



Xandex DM-1 Ink Cartridge Backflow Investigation **Conducted by Northeastern University**

Although historic occurrences have been less than one percent, backflow phenomenon among DM-1 series DieMark cartridges has caused problems for certain clients of Xandex, Inc. In these cases, customers report that cartridges provided by Xandex eventually develop a condition where ink abnormally flows out of the top of the cartridge (backflow), making test results inconclusive and slowing the manufacturing process. As part of Xandex's goal of continuous improvement, we initiated two backflow investigation projects with the teams at Northeastern University. It was our hope the teams at NEU would be able to use their considerable resources to gain a better understanding of the root causes of the backflow phenomena.

Although the teams were able to provide some valuable insight into the factors affecting backflow, the design changes proposed in the first technical paper were not practical in volume manufacturing and could not be implemented by Xandex. The results of the second technical paper were inconclusive and the Northeastern team advised that other causes might be contributing to the backflow problem.

Since this problem primarily affects only certain customers, the Northeastern team also concluded that Xandex should focus on cartridge use habits at specific customer sites to determine what might lead to backflow problems at those locations. Xandex has since identified a number of variables in customer usage habits that lead to higher backflow rates. Priming technique, opening and closing of the cartridge, and usage beyond the recommended cartridge open time are among the customer specific variables that affect backflow rates.

Xandex believes the above noted, customer-specific use models are the primary contributors to the cartridge backflow. However, Xandex continues to search for ways to further reduce or completely eliminate the backflow phenomena.

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