Reusable Plate System Using Anodize Aluminum Substrate

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Abstract

Reusable plates system has capability of recycling offset printing plate. A process of repeated erasing and reimaging provides not only economic advantages but also environmental benefit as well.

Reusable plate using anodized aluminum are imaged in the same fashion as today's thermal-plate CTP systems and therefore provide the same level of printing quality. Plate life is good for 100,000 impressions per image and each plate can be erased and re-imaged up to 20 times.

Unlike direct imaging system equipped on a press at each printing unit, the reusable plate system is a stand alone, off-press system. As a single unit, investment costs are lower, and it allows for plate production to be accomplished in a more-favorable environment. Moreover, as an off-line system, the press does not need to be stopped during plate making, improving overall pressroom productivity.

The RPS-X1 as a prototype of reusable plate system uses sleeve type of plate carrier to match the variable cutoff sizes of web offset press that readily accommodates a range a different sleeve circumferences.

Introduction

Recently, digitization has proceeded in the printing industry by installing a CTP (Computer To Plate), and workflow for efficient management of production control, etc. to fulfill the demands of the market including cost reduction and quick delivery.

Moreover, a plate making press (On-Press imaging) has come on the market, thus allowing plate making and printing, which were separate processes before, to be performed on the same unit. However, the plate making press which writes an image on a printing plate directly to print it is limited to a small-sized low-speed press, and is not popular among high-speed large-sized offset presses which play a central role in commercial printing. The factors are the following problems which are typical of the plate making press.

- Plate material cost to ensure image quality and plate life is high.
- An expensive laser imaging device needs to be installed in each color printing unit, thus increasing an initial investment.
- The press needs to be stopped during plate making, thus lowering an operation rate as a press.
- The environment (vibration, dust, etc.) on the press has many disadvantages to plate making work to present limits in plate making quality.

The reusable plate system described here can deal with diversified printing processes by overcoming the above-mentioned problems to realize integration of plate making and printing. In other words, plate material cost and adverse effects on the environment are reduced by developing recyclable plate material, and integration of plate making and printing is realized without lowering productivity of the press to increase efficiency of the workflow by installing the reusable plate system in the vicinity of the press. Here, basic performance of the unit which has realized this plate recycling process is described.

Plate Recycling Process

(1) Preparation

As a base of the printing plate needs to be recyclable and to provide high printing quality, it uses anodized aluminum. Integration of this aluminum plate into a printing plate cylinder on a sleeve has prevented deformation and flows on the plate material caused when the press and the plate maker are changed, thus ensuring the same printing performance as a PS plate (presensitized plate) and a CTP plate which are conventional printing plates.

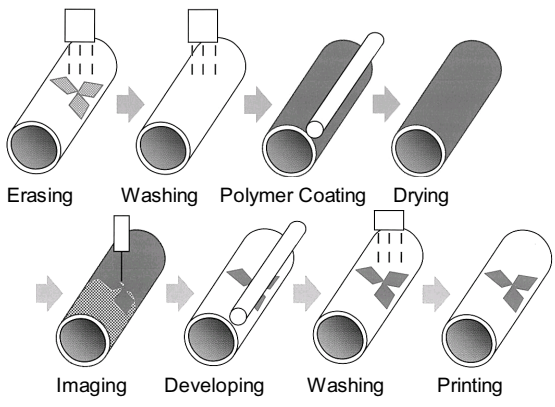

Figure 1. Plate recycling process

(2) Polymer Coating

Liquid polymer is coated as material on the aluminum plate. Because the material for printing image is required to satisfy both the plate life as the printing plate and easy erasability of image for recycling, a positive polymer which is easy to control independently strength on a printing area and image formation is used. The polymer permits easy handling in a bright room, and requires no special facility for storage.

(3) Drying

With control of temperature of a plate surface by heater, a polymer orientation is crystallized to form a printing area layer with the plate life having high degree of hardness and low solubility.

(4) Imaging

The polymer is heated to high temperature instantaneously to randomize its orientation by irradiating an infrared laser to an area equivalent to Non-printing area to increase solubility of the polymer in a developing solution.

(5) Developing

The polymer on the Non-image area is removed with an alkaline developing solution to develop images in laser wiring. This concludes the plate making process as the printing plate.

(6) Printing

Because a plate configuration is the same as that of conventional one, the same printing setting as the conventional offset printing is possible, thus permitting use of commercially available ink and dampening water.

(7) Erasing

Ink on the polymer is removed from the plate surface when the polymer of a printing area is dissolved with erasing solution, which allows efficient erasing of the image area. Moreover, erasing waste solution on the plate surface is removed by water washing to become the same state as a rippled plate in its initial state. With this process, preparation for the next plate making is completed.

RPS-X1 as a Prototype

The plate sleeve can be removed in the axis direction from a plate cylinder of the press, and the plate sleeve removed from the press is mounted on the RPS-X1 to recycle the plate, and then, it is mounted on the press again. Because the plate sleeve is made of light material, it is easy to carry, thus allowing highly easy handling of the printing plate in the plate recycling.

The main specification is shown in Table 1. The printing plate can be recycled repeatedly up to a cumulative total of 500,000 impressions at which performance deterioration occurs because of abrasion of anodized aluminum plate as a substrate. Also, it has been proven that recycling is possible up to 20 times by preventing accumulation of residues in erasing as much as possible. For the above reasons, an epoch-making system configuration which deals with a small lot of up to 25,000 in average to allow reduction in printing material cost and efficient workflow has been realized while maintaining the same level of productivity as that of the conventional offset press.

Figure 2. RPS-X1

Table 1. Specification of the RPS-X1

Dimension	H1553×W2275×D2188mm
Weight	About 1500kg
Resolution	2400dpi
Polymer type	Thermal
Substrate	Anodized aluminum
Durability	100,000 / image 500,000 / substrate
Repeatability	20 times

Conclusion

The plate recycling technique has realized reduction in plate material cost and in adverse effects on the environment while maintaining the same level of printing productivity as that of the conventional unit, and is a system which satisfies the printing needs of dealing with the diversified small lot.

The RPS-X1 has realized the reusable plate making process shows the capability of realizing a process integrating plate making and printing.

In The Years Ahead, We Are Going To Continue Our Efforts For Total Printing Systemization Which Can Be Applicable To Efficiency Of A Process Including Creation Of Printing Information And Post-Processing Of Printed Material, And To Diversity In Printing Information.

Biography

Mitsuru Tabuchi has worked in the Paper & Printing Research Center at Mitsubishi Heavy Industries in Hiroshima since 1991. His work has primary focus on the digital offset printing press including imaging process.