(Picture: www.dreamstime.com)

Process security - step by step
The path of the ticket to the passenger

„The train is coming - quick get the ticket“!
And then it happens, trouble with the ticketing machine and the ticket doesn’t print.
Train gone, appointment missed.

The above scene gives a glimpse into the technical challenges manufacturers, of integrated thermal printers, face. Especially for automated ticketing systems in mass transport or service areas, it is necessary to anticipate any possible sources of trouble. These can reach from improper handling to vandalism. The latter is especially valid in cases where tickets represent a monetary value. It is critically important that printer units function reliably, and customers receive their money back in case of a malfunction.

It is difficult to guard against targeted violence. However, more typical uses of force can be taken into account, as long as all externally reachable parts withstand foot kicks and hits by hands. Therefore, the preferred material for ticket output compartments is metal.

The exact design, as to how this output system component is protected, depends on the application. Although there are different handling categories, they all have in common the assumption that the user is untrained.

- Operators in corporate environment, such as service employees, or similar. Here, users are known but not necessarily trained. Only typical operator errors are to be expected.
- Operators in a non-public areas may not be known but observable. Here, an operator is not trained and perhaps impatient, but users expect to be on camera.
- Operators in public areas. Automated ticketing machines, are typically placed in public areas. Operators are neither trained nor observed. Frustrated or disgruntled operators may use violent force toward equipment.
- In cases of vandalism, the object is to destroy rather than to use the equipment. Robust system design and construction can potentially limit destruction.

Integrated thermal printers and external influences

Thermal printers are sensitive to environmental conditions. Printing tickets is, in and of itself, a challenging process. To achieve exact printing, precise paper alignment is critical. Also, paper feed speed during printing needs to be stable, or horizontal resolution changes. The result may be a failed print.

With printing happening in a protected area inside the automated ticketing machine, printing itself is not the challenge. However, the process of buying a ticket involves more than just printing it. Manufacturers have to consider factors involved in getting the ticket to the customer while protecting the printing process.

Instead of waiting for the print process to finish, impatient customers may be inclined to pull on a ticket as soon as some of the ticket becomes visible. High print speeds, for example, 200mm/s are effective in such cases. At an average ticket length of 10cm, the entire process only takes 0.5 seconds to complete.

This example illustrates how reliable output design can prevent costly malfunctions.

Various design schemes increase ticket output safety.

Increased print speed
Printers with very high print speed improve reliable operation dramatically. Experience shows, print speeds of greater than 150mm/s, reduce operator frustration. This is a practical solution for ticket terminals. However, it is not effective in preventing internal paper jamming or pulling of a ticked during the cutting process.

Sensing a paper jam
Use of an Anti-Paper-Jam sensor assures immediate recognition of a jam, and the printing process is stopped. Professional systems of this type mostly prevent damaged print outs. This is also an interesting solution, for instances where the ticket output is blocked externally.

To prevent other common problems effectively, the ticket output systems needs to be separated from the ticket printing process. In other words, a ticket is issued only after the printing as well as the cutting process are completed.

The following options exist:

Drop-down Compartment
It is a safe method to deliver the ticket via a drop-down compartment. A latch only opens toward the inside, covering the printer mechanism and only allowing access to the ticket.

There are however down sides to a drop-down compartment. Space is one of them. The size of the drop-down compartment needs to match the size of the largest possible ticket the machine is designed to print. Also, tickets often experience a static charge inside the drop-down compartment. The result is that a lightweight ticket may simply “stick” to a wall of the drop-down compartment where it may become inaccessible due to the way the latch opens. This can easily become the biggest challenge to user friendliness, in cases where compartments are large, and paper tickets are small and light.

Moreover, in cases of pure vandalism, a drop-down compartment seemingly invites the placing of foreign objects such as firecrackers. Even the most attentive guest or operations employee will likely not be able to remove objects in time.

Dispenser- / Presenter-Output
In cases where the ticket length is fixed and will not change, a dispenser can be deployed. A spout guides the ticket from the printer to the exit slot. If the spout is just a little shorter compared to the ticket, the ticket can only be reached, once printing and cutting is completed. The ticket can either slide down the spout, or it can be advanced mechanically.

An integrated printer equipped with a presenter, stores the ticket during the printing process and delivers the ticket with increased velocity; right after the cutting process is completed. This has the advantage that the ticket, during the output phase, has no physical connection to the printer anymore, so an operator can neither steel paper nor tamper with the printer mechanics. The output system should be built very robust, such that even forceful paper pulling will not result in any damage.

A presenter offers the added advantage of ticket storage. A ticket can be retracted and stored inside the printer unit via a so called “retract function”. This avoids waste on the floor in front of the unit, as tickets or receipts are not dropped. More importantly yet, privacy is guaranteed. Strangers have no access to a printout containing a previous user’s personal data.

There are two dominant presenter types on the market.
The loop presenter stores the paper by creating a paper loop (figure 1). Hereby paper thickness is a part of the working principle. A paper weight of 120 g/m2 is typical. A down side is that an upwardly created loop can get too long and collapse or fall over and may cause a paper jam. Loop presenters are offered with or without retract function.

A reverse-ticket presenter
Printout storage is unlimited (figure 2). A printout is internally reversed, such that the ticket is presented end first. Paper properties play a lesser role in functionality, so thicker paper stock can be used. The working principle of reverse-ticket presenters always includes a retract function.

All mentioned challenges were taken into account during the development of the various GeBE ticket printer series. For instance, all of the printers within the GeBE-COMPACT Plus series, feature presenters with full metal presenter spouts. This addresses the mentioned issues, while at the same time allowing unclaimed tickets to be retracted via the retract function.

The GeBE-Motion series features reverse-ticket presenters with an output velocity of 400mm/s. An anti-jam unit, and special software for error correction, assures highest functionality.

The GeBE product portfolio covers any imaginable Kiosk task. Adaptation to various applications can be realized, even at small order quantities.

Summary
Experience shows, paper printing machines trouble can never be prevented entirely. However, solidly built printers can reduce service disruptions considerably. Those printer systems are typically more expensive. However, a single prevented service call may easily make up for the difference in initial price. This justifies deployment of a well thought out printer component, over a less expensive one.

Additional information under www.gebe.net

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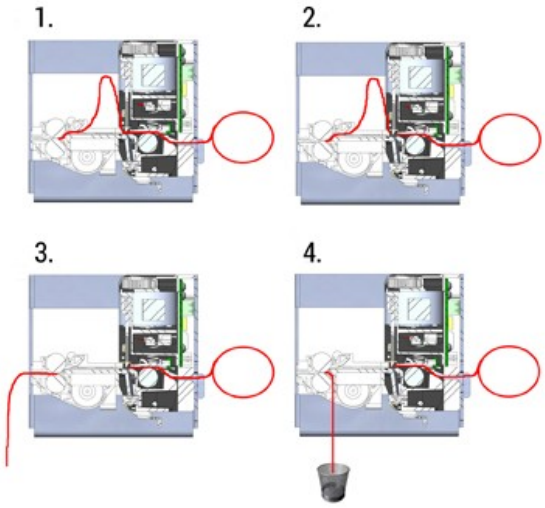
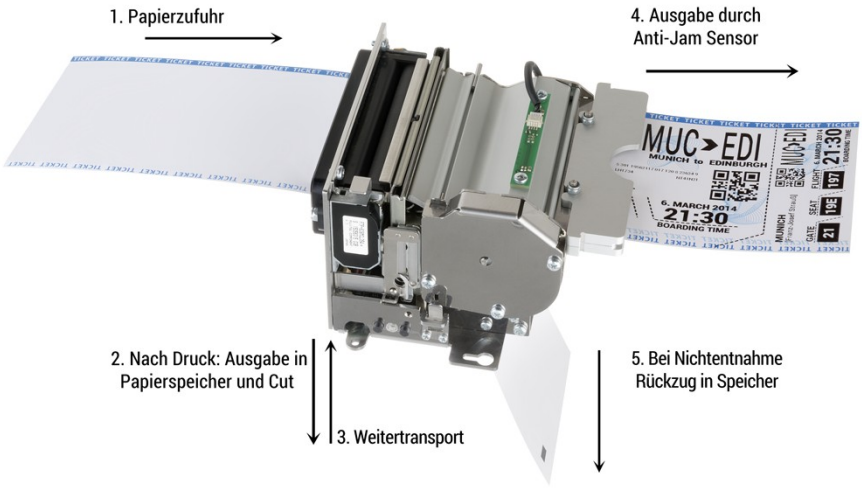
Figure 1: Functional principle of a loop-presenters



The loop-presenter (1.) transports the already printed paper, prior to Cut (2.) and paper output (3.), upward. Maximum paper thickness and ticket length need to be regarded, since loops can get to long and collapse or fall over and may cause a paper jam. Loop-Presenters can be offered with retract-function (4.).

Figure 2: Functional principle of a reverse-ticket presenter



Here are the functional process steps. Example: GeBE-MOTION.
After paper is pulled in (1), the reverse-ticket presenter pushes the printed paper first downward and cuts. The cut ticket is pulled back up (3) and subsequently horizontally delivered (4). The retract function (5) protects against misuse of printed data on unclaimed tickets, while reducing paper waste.

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