

Mitsubishi Variable Size Commercial Web Offset Press, LITHOPIA MAX-V, Realizing Dream of the Printing Industry (Field follow-up data)



YUKIKAZU SHOJI*1
MIKIO MOTOOKA*1
ISAMI MITAMURA*1

YOSHIAKI KANDA*1
TORAO IWAMOTO*1
HIROSHI KOBARA*1

"If only one machine could print in various sizes!" The answer to such a market need is the newly developed variable size commercial web offset press LITHOPIA MAX-V. This paper, further to the previous report(1), describes the operating conditions of this type of press that is already installed, based on data obtained through field follow-up. The customer who kindly cooperated in this follow-up activity has now given an evaluation. The follow-up will continue to improve the machine and stimulate efforts to raise its quality still higher.

1. Introduction

Commercially available offset presses for printing magazines and advertising leaflets can be roughly classified by the paper feeding method into sheet-fed offset presses using sheet paper already cut and aligned, and aligned and web offset presses using a web, printing on both sides continuously, cutting to a specified size, folding and producing prints (commercial web offset press). In both cases, a thin aluminum image plate is wound on a plate cylinder and rotated so as to print on the paper. In the sheet-fed offset press which holds only the tip of the sheet paper, printing continues without waste of paper when paper of the proper size is selected according to the image size. In the commercial web offset press, however, the image of the size equal to the circumferential length of the plate cylinder is repeatedly and continuously printed on the web paper. Therefore, in order to avoid loss of paper, it is necessary to have a printing press whose size exactly matches the production print size (Fig. 1).

In a commercial web offset press, since continuous paper is used, high-speed operation is possible and its productivity is more than three times that of the sheet-fed press. It has thus been a dream of the printing industry to realize flexibility of its print size, overcoming all difficulties to meet the high expectations held for such technology. In answer to this dream, Mitsubishi Heavy Industries, Ltd. (MHI) has developed "LITHOPIA MAX-V," a variable size commercial web offset press, which allows easy replacement of major component parts such as the plate cylinder. The first product was delivered to a domestic printing company and started commercial operation at the end of October 2005.

2. LITHOPIA MAX-V technology

Three MHI established technologies are in the background that have helped realize the variable size commercial web offset press for the first time in the industry, which is capable of answering the needs of commercial printing in general.

- Changing technology of printing length: sleeve blanket technology
- Changing technology of cut-off length: shaftless drive technology
- Stable transfer technology of cut-off printed products: pinless technology

Each mechanism is explained below.

(1) Printing unit

The printing cylinder has a sleeve mounted on the core so that the cylinder's circumferential length can be changed by replacing the sleeve, enabling the printing size to be changed.

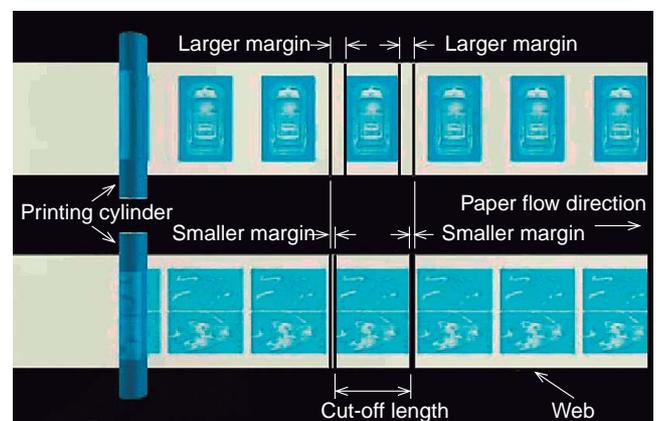


Fig. 1 Relation between machine size and production size
Upper: improper size, lower: proper size



Fig. 2 Sleeve exchange operation



Fig. 3 Variable size folder

The two most-used printing sizes in Japan, 546 mm and 625 mm, represent the maximum and minimum size, and LITHOPIA MAX-V is capable of accommodating any other sizes in between.

When changing the sleeve, the operation side sub-frame retreats to create a working space for the exchange. The sleeve inner wall is then dilated by high-pressure air to allow the sleeve to be removed and replaced. The time required for exchanging one sleeve is about one minute (Fig. 2).

(2) Folder

The folder consists of an accelerating transfer belt device and the tip jaw gripper device that were developed to form the cutoff size change mechanism, the folder cylinder with the tucker blade device based on conventional technology, and others.

In the case of the variable size folder, the position of the image starting should coincide with that of cutting so that the printing cylinder and the folder cutoff cylinder rotate in synchronization. In other words, when the sleeve diameter is changed, the paper speed is changed, but the cutting timing is unchanged so that the length of the printed product after cutting is always the same as the circumferential length of the printing unit sleeve. Even if the printing size is less than 625 mm, the system is controlled in such a way that the tip of the printed paper is held by the jaw gripper device with correct timing (Fig. 3).

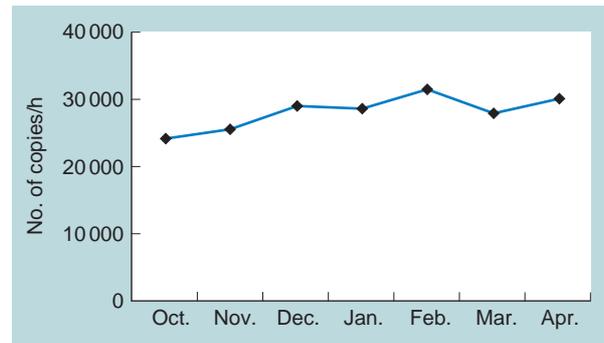


Fig. 4 Production index

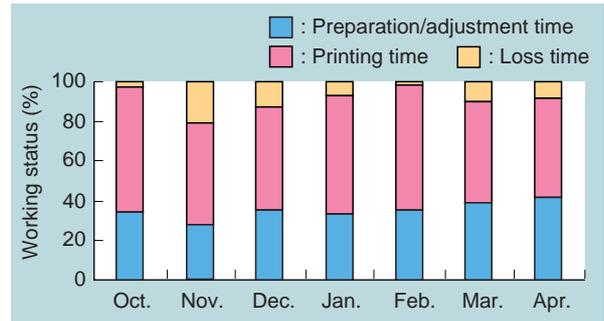


Fig 5 Working status

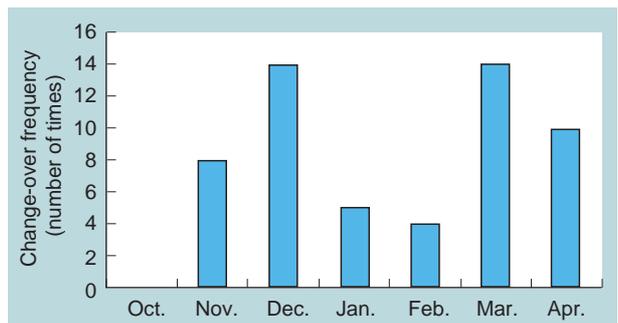


Fig. 6 Cutoff change frequency

3. Field follow-up data

The first machine consisted of two units of variable size folders. Its total production until April 2006 was approximately 25 million copies, the total number of jobs being approximately 360.

(1) Productivity

Production index (no. of produced copies/printing time) is tending to increase (Fig. 4). This is because printing speed is increasing with stabilization of the machine function. The fact that loss time (machine troubles etc.) is decreasing, though slowly, also proves that the machine is becoming more stabilized (Fig. 5^(Note)).

Note: "Preparation/adjustment time" includes time for roller cleaning, machine cleaning, etc.

(2) Job rate

Monthly cutoff change-over frequency seems to have increased in December and March. This is because various jobs were handled in peak seasons, namely calendar year end and fiscal year end (Fig. 6).

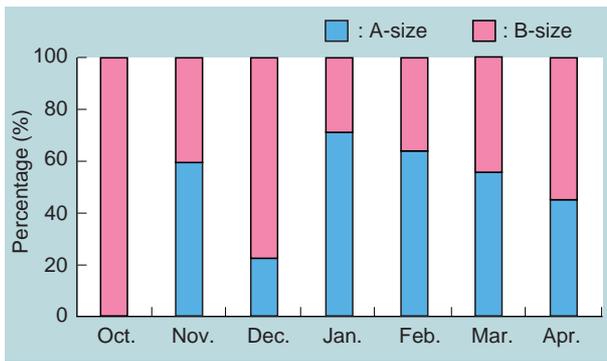


Fig. 7 Percentages of A-size and B-size (Monthly)

A-size printing started in November; A-size and B-size print shares were nearly even in other months except that the B-size percentage increased in December (Fig. 7). This was because the demand for printing of leaflets increased at the year end. Thus, MAX-V is capable of levelling off peaks and bottoms by changing print sizes season-by-season, with the machines thus operating at their full capacities all the year round.

With regard to rate of signature, it can be seen that magazine product (B5-8 pages, B5-16 pages and A4-8 pages, A4-16 pages) occupied 70% of the total job (Fig. 8).

(3) Cutoff change-over time

Cutoff change-over time was as follows:

- Sleeve exchange 4 units/2 men → 15 min
- Plate exchange 4 units/2 men → 8 min
- Folder change-over/1 man → 10 min
- Other work (stacker-bundler change-over, etc.) → 5 min

The total time consumed was approximately 38 minutes. At present, the printing unit and the folder are changed separately and individually so that more time saving may be possible if the printing unit and the folder are changed in parallel, making the most of the merits of the shaftless method.

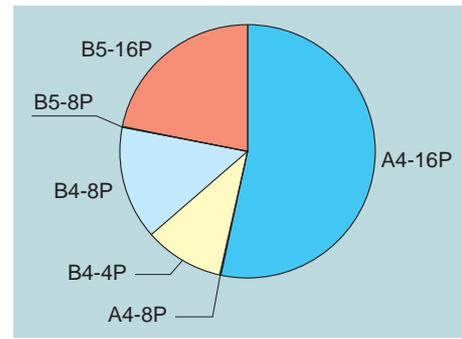


Fig. 8 Rate of signature

4. Conclusion

A half year has passed since the field follow-up started. When this machine was introduced, the customer, then inexperienced with this machine, appeared to be embarrassed, but along with continued commercial operation such anxiety seemed to disappear. The customer has given his assessment that both A-size and B-size printing qualities are very stable. In the future, the user intends to concentrate on high-quality printing of commercial catalogs and information publications, for which MAX-V can achieve even higher performance. Follow-up will continue and the printing machine will be further improved to even higher standards to guarantee the customer's satisfaction.

References

(1) Shoji et al., Mitsubishi Variable-Size Commercial Web Offset Press, DIAMOND MAX-V, Realizing a Dream of the Printing Industry, Mitsubishi Heavy Industries Technical Review Vol. 43 No. 1 (2006)



Yukikazu Shoji



Yoshiaki Kanda



Mikio Motooka



Torao Iwamoto



Isami Mitamura



Hiroshi Kobara