

Gravure Catalog and Insert Council
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The Gravure Press



Quebecor World



The Gravure Press - Basics

Printing Processes

- Relief (image area is raised from the plane of the plate)
 - Letterpress, Flexography
- Planographic (image area is flush with the plane of the plate)
 - Offset Lithography
- Intaglio (image area is below the plane of the plate)
 - Gravure
- Screen (image area is cut out of the plate)
 - Silk screening



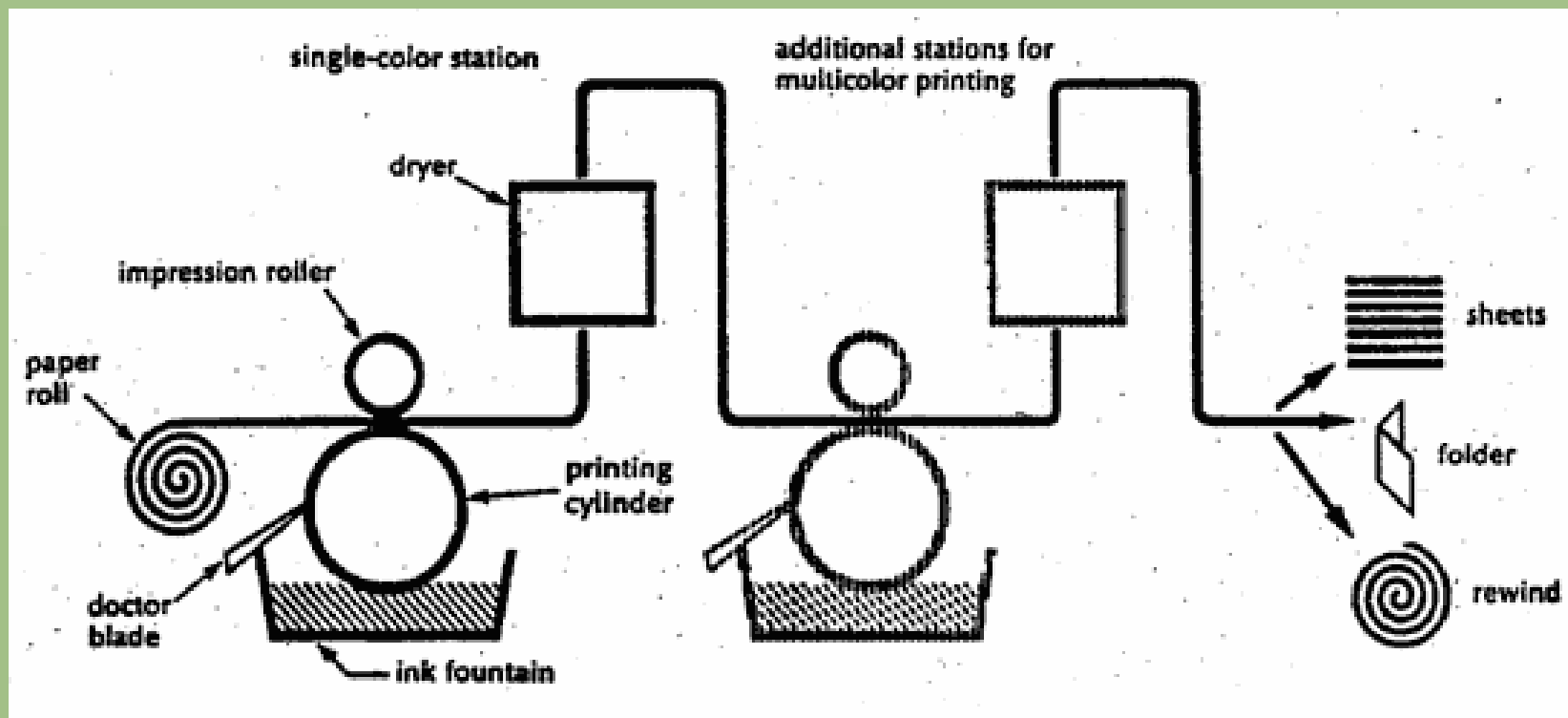
The Gravure Press - Basics

Publication Rotogravure Printing Press

- Reel stand
- Eight (8) print units (typical)
 - **Design cylinder (engraved image – recessed cells)**
 - **Ink fountain**
 - **Impression roller**
 - **Dryer**
- Folder
- Delivery (stitchers, trimmers)



The Gravure Press - Basics





The Gravure Press - Basics

Publication Rotogravure Ink Application

- As the web passes through the press:
 - First color is applied to one side of the paper web; web passes through a dryer
 - Second color is applied on top; web passes through a dryer
 - Third color is applied on top; web passes through a dryer
 - Fourth color is applied on top; web passes through a dryer

Web is turned over and process repeats on the other side of the web

8 Print Units, 8 Design Cylinders, 8 Ink Fountains, 8 Dryers



The Gravure Press - Basics

Publication Rotogravure Inks

- Yellow, Magenta (Red), Cyan (Blue) and Key (Black)
- Fluid
 - *As applied*, approximately 80% to 85% solvent, by volume
- Solvents
 - Hydrocarbon solvents
 - Aromatic solvents, primarily toluene
- Inks dry by evaporation



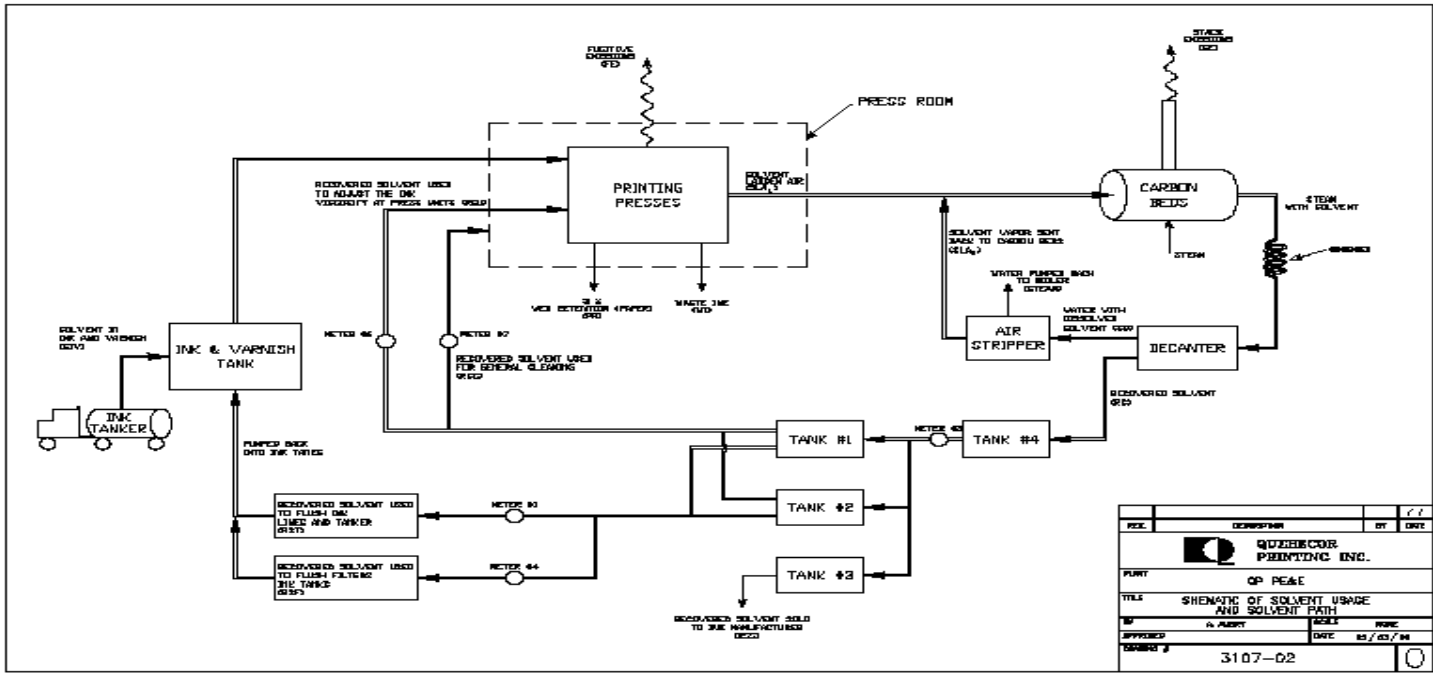
The Gravure Press - Basics

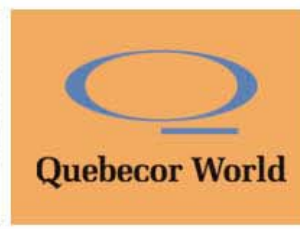
Publication Rotogravure Press Dryer

- Ink solvents evaporate ("driven" from substrate) in the dryer (leaving pigments on the substrate to form an image)
- 3 "T's"
 - Time
 - Turbulence
 - Temperature
- Dryer exhausts to carbon adsorption system (solvent vapor is ducted to carbon adsorption system) which will be covered by Dave Coggins



The Gravure Press - Basics





The Gravure Press – Capture and Control Systems

Solvent Loss to Atmosphere (Emissions)

- Fugitive losses (capture losses)
 - Solvent escapes “ahead” of the dryer (ink sumps, ink fountains and point of application)
 - Solvent emits to atmosphere through doors, windows, roof exhausts



The Gravure Press – Minimizing Capture Losses

Permanent Total Enclosures (PTEs)

- USEPA Design Criteria
- Any NDO (natural draft opening) shall be at least four equivalent opening diameters from each VOC emitting point
- Any exhaust point from the enclosure shall be at least four equivalent duct or hood diameters from each NDO.
- The total area of all NDO's shall not exceed 5 percent of the surface area of the enclosure's four walls, floor, and ceiling.
- The average facial velocity (FV) of air through all NDO's shall be at least 3,600 m/hr (200 fpm). The direction of air flow through all NDO's shall be into the enclosure.
- All access doors and windows whose areas are not included above shall be closed during routine operation of the process.
- All VOC emissions must be captured and contained for discharge through a control device.



The Gravure Press – Minimizing Capture Losses

Permanent Total Enclosures (PTEs)

- When a printing press is located within a PTE, USEPA allows an assumption of “100%” capture efficiency (no fugitive losses to atmosphere)



The Gravure Press – Minimizing Capture Losses

Permanent Total Enclosures (PTEs)

- “Real Life” challenges
 - Keeping enclosure access doors closed during press operation
 - Alarms and press interlocks
 - Maintaining negative pressure (fans and controls)
 - Enclosure design
 - Ink sumps must be within enclosure
 - Specialty inks in portable containers (55-gallon drums or totes) must be within the enclosure



The Gravure Press – Minimizing Capture Losses

Other Capture Improvements by the Industry

- Dryer design
- Scavengers
 - Doctor blade sweeps
 - Floor sweeps



The Gravure Press – Minimizing Capture Losses

Other Capture Improvements by the Industry

- Pressroom air handling systems (negative air pressure)
- Maintenance
 - Regular filter changes
 - LEL controls
 - Exhaust fans
- Other
 - Automatic closures on ink sumps
 - Lids on drums, buckets
 - General housekeeping
 - Other emission sources (bulk ink and solvent storage tanks, cylinder wash tanks, etc.)



The Gravure Press – Energy

Energy Consumption

- Natural gas and fuel oil
 - Boilers
 - Press dryers (steam heat)
 - Web conditioning (steam)
 - Carbon adsorption system (desorption)
 - Comfort heat
- Electricity
 - Motors
 - Lighting



The Gravure Press – Energy

Energy Emissions

- Direct emissions
 - Natural gas and fuel oil
 - By-products of combustion
 - NO_x, SO₂, PM and PM₁₀, CO, VOC
 - CO₂ and N₂O (greenhouse gases)
- Indirect emissions
 - Purchased electricity
 - By-products of combustion
 - NO_x, SO₂, PM and PM₁₀, CO, VOC
 - CO₂ and N₂O (greenhouse gases)



The Gravure Press – Energy

Energy Emissions

- Direct emissions
 - Natural gas is a “clean-burning” fuel
 - Fuel oil used as backup only
- Indirect emissions
 - Purchased electricity
 - Coal
 - Hydro, Nuclear, Wind, Solar



The Gravure Press – Energy

Energy Conservation Opportunities

- Natural gas and fuel oil
 - Optimizing steam cycles at the carbon adsorption system
 - Reducing steam leaks (steam traps)
- Electricity
 - Variable frequency drives
 - Lighting projects
 - Energy management systems (motion detectors)
 - Older equipment replacement (e.g. chillers)
 - Air compressor upgrades



The Gravure Press – Conclusion

Questions?

Comments?

Follow-up questions and comments can be addressed to:

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