

Functional Film, Paper, Foil, and Converting Technology

CONVERTECH INTERNATIONAL

ISSN 2432-2822
2nd Quarter 2024
Vol. 9 No. 2



First unveiling of surface inspection device for gravure cylinders Anchor coating agent for IJ printing is also under development

THINK LABORATORY

Think Laboratory, which provides the “New FX3” fully automated laser gravure cylinder making system for the flexible packages printing market, unveiled its gravure cylinder surface inspection device under joint development with Sirius Vision, an image inspection system manufacturing company, at the CON-VERTECH 2024 exhibition held at Tokyo Big Sight in February this year. This device has been integrated into the New FX3 installed at the company’s headquarters and is being demonstrated to those who wish to do so. The company is also developing a new lineup of a dedicated anchor coating agent and its coating unit for the FXIJ water-based inkjet (IJ) printing press for flexible packaging. It’s expected to attract attention at drupa 2024.

Defect identification with AI

The New FX3 performs a series of processes fully automatically, from removing a hollow cylinder made of iron or aluminum from the stocker, measuring the surface condition, plating it with nickel or copper after polishing,

coating the surface with a photosensitive material, drying, laser exposure, etching, forming a cell pattern, and finally chrome plating, finishing polishing, and setting it in the stocker. Currently, more than hundred lines are in operation in Japan and overseas countries, and they continue to manufacture the cylinders for gravure printing every day.

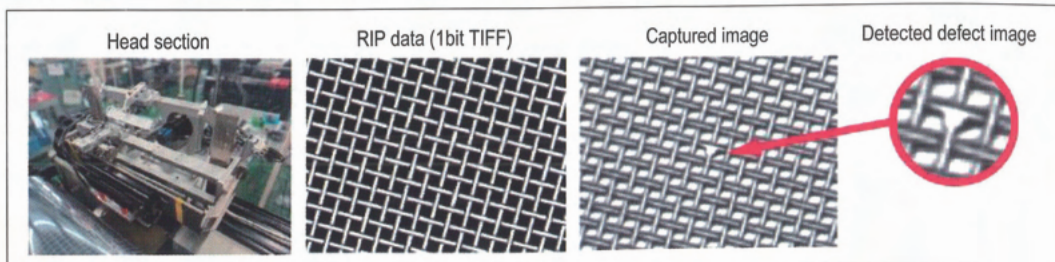
On the other hand, the only challenge in the manufacturing process of the cylinders is the inspection process to check whether the product is defective or not. Normally, the cylinders are inspected one by one with a special offline inspection device after cylinder making, and they are repaired or remade if there are any defects. The production capacity of the New FX3 is up to eighty cylinders in 24-hour operation per day. Therefore, day and night, each cylinder is transported to the inspection device, set up, inspected, repaired if necessary, and finally returned to the storage. These processes require sufficient manpower.

According to Tatsuo Shigeta, the president of Think Laboratory, even

the gravure cylinder platemakers who use the New FX3 in a clean environment experience one or two defects per week, which is a very low frequency. On the other hand, in an environment with a low degree of cleanliness, the defect rate is 3 to 4 %, but in both cases, it’s necessary to inspect all the items, which is a burden. This was the last essential element for the New FX3 to fully automate gravure cylinder making.

So, Think Laboratory and Sirius Vision have teamed up to develop the gravure cylinder inspection device.

This device compares the image taken by the camera with the RIP (Raster Image Processor) data for laser cylinder making, which converts the print data into dot data, and detects defect. The resolution per pixel is 10 μm, which is higher than that of the existing inspection devices. Also, the higher the detection capability, the heavier the scanned data usually tends to be. However, the cylinders with a surface length of 1,100 mm and a diameter of 600 mm can be quickly inspected in less than five minutes. The defects are



Detect defects in RIP data (1bit TIFF) and captured images



This is the standard equipment on the New FX3, and the surface inspection of cylinders is fully automated

Samples printed by FXIJ, including actual products

automatically sorted, selected, and marked by AI.

At Think Laboratory, this device is integrated as a unit that makes up the New FX3 line, and the process of removing the cylinder after cylinder making is completed by a robot, setting it in the inspection system, taking it out again by the robot after the inspection is completed, and separating the finished product from the defective product and placing it in the stocker.

New orders for the New FX3, which is equipped with the inspection device as standard, has begun this spring. For the customers those who are using the existing New FX3, it can be retrofitted so that it fits within the W16xD10m installation space. In addition, they are considering addressing the inspection needs of electronically engraved cylinders. The president Shigeta commented, "We would like to position it as the standard in the gravure printing industry and provide the New FX3, which can produce the high quality gravure cylinders."

them was a long flexible packaging bag that could hold a whole salmon. This is an example of how the small printing area makes ordinary gravure printing inefficient, but the IJ printing can print on the part you want to print.

A new development theme is underway at FXIJ. Until now, the company has advertised the ability to print

without an anchor coating. This made it possible to print PET, OPP, Ony, PVC, cellophane, etc., but in order to support a wider range of materials, they began to develop a product that also meets the needs of anchor coating. In particular, they are trying to improve the ink adhesion when printing on PE, aluminum foil, aluminum vapor deposition



FXIJ type1000 FullAuto SP

FXIJ model lineup

Model		type 500	type 1000 FullAuto	type 1000 FullAuto SP
Specialty		For reverse printing only	For reverse printing only (splicing is possible)	For both reverse printing and surface printing (splicing is possible)
supported base material width		600 mm	1100 mm	
effective printing width		512 mm	1032 mm	
supported printing roll length		12000 m	12000 m × 2	
supported base material	type	PET shrinkable film, non-woven fabric, A-PET film or sheet		
	thickness	PVC long sheet, embossed sheet, paper-based materials		
ink	type	12 - 300µm		
	number of colors	water-based pigments for IJ		
	anchor coating	five colors (CMYKW)		
IJ head	ejection method	not necessary		
	resolution	piezoelectric actuation method		
	configuration	1200 × 1200 dpi (CMYK)		
printing speed		KCMYW		
drying		WKCMYW		
printing speed		30 - 70m/min(subject to fluctuation depending on the base material and /or the image to be printed)		
drying		Either by combination of a heat pump and hot-air drying or by a dryer unit based on various heat sources		
printer dimensions	W	7000mm	10000mm	18500mm
	D	2500mm	3500mm	3500mm
	H	3000mm	3000mm	3000mm

Development of anchor coating agent for FXIJ

In relation to the FXIJ water-based inkjet (IJ) printing machine for flexible packages, the product samples created by the company's BMF (Business Model Factory) were exhibited. Among

film, laminated film, etc., and expand the IJ printing market using the water-based ink. As with the water-based ink, they have also developed the anchor coating agent in-house, and they are already in the process of testing of-line using pre-anchored films and prototyping FXIJ equipped with its coating unit.

Sample printed on trivalent chrome plated cylinder

In the corner of the booth, a POP promoting trivalent chrome plating, a gravure cylinder using it, and the printing samples were exhibited. These were made by Think Laboratory and commissioned by Dainihon Package to be printed.

The printing conditions for the exhibited samples are as follows. With five cylinders of CMYKW, the screen frequency is 250 lines. Among them,



What you can see in the back is a printing sample of Dainihon Package

the CMY cylinders' cell depth is 14 μm, the K's is 15 μm, the W's is 16 μm, and the cell shape is an AF dot for CMY cylinders, a standard TH dot for the K cylinder, and a honeycomb dot for the W cylinder. The ink used was DIC Graphics' solvent type (non-toluene) laminate gravure ink "FINART S", and the printing press was a gravure printing machine made by Orient Sogyo, which printed at 250 m/min on PET film (thickness 12 to 15 μm).

It's also added some information about AF dot. It was first unveiled by Think Laboratory at the same trade

show in 2023 and was developed to eliminate one of the challenges of solvent gravure printing which was missing ink in highlight areas in low speed. This new dot has a vertical screen in the circumferential direction of the cylinder (film running direction), and can improve the ink transfer capability in the dot 2 % region. In addition, an X-shaped cell is adopted in the middle to further improve the metastasis and granularity of the dot. This dot achieves a beautiful gradation even with the screen of 250 lines, and can reproduce even the small one pt letters.

THINK LABORATORY

New era of new gravure Proposal.

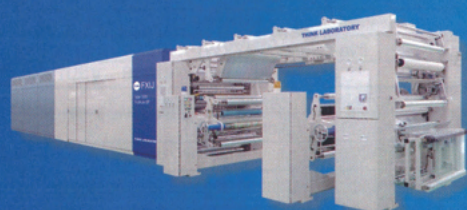
Fully Automated Gravure Cylinder Making System

New FX 3 + Inspection System

- 400m/min high speed supported
- 25% ink reduction
- Improve on crawling
- Improve on highlights



<https://youtu.be/Inmvzwaqlfk>



Inkjet Printer for Flexible Package

Ink Jet Printer for Water Based Ink only CMYK+W

FXIJ type 1000 FullAuto 1200dpi



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