Rotogravure Printing

- Products, Characteristics
- Requirements, Solutions
- Automation Concept
- Register control
- Safety Integrated
Commercial and rotogravure printing for packaging

Typical products

- Magazines (i.e. Spiegel, Stern)
- Catalogs (z. B. Quelle, Otto)
- Cardboard boxes
- Tetra-Paks
- Film packaging
Decor printing
Typical products

- Decor- and furniture-surfaces (i.e. wood and stone)
- Wallpaper printing
- Acryl-foam printing
Principles of gravure printing

- The printing motive is engraved onto the gravure cylinder.
- The ink is pressed into the cells of the rotating gravure cylinder.
- During inking-up the printing and none printing areas are flooded with ink. The needless ink is doctored with the blade.
- The impression cylinder presses the printing material on the gravure cylinder.
- The ink is transferred from the gravure cylinder onto the printing material.
Characteristics of rotogravure printing for packaging

Characteristics
- 8 to 10 printing units per machine
- Every production has a different set of printing cylinders
- The machine can be extended by additional converting elements
- Machine speed from 300m/min to 700m/min

Advantages of rotogravure presses
- Variable printing formats through different printing cylinder diameters
- Long lifetime of printing cylinder (>1,000,000 copies)
- Front- and backside printing in one step
- Many different kinds of printing colors applicable
- Many different materials may be printed
- High printing quality
- Simple printing principle

Limitations
- Solvent based colors (environment policy)
- The gravure of the printing cylinder is very costly
Machine configuration

- Infeed
- Printing units
- Quality check
- Outfeed
- Unwinder with flying spice
- Rewinder with flying spice

Quelle: Handbuch der Printmedien
In rotogravure printing the wet ink cannot be overprinted. Therefore drying is obligatory after each printing element.
## Rotogravure printing for packaging: requirements and solutions

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| Safety functions           | Integrated safety functions in SINAMICS S120
Certified acc. to EN 954-1, Cat. 3 and IEC 61508, SIL 2                                                               |
| Compact drives for modular concepts | DC/AC Book Size*: feeding unit (BLM/ALM) up to 120 kW
DC/AC Book Size*: single-/double motor module up to 107 kW
AC/AC Blocksize*: single motor module up to 90 kW
SIMOTION D for single-/ multi axis application
* Line voltage 3-ph 380V to 480V |
| Servomotors                | Synchronous- / asynchronous- and torque motos in compact design in natural-/ air- and water cooled from 0,05 up to 180kW
**Explosion-proof servomotors available**                                                                             |
| Integrated functions       | Register control integrated into SIMOTION D. Decoupled register set point calculation for less waste                   |
Rotogravure printing: requirements and solutions

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Configuration for centralized concepts

One drive module for:
- Unwinder
- Printing unit
- Winder
Configuration for a decentralized concept

One drive module for:
- Unwinder
- Printing unit
- Winder
Principles of register control

Visualization / Operation

- Measurement of register marks
- Visualization of register difference
- Register control
- Corrective actuation

Calculation of register deviation control loop algorithm

- corrective actuation
  - measurement

Sensor/ Camera

- printing marks
- register deviation
Camera system

- The camera system is the key component of the register control system.
- The flash and complete analysis of the picture is implemented in the camera system.

Printing marks on the web

Intelligent Camera System™ = Picture recording, analyzing and flash triggering

Transmit the measured to the closed control loop of the drive system.
Closed loop control

- The closed control loop is realized in a SIMOTION Control Unit.
- The camera is directly connected to the SIMOTION controller.
- The register controller are interconnected by the drive bus system.
- The integrated implementation is superior to existing systems.

**Competitor**

- Disturbance i.e. from winder
- Register error

**Siemens Motion Controller**

- Disturbance i.e. from winder
- Register error
Influence of register movement

EZW  1.DW  2.DW  3.DW  4.DW

G2 L Register Error (ohne Entkopplung) (mm)
G2 L Register Error (mit Entkopplung) (mm)

G3 L Register Error (ohne Entkopplung) (mm)
G3 L Register Error (mit Entkopplung) (mm)

G4 L Register Error (ohne Entkopplung) (mm)
G4 L Register Error (mit Entkopplung) (mm)

v = 100 m/min

v = 200 m/min
Modular controller setup

- Register controller
- Pre control & uncoupled
- Decentralised concept with linked algorithm

- Register alarm message
Safety Integrated

Fail-safe drives – SINAMICS S120, the flexible drive system for sophisticated drive tasks

SINAMICS S120 offers following Safety-Integrated-applications: (terms acc. to IEC 61800-5-2)

- Safe Torque Off (STO)
- Safe Brake Control (SBC)
- Safe Stop 1 (SS1 => at n=0 → STO)
- Safe Stop 2 (SS2 => at n=0 → full torque available)
- Safe Operating Stop (SOS)
- Safely Limited Speed (SLS)
- Safe Speed Monitor (SSM)

Safety Integrated increases security at machines
Safety Integrated
Enabling of safety functions through failsafe communication

- Acquisition of sensor signals through failsafe periphery
- Processing of signals through failsafe CPU
- Enabling of drive based safety functions via PROFIBUS with PROFIsafe telegram

Safety Integrated reduces costs
Safety Integrated
Enabling of safety functions via failsafe terminal module TM54F

- Acquisition of sensor signals though safety devices
- Processing of signals through safety devices
- Enabling of drive based safety functions via failsafe terminal module TM54F

Integrated Safety even with hardwired solutions