ToolWorx

THERMAL TRANSFER PRINTHEADS

One of the most overlooked and important features of a thermal transfer printer is the printhead. Thermal transfer printing utilizes the technology of the fax machine thermal printhead, except that instead of printing onto paper with a thermo-sensitive coating to achieve a black image, the thermal transfer printer uses a thermo-sensitive pigmented ribbon. This means that print can be laid down on a wide variety of substrates i.e. paper, films, cartons, etc. and in different colors.

The printhead itself consists of a large number of elements, encapsulated in ceramic, and terminating in contact with the ribbon. When these elements are selectively heated, they melt the coating on the ribbon, which is then transferred to the material to be printed. As the printhead is passed over the material and ribbon, a dot matrix is built up giving shape to the text, barcodes or graphics that are required for the print format.

The following Q&A originally appeared in 'isit.com Magazine':

Q: Why worry about printhead life?
A: Printheads are expensive, ranging from several hundred dollars to several thousand dollars each. For this reason alone, you want them to last as long as possible. However, there is an even more important reason. When printheads wear out, poor print quality and marginally scannable and unscannable bar codes are generated. The longer the printhead lasts, the less chance of generating unreadable bar codes. It is essential to protect the printhead by using a quality ribbon.

Q: What does the printhead need to be protected from?
A: Friction and prolonged use at high printhead energies (i.e. heat) can cause deterioration of your printhead. In addition, excessive buildup or ink residue on the printhead, and misuse or abuse by the operator can cause damage to the printhead.

Q: What protects the printhead from abrasion?
A: Printheads have a thin, hard coating over the heating elements that protect them from abrasion while providing efficient heat transfer. The ribbon also protects the printhead from abrasion damage. First, the ribbon separated the printhead from the printing substrate to shield it from abrasive movements. This is why the ribbon must be at least as wide as the printing substrate. The ribbon also has a lubricated backcoat that allows it to

flow smoothly over the printhead with minimal abrasiveness. (Note: Many thermal transfer printers can be run in either the thermal transfer or the direct thermal mode. In the direct thermal mode, heat energy is delivered to thermal paper and no ribbon is used. Printheads wear out faster in this mode not only because of the additional temperature requirements, but also because there is no ribbon in place to prevent abrasive wear caused by the substrate.)

Q: What causes abrasive damage to printheads?

A: Abrasive damage can arise when a label or tag stock is wider than the ribbon because the media on either side of the ribbon's edges passes directly over the printhead. Using a ribbon with an ineffective backcoat, using inappropriate media for thermal transfer, and improper cleaning of the printhead are additional causes of printhead abrasion. Ironically, some ribbons with backcoats specially formulated to clean the printhead may also cause abrasive damage.

Q: How can I recognize abrasive damage?

A: The first sign of abrasive damage to a printhead is likely to be a decrease in image quality. In the extreme, abrasive wear can result in failure of one or more heating elements in the printhead. This leads to a "white line" through the printed image where the printhead no longer has the ability to transfer ink.

Q: Do quality ribbons require lower energy setting?

A: Yes. Choosing a ribbon and substrate combination that is matched for optimum print quality at the lowest energy settings can extend printhead life. In addition, quality ribbons are coated with a high-performance backcoat designed to protect the printhead from abrasion, prevent hard residue deposits from building up on the printhead surface, and provide intimate contact with the printhead to improve heat transfer efficiency.

Q: What is printhead "buildup"?

A: Buildup of deposits on printheads over time is a normal occurrence and is not a cause for concern. Buildup may be caused by several sources including small amounts of ink and backcoat from the ribbon, dust, and dirt from the nearby environment; paper dust and particles on the media created during the label conversion and slitting process; and/or excessive adhesive applied during the laminating process.

Q. When does printhead buildup become a problem?

A. Buildup becomes a problem when maintenance guidelines are not followed. Any deposit on the printhead, if not removed regularly, can insulate the heating elements from the ribbon and require printing at higher energy settings. Using a "bargain" ribbon that can leave buildup on the printhead, which is virtually impossible to remove even with alcohol cleaning pads, increases the problem. To compensate for the resulting deterioration of the image, operators gradually increase energy settings on the printer, which can ultimately shorten printhead life. Burned-out pixels in the printhead result in

unscannable bar codes. Some retailers, such as K-Mart and Wal-Mart, will even fine suppliers who provide merchandise with unscannable tags and labels.

Q: How do I prevent buildup from becoming a problem?

A: Purchase a good quality ribbon and printing substrate. Minimize the accumulation of dust by keeping the printer cover closed. Follow the OEM's recommended operating, maintenance, and printhead cleaning schedule.

Q: How long will a printhead last if I use the best possible ribbon?

A: Actually, that depends on the printhead design and such additional factors as printer speed, energy settings, static, substrate, and ribbon quality. A good ribbon should be guaranteed not to cause significant degradation due to buildup or abrasion throughout the printhead's rated life. Generally, the industry standard is that the printhead should last for one million linear inches of use.