

Multifunctional Specialty Printer MICROLINE 895

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OKI Data's dot impact printers (SIDM: Serial Impact Dot Matrix Printers) have earned high reputation and trust from customers the world over. The multifunctional MICROLINE[®] 895 (ML895) business printer was developed by bringing together expertise cultivated from years of supporting the SIDM market and is an appropriate printer for specialty use. This article will introduce the history, features and market trend of SIDM followed by developmental background of the ML895.

SIDM History and Printer Designs/Functions

The printers' origin can be traced back to the merging of the typewriter (electric) and telegraph technology. Concepts behind today's printers have been around since the 1950's. SIDM's design that continues to the present appeared in the 1960's, but along with the development of computers, manufacturers have introduced products with various other designs and functions. As described, SIDM has existed long before the arrival of personal computers or OS's. Since then, they have evolved independently incorporating needs from various world regions and users, and even now, manufacturers sell products with wide variety of functions. This evolutionary trail is illustrated in **Figure 1**. It shows a significantly different aspect than the development of the more recent non-impact printers (NIP), which essentially the same model has been deployed throughout the world.

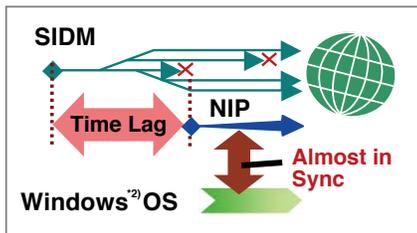


Figure 1. Illustration of SIDM and NIP Evolution

Viewing characteristics closely related to regionality, the SIDM can be summarized as follows.

(1) Handles variety of media

1) Classification of media by type:

Continuous paper, single sheet, copy paper, etc.

2) Classification of media by application:

Forms, slips, checks, passbook, booklet, etc.

(2) Variety of equipment variations

Various designs exist depending on application, but the most typical are the round and flatbed types.

• Round type printer:

This basic design has existed since the introduction of SIDM, and it is popular worldwide. As shown in **Figure 2**, paper winds around a cylindrical platen and fed to the printing section. Since the paper must curve, the printer is not suitable for use with thick media. However, the design is relatively simple, and the printer's footprint is small.

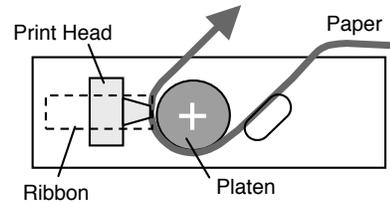


Figure 2. Basic Design of Round Type Printer

• Flatbed type printer:

Intended to ease the handling of media, the flatbed type was later developed. As **Figure 3** shows, paper feeds into the print section almost in a straight line. Therefore, it handles thicker media such as copy sheets without difficulty. On the other hand, the footprint is greater than the round type with similar specs. The type is mainly popular in China and Japan. Sales volume in Europe and the U.S. has been small.

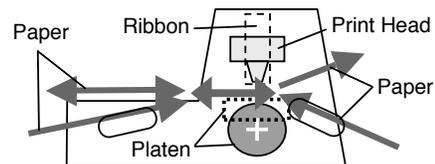


Figure 3. Basic Design of Flatbed Type Printer

*1) MICROLINE is a trademark of Oki Data Corporation.

*2) Windows is a registered trademark of Microsoft Corporation in the United States and/or other countries.

The above designs served as basic models for the development and worldwide sales of specialty printers that varied in shape, paper passage and supplemental features depending on their specific business use.

(3) Inexpensive running cost

Since the printers are media independent, have simple print mechanism and consumables are relatively inexpensive, the TCO (Total Cost of Ownership) is kept down.

SIDM Market Trend

Due to the rapid change in business style characterized by mobile and cloud computing, SIDM market is on a long-term decline as shown in **Figure 4**. This is especially true in developed countries represented by the U.S. and Europe.

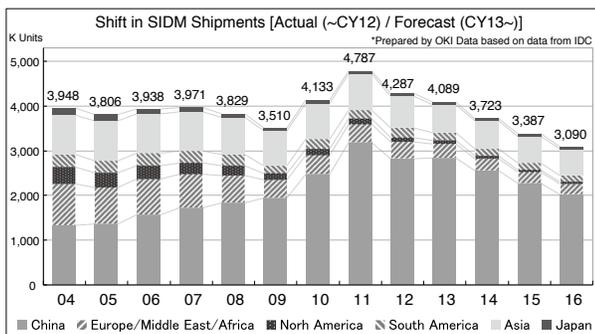


Figure 4. SIDM Shipments and Market Forecast

Even in China, which has driven or maintained the entire world market almost in unison with the country's growth, the SIDM market has been on a downward trend since 2011, and the decline is expected to continue. Under these circumstances, the demand for SIDM is essentially limited to business applications that require "media independence, printing on copy sheets" and "cheap running cost".

Not only the simple economics of cheap running cost, but also the capability to print on copy paper to prevent document tampering is a large benefit. In fact, many countries mandated by law to make document duplicates using copy paper. However, due to recent technical advancements, countries are increasingly switching to alternative means such as electronic invoices.

Distinctiveness and scarcity is strong with specialty printers, but among them, the passbook printers for financial systems, especially popular overseas, have a relatively organized market. Many of these printers have mechanisms specialized for passbook printing and configured with dedicated passbook-related functions. Their control command is also a proprietary system.

However, functionality and interface with higher-level equipment are the same as SIDM. On the other hand, the sales channels differ from SIDM, and they are often integrated with specialized systems before being sold. Therefore, in many cases, their sales are not reflected in the statistical data like the one shown in **Figure 4**. Although the general flow is toward a shrinking market (passbook-less by digitization) similar to SIDM, demand for these printers still exists. It should be noted that in Japan's financial market, specialized terminals called bookkeeping machines equipped with a variety of passbook-related functions are widely used, and passbook printers like those found overseas are almost non-existent.

ML895's Product Concept

In order to meet the diverse demand for SIDM remaining around the world, ML895 was developed with utmost attention to its ease of use as a business printer. The mechanism is based on OKI Data's long-selling, high-performance flatbed printers that have been popular in China's large market. Despite being a general-purpose machine, its media handling capability is on par with specialized printers and withstands heavy use. It offers full-fledged features/performance and high cost performance all at an affordable price. Compact size provides a footprint comparable to that of the round type printer giving users more freedom on the placement. It is also the first OKI Data product with the capability to connect with financial applications.



Photo 1. ML895 Printer

(1) Improve applicability to variety of tasks

1) Media handling

- Design was to be based on flatbed type printer to ensure stable paper transport. It must have the capability to print on passbooks, passports and other thick booklet type media with ease. It needed to significantly surpass the 3mm maximum

thickness of previous passbook printers and handle media up to 6mm thick enabling automation of tasks that once had to be handwritten.

- Instead of “cut forms only” frequently seen with specialty printers, variety of media including continuous paper had to be handled with the same printer.

2) Connectivity with financial applications

- To expand application, control commands compatible with overseas de facto products for financial passbook printers must be standard equipment.

(2) Provide ease of use with consideration for placement

1) Space saving

- Compact and lightweight body for a small footprint.
- Consideration of paper passage and cable connections for greater freedom of placement such as placing the printer against a wall.

2) Improved operability

- Front operation of paper loading and discharge.
- Improve paper loading with skew collection and set-free functions.

ML895 Features and Specifications

(1) High-speed printing

Printer is capable of printing Japanese Kanji at 80 characters/sec and with 2X speed, 160 characters/sec. Printing time can be further reduced with 3X and 4X speeds.

(2) Compact, lightweight, space saving

Due to thorough study down to the finest components, the printer is compact and lightweight while maintaining strength. Combination of molded materials reduced weight by 43% (total weight: 8kg) and footprint by 24% compared with OKI Data’s previous model. **Figure 5** shows the dimensions of the printer.

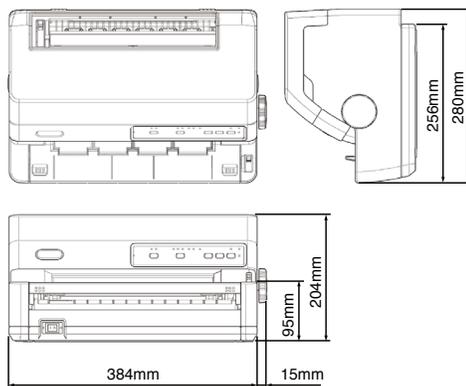


Figure 5. Dimensions

On the backside, attention was given to the interface and power cable layout making sure cables do not interfere with placement when work counter or desk space is limited (**Photo 2**).



Photo 2. Connection Cable Layout (Backside)

(3) Throughput of media up to 6mm thick

The ingeniously designed printing section allows printing on thick booklets, which were previously handled with a typewriter or by hand.

(4) Continuous paper support

Tractor unit provided below the front table supports paper up to 9.5 inches wide and is capable of handling continuous paper such as business forms.

(5) Operability

In addition to the control of the operation panel, paper loading and removal are also performed on the front side for improved operability. Taking into consideration the media thickness and ease of media removal, a model with two selectable media discharge passage is available.

- Thick media such as booklets use the horizontal passage shown in **Figure 6-1** and discharges at the front.
- Normal media (forms, slips) take the upward passage shown in Figure 6-2 and discharges at the top of the printer. After intake and printing, allowing the media to discharge in the direction of flow reduces discharge time (forward discharge also possible). Depending on the type of media used, the operator can select the discharge direction with a flip of a lever.

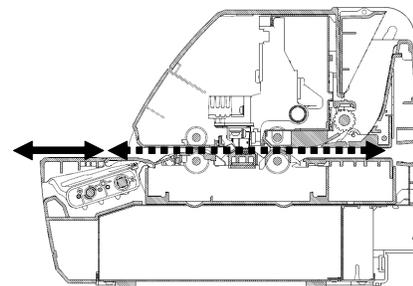


Figure 6-1. Horizontal Discharge Passage

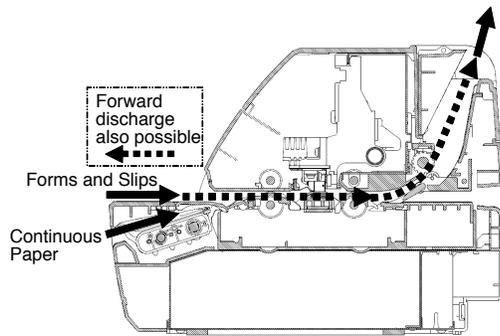


Figure 6-2. Upward Discharge Passage

New Technologies

ML895's two biggest sales features, thick media support and compact size, proved too difficult to achieve with existing technologies. Therefore, new technical developments were necessary.

(1) 6mm thick media support

When enabling a traditional flatbed type printer to pass thick media, print head and lower feed roller were fixed, forward/rear upper feed rollers raised, and platen moved down according to media thickness. However, hard covered booklets that are thick do not flexibly bend and would not smoothly pass through the printer using this method (for basic configuration of flatbed type printer see **Figure 3**). To resolve the problem, print head and upper roller were fixed, and lower feed rollers and platen were made to move down according to media thickness to provide a completely horizontal passage as shown in **Figure 7**. Furthermore, a mechanism that allows the forward/rear lower feed rollers and platen to move independently was implemented to handle the step that occurs in booklet type media due to difference in number of pages. This reduced travel stress of the media smoothing out the transport.

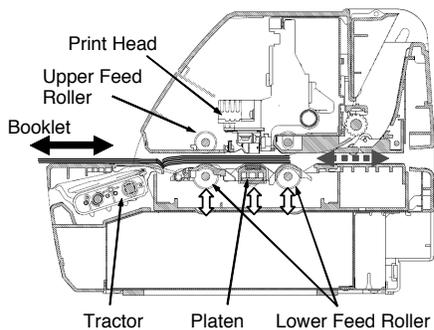


Figure 7. Completely Horizontal Transport System

(2) Front Tractor Implementation

With previous printers, use of continuous paper required a tractor, which protruded outside the printer or built-in, unavoidably enlarged the overall size of the printer. In the effort to reduce size, the new printer incorporates the tractor unit underneath the front table. However, the normally separated single sheet and continuous paper inlets became shared resulting in a narrowed travel passage on the continuous paper side. To correct the problem, a vertical moving flap was implemented at the edge of the table as shown in **Figures 8-1** and **8-2**. When continuous paper passes through, the flap retreats upwards to stabilize the traveling paper.

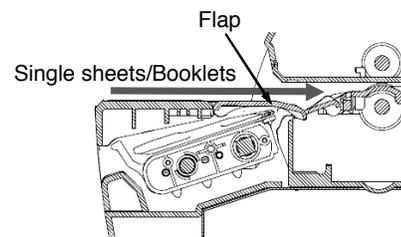


Figure 8-1. Tractor and Flap (Single Sheet Paper)

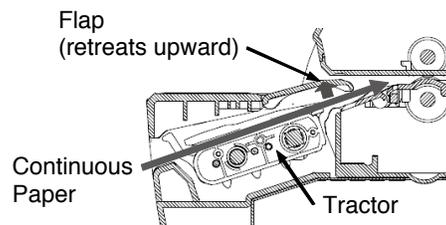


Figure 8-2. Tractor and Flap (Continuous Paper)

Summary

ML895 was planned as a culmination of OKI Data's SIDM expertise. Development with utmost attention to the ease of use has resulted in a unique product never before seen elsewhere. OKI Data is confident the features described here will inevitably match the needs of customers around the world.

OKI Data will continue to provide easy to use products that pursue the needs of the market. ◆◆

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