage goes back to capping state. The geometry of the notches may be such that the radius is bigger on the outer side so that inks tend to flow to outside of cap. In some cases, the cap may have sufficient space to include an absorber. And in such cases, the geometry and/or placement of the notches can be modified to guide ink flow outside of the cap. Additionally, in some cases, the openings of the cap notches can be modified, such as to be small enough to meet color pen requirements (e.g., to meet venting/flow rate while still guiding ink flow from the printhead surface).

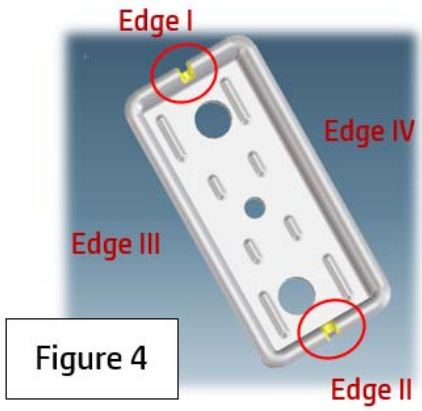

Figure 4

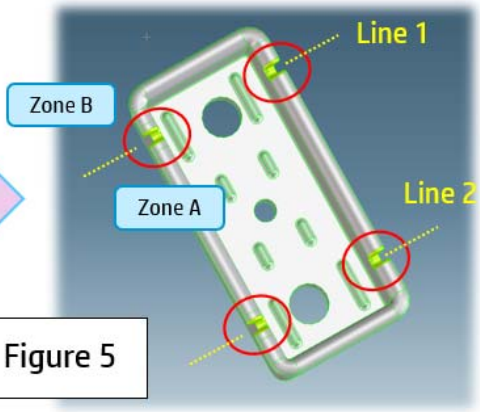

Figure 5

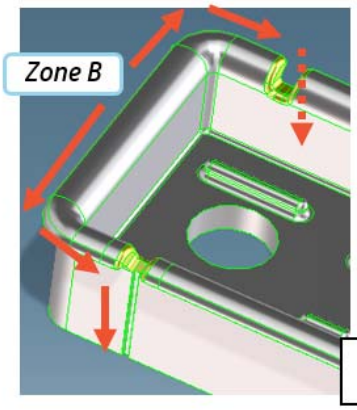

Figure 6

An additional advantage of the proposed four notch design, such as shown in Figure 5, is that by having four notches (rather than just two) there is a decreased likelihood of notch blockage (e.g., by ink drool).

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