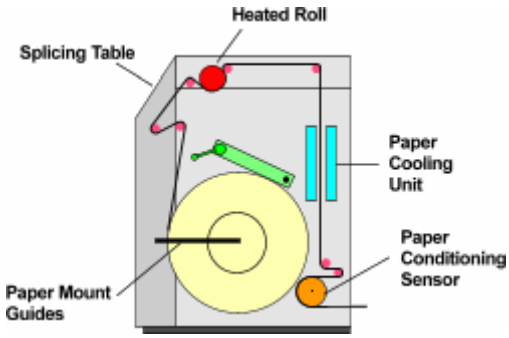
IBM Info Color 70

Paper supply unit



The following processes take place in the paper supply:

The IBM InfoColor 70 can print on a wide variety of papers, films and laminates from 40 gsm to 270 gsm.

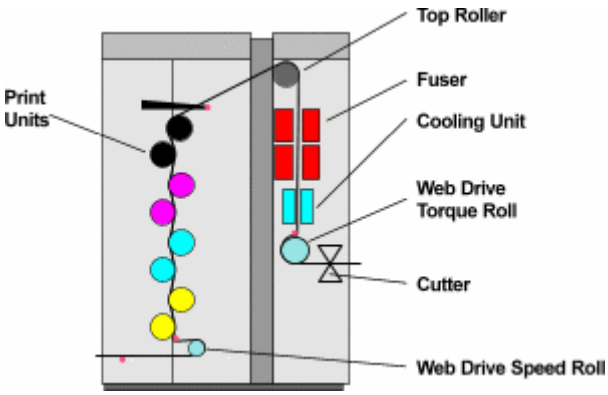
The material is supplied on a roll which can last up to two hours. Changing to a new roll is simple. A tape splice allows the reels to be changed with minimum stoppage time. The paper does not have sprocket holes and there is virtually no waste.

The operator first inserts an axle in the core of the paper roll and then places the roll in the paper supply using a small hand truck. The paper supply has no paper-driving function; instead, the web is pulled from the paper supply by the web-drive motors in the print tower. A brake system keeps the paper web at a constant tension between the reel and the first web drive motor. The brake system also detects when the amount of paper remaining on the roll is low and gives the operator an audible warning.

When a roll is finished, or when you decide to change paper before the roll is finished, you splice the leading edge of the new roll to the trailing edge of the old roll.

Moisture influences print quality. Thus, the paper supply includes a paper-conditioning system that uses a heated roll to dry the paper to a certain moisture content. After drying, the paper temperature is reduced by a cooling unit. The entire system is controlled by a paper conditioning sensor. When printing stops, the paper is immediately pulled away from the heated roll to avoid scorching the paper.

Printing tower



The following processes take place in the print tower:

The print tower has eight print units, four for each side of the paper. Each unit prints one of the four "process" colours, cyan, magenta, yellow, and black (CMYK). The next section describes how a single print unit functions.

After the paper passes through the eight print units, it goes over the top roller, which directs the paper toward the fuser.

The non-contact fuser melts and fuses the four toner layers to each side of the paper.

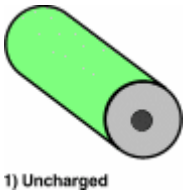
Because the temperature of the paper is high when it leaves the fuser, the paper passes through another cooling unit, which blows cooled air on the paper's surface.

The paper web is driven by two motors, which are accurately controlled to maintain a constant web speed and tension. This constancy provides a stable register (the correct positioning of the four colour layers on top of each other andthe positioning of the image on the front of the paper as compared to the back).

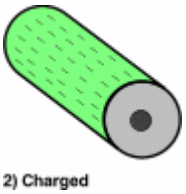
Before the paper leaves the print tower, it passes the cutter, where it is cut perpendicular to the paper movement. The paper is then transported by a conveyer to the output stacker.

A print unit

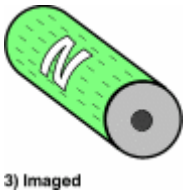
The digital printing process used in the IBM InfoColor 70 can be simplified by splitting the operation into 6 separate stages.



The photosensensitive drum starts off with no static charge on the surface and free from toner.

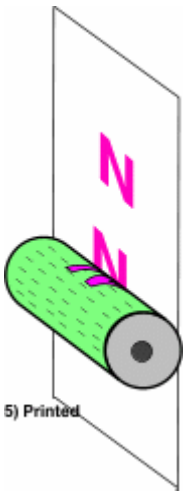


The drum is then given a uniform negative charge across its surface.



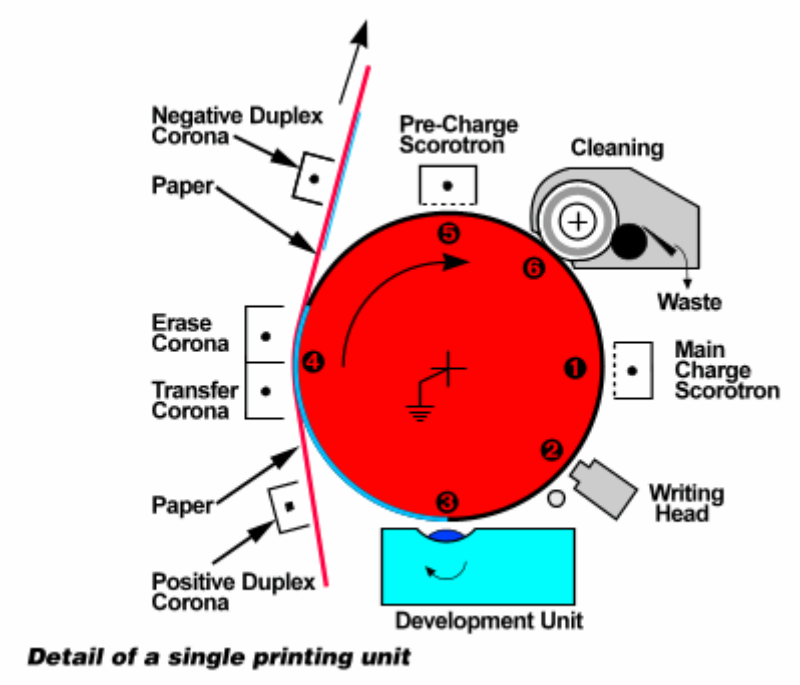
A bank of 600dpi LEDs create a latent image area across the drum. This removes the charge in the image areas.

The charge difference between image and non-image areas attracts the toner.



The toner is transferred to the paper using high electrical charges on the opposite side of the paper. When the paper has been through all four colour stations, the ink is fused onto the paper using a high temperature, non contact fuser.

The cylinder is then discharged and any excess toner is cleaned off. After which the process repeats.

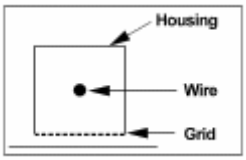


Detail of a single printing unit

1.

The center of the print unit is the drum. This drum is a grounded aluminum core covered with a layer of organic photoconductor. The photoconductor is an insulator in darkness but, when exposed to light, becomes conductive. The drum rotates as the paper web moves.

The surface of the drum is charged to a uniform negative potential by the main charge scorotron, which is a type of corona that also contains a grid. This grid makes it possible to control the electrostatic potential of the underlying surface, as shown in the illustration below.



Scorotron and Underlying Surface

2.

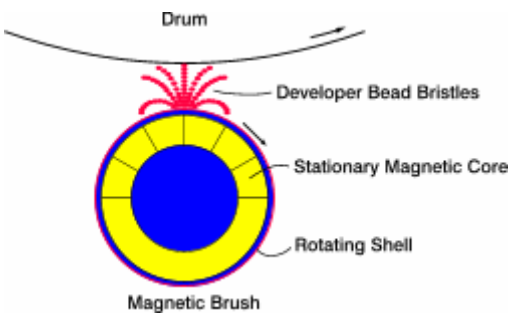
The printed image is formed by transmitting light on the drum's surface in the areas where the image should be and no light where the paper should remain white. In areas where the drum is exposed to light, the organic photoconductor layer becomes conductive, flows the charges to the ground. The light source that generates the image is a light emitting diode array (LDA), which contains 7424 LEDs spaced at 42.3 microns (600 LEDs per linear inch).

Each LED is individually addressable. Different levels of grey can be achieved by modulating the amount of light exposure. The LDA is mounted parallel to the drum axis, so that the image is recorded linewise as the drum rotates. A new line of data is printed each time the paper moves 42.3 microns.

This forms a 600 dpi matrix of spots on the drum with each spot having a grey level resolution of up to 4 bits, depending on the configuration.

3.

A development unit develops the latent image by depositing toner particles on the drum. The development unit contains the developer, which is a mixture of< toner and magnetizable carrier particles. When this mixture is stirred, the toner and carrier become electrically charged, causing the toner to stick to the carrier. The developer (toner plus carrier) is attracted to a magnetic roller and forms a magnetic brush (see illustration below).



Attraction of Toner to the Drum

When an area of the drum containing an image passes the magnetic brush, the toner particles are attracted away from the carrier particles and toward the drum by the electrical field between the drum and the magnetic brush. The more the drum was exposed to light, the more toner will be attracted to the drum. The carrier remains in the development unit. Because toner leaves the development unit, an automatic toner dosing system adds toner back to the development unit to replenish it.

4.

The developed image formed by the toner particles on the drum is transferred to the paper passing the drum by the transfer corona.

5.

The pre-charge scorotron operates in the same way as the main charge scorotron and is needed to precondition the drum's surface and the remaining toner particles for cleaning.

6.

Because toner transfer is not 100% efficient, some toner will remain on the drum. This toner must be removed so the next image to be printed is not corrupted. The cleaning unit removes these particles and directs them to a toner waste bottle.

7.

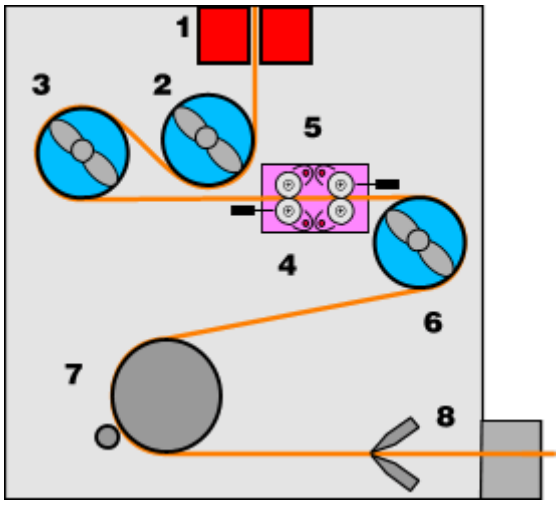
The cycle continues as the drum passes the main charge scorotron to charge the drum again.

Paper conditioning

All the way through the digital press, the paper is being conditioned. The paper supply unit contains a humidity controller, to ensure that the paper web is neither too dry, or too damp. The paper is initially cooled as it leaves the paper supply.

After passing through the print units the paper web passes through the fuser, it is then cooled back to room temperature.

The gloss unit



1. Heating unit

2. Cooling roller 1

3. Cooling roller 2

4. Gloss unit showing two sets of nip rollers

5. 1000 W heating lamp (x2) and 500W Heating lamp (x2)

6. Cooling roller 3

7. Torque controlled web drive roller

8. Cutter which cuts the web into individual sheets

The gloss unit includes a set of pre-cooling rollers, a chamber that contains two pairs of heated pressing rollers and a final cooling roller. These components provide enhanced colour saturation through a new 2 step fusing system. These units when combined with the included high torque web motor enable the InfoColor to print on heavier stocks such as book covers, promotional cards, and more.

The Gloss unit allows you to print higher quality gloss-finishes. It consists of an extra set of cooling rollers that cool the web after it has passed through the fusers. The web is then passed through a compartment with two sets of nip heated rollers apply the finish. The paper is then returned to room temperature by the third cooling roller.

The gloss facility can be turned on and off and temperature controlled to moderate the amount of gloss. It can also be retrofitted to machines in the field.

A major benefit of the gloss unit is that it comes with a torque controlled driving roller; this roller allows the printer to use heavier stocks of paper and board (up to 250gsm).