TECHNICAL NOTE

ESDA Cascade Developer Awareness

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This paper provides additional information for use of the ESDA.

Introduction

In the normal use of the Electrostatic Detection Apparatus (ESDA), there are times when the toner residue seems faint when attempting to develop latent indented impressions. The typical action taken when this occurs is to simply cascade developer multiple times, or possibly add additional toner to the glass cascade developer beads before continuing the process.

It has come to our attention that the surface of the cascade developer beads actually loses the ability to attract toner particles, reducing the effectiveness of the ESDA process. Apparently, over time the surface of the beads becomes roughed up or pitted, which adversely affects its ability to hold a charge. With a reduced ability to attract toner particles, less toner material is available during the cascading process to develope the latent image.

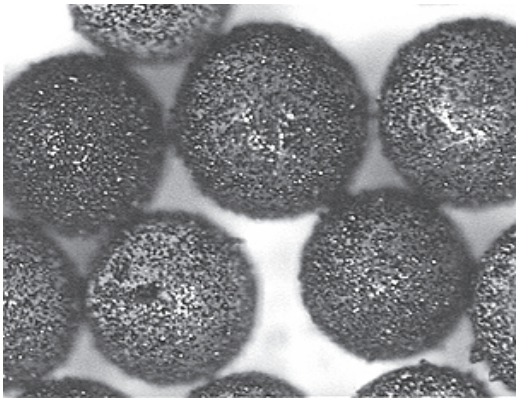

Figure 1. New beads. Most of the beads readily attract toner particles.

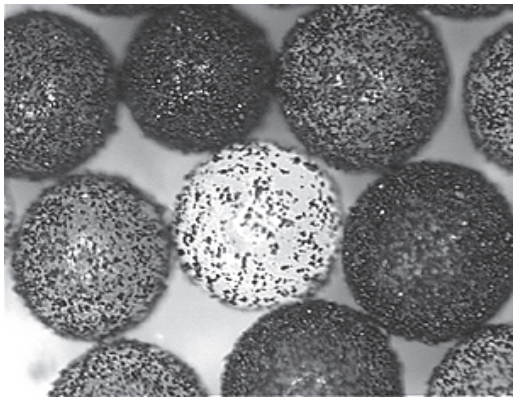

Figure 2. Used beads. Some of the beads show reduced ability to attract toner particles.

Discussion

Forensic Document Examiners (FDEs) should therefore routinely check and replace cascade developer beads as necessary. A simple visual check, under magnification of 10-30x, can reveal the condition of the beads which allows for a determination of whether or not the beads should be replaced (Figures 1, 2, and 3).

To manufacture the cascade developer beads, Foster + Freeman obtains the new industrial grade glass beads from a local specialist glass supplier. The beads are made from fresh glass that is crushed to sub 4 mm size fragments and then fed into a rotating, heated drum. The drum

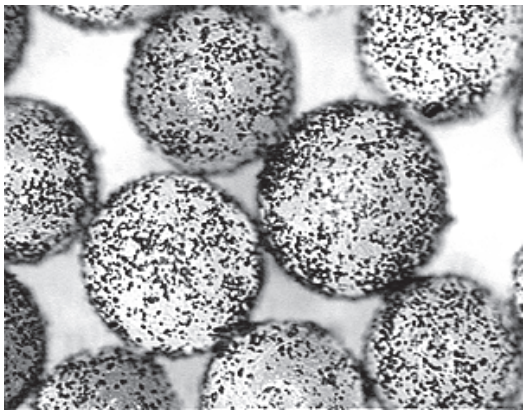

Figure 3. Old beads. Many of the beads lose the ability to attract toner particles.

is maintained at a temperature of approximately 600 degrees centigrade, which is hot enough to soften, but not completely melt the glass. The drum is also angled so that the glass fragments gradually tumble through it during this heating process, resulting in the formation of spherical beads. The glass beads are separated according to size by passing them over a series of graduated meshes, checked for roundedness on a slowly revolving table, separated, and packaged for sale for use in casting and bead blasting applications, as well as for use in the ESDA.

After purchasing, Foster + Freeman adds the toner at a ratio of approximately 19 parts of beads to one part of toner. This combination is mixed and then packaged in containers for market sales.

Acknowledgements

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