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Water versus Solvent Gravure Inks

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working for you.

Presentation Contents

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  - Resins
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- Market Share
  - Where is water stronger and why
  - Where is solvent stronger and why
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- Solvent summary

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VOC Emission Controls

- Typical Solvent Inks
  - Solvent portion of inks 100% VOC
  - Solvent recovery
  - Solvent Incineration
- Greatly reduce VOC content of inks
  - Water based Inks
  - Solvent portion of inks ~12% VOC

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Water Based Inks V. Solvent Based Inks Safety and Storage

- Water Based Inks
  - Most water based inks are non-red label
  - Non-red label inks do not
    - Require special warehousing, storage and handling procedures
    - Require special shipping restrictions
    - Non – Flammable (Most Water Inks)
- Solvent Based Inks
  - All solvent based inks are red label
  - Red label inks do
    - Require special warehousing, storage and handling procedures
    - Require special shipping restrictions
    - Flammable

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Water Based Inks V. Solvent Based Inks Resin Chemistries

- Solvent Based Inks
  - Nitrocelluloses
  - Polyamides
  - Polyurethanes
  - Polyesters
  - Vinyl Chlorides
  - Acrylics
  - Maleics
  - PVB (Polyvinyl Butyral)
  - CAP (Cellulose Acetate Propionate)
  - CAB (Cellulose Acetate Butyrate)

- Water Based Inks
  - Acrylics (95+%)
  - Urethanes (4+%)
  - Polyesters and others (Minor Usage)

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Water Based Inks V. Solvent Based Inks Resin Chemistries

- Ink Characteristics Provided by Resin
  - Printability
  - Adhesion to a Particular Substrate
  - Gloss
  - Heat Resistance
  - Ink Film Flexibility
  - Lamination Potential
  - Durability
  - Ease of Press Clean Up
  - Rheology
  - Viscosity
  - Other Physical Ink Properties
- Solvent Inks
  - Multitude of Resin Chemistries
  - Synergetic Effects
  - Multitude of Applications
- Water Inks
  - Single Primary Resin Chemistry
  - Limited Number of Applications

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Water Based Inks V. Solvent Inks – Press Handling

- Water Based Inks
  - Complex Mixture of Chemicals
  - Requires Larger Amount of Press Side Attention
    - pH Management
    - Defoamer Addition
    - Correct Mixing Procedures
    - Viscosity
- Solvent Based Inks
  - Relatively Simple Mixture of Chemicals
  - Requires Small Amount of Press Side Attention
    - Viscosity

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Water Based Inks V. Solvent Based Inks – Performance Properties

Performance Property	Water Based Ink	Solvent Based Ink
High Gloss Potential	Excellent	Excellent
Heat Resistance	Excellent	Excellent
Rub Resistance	Excellent	Excellent
Chemical Resistance	Excellent*	Excellent*
Adhesion	Substrate Limited	Wide Range of Substrates
Press Speed	Slower**	Faster**
Oven Heat Requirements	Higher	Lower
Printability	Substrate Limited	Excellent
Press Side Maintenance Level	High	Low
Lamination Bonds	Substrate and Process Limited	Wider Range of Substrates and Processes

* Depending on the application, to achieve excellent chemical resistance, use of cross linker might be necessary

** Press speed will ultimately depend on press and oven design, but all things being equal, typically water based inks will run slower than solvent inks. Also, high speed printing systems are always solvent based

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Water V. Solvent Markets

- High Performance Laminations
  - Bonds 500+ g/in
  - Zipper Pouch Applications
  - Approximate Market
    - Solvent 95%+
    - Water <5%

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Water V. Solvent Markets

- Medium Performance Laminations
  - Bonds 100 – 500g/in
  - Snack Food Bags
  - Approximate Market
    - Solvent 90%+
    - Water <10%

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Water V. Solvent Markets

- Low Performance Laminations
  - Bonds <=100 g/in
  - Bottle Labels
  - Approximate Market
    - Solvent 85%+
    - Water <15%

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Water V. Solvent Markets

- High Performance Surface - Film
  - High Speed Printing (1500+ ft/min)
  - Highest Level Print Quality
  - Adhesion
  - High Level End Use Properties
  - Approximate Market
    - Solvent - ~100%
    - Water - Minimal

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Water V. Solvent Markets

- Low Performance Surface - Film
  - Low Speed Printing (>600 ft/min)
    - Highly Oven Dependant
    - Cylinder Dependant
  - Acceptable Print Quality
  - Adhesion
  - Acceptable End Use Properties
  - Approximate Market
    - Solvent - 75+%
    - Water - <25%

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Water V. Solvent Markets

- Paper Applications
  - Press Speed - Generally Equipment and Substrate Dependant
  - Acceptable – High Quality Print Quality (Substrate Dependant)
  - Adhesion
  - Acceptable End Use Properties
  - Approximate Market
    - Solvent - ~30%
    - Water - ~70%

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Water Based Ink Summery

- Require more press side assistance
- Narrower application window
- When they used on flexible substrates
  - More Difficult to Dry
    - Slower Press Speeds
    - High Performance Ovens
    - Cylinder Etch
  - Will generally provide at least a slightly lower level of printability
  - Will generally provide lower bond values for laminated structures
  - Preferred use for lower performance structures
- Preferred used on uncoated papers
  - Excellent printability
  - Excellent drying
  - Excellent properties

Solvent Based Ink Summary

- Market leader in:
  - Film printing - easier to dry
    - Allows for higher press speeds
  - Gravure printing – due to easier drying has less hazing
  - Wider range of applications due the multitudes of resins available

- Due to inherent low surface energy of solvents, simpler formulas which make printing easier.

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