Digital Workflow for Corrugated

FPPA Presentation

February 19, 2007

Bob Hannum

Topics

- Brief Company Overview
- Current State of Digital in North America
- New Digital Technology
- Technical and Economic Fit
- Digital Printing Option

DuPont Imaging Technologies

Packaging Graphics

Flexography Plates

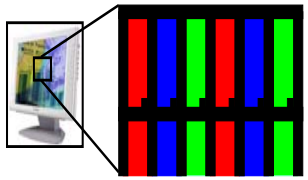
Cyrel®
Cyrel® *FAST*

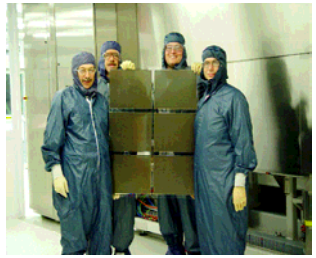
Photopolymer Laser Thermal Ablation

Color Filters

LCD Fabrication

LCD OEMs





Thermal Ablation Transfer, Integration

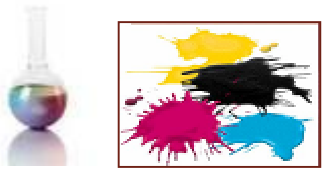
Digital Printing Systems

Inkjet Systems For Graphics, & Textiles

Cromaprint™, Artistri™, OEM, & Specialty Colorants

DuPont™ Cromaprint™ digital printing systems

DuPont™ Artistri™ digital printing systems



Dispersants, inks, concentrates, And colorants.

Systems Integration, Inks, Fluids, Color Controls

Display Enhancements

LCD & Plasma Display Components

LCD & Plasma OEMs

Advanced Materials & Processes

DuPont Authentication

Security, Identification, & Brand Protection

OVDs, Optical Coding & Bio Markers

Advanced Materials, Holograms, Color & Bio Markers

Color Communication

Color Proofing

Cromalin®

Systems Integration, Inks, Coatings, Color Management

Current State of Digital

Digital Imager Installations - NA

Corrugated Segment

- 16 tradeshop companies have installed digital imagers
- 2 converter companies have done the same
- A total of 23 imagers have been installed in these locations

- Of the 23 imagers, 12 are installed at traditional “corrugated tradeshops”

Plate Thicknesses Used

A wide variety of plate thicknesses are being used in most a corrugated printing applications (from brown box printing to high-end graphics)

Thickness	Sales
• .112”	
• .125”	Over 50%
• .155”	
• .250”	~ 33%

Digital Workflow Options

Workflow Options

Continuing trends from CPG's and Retailers is the desire to re-purpose digital assets for multiple packaging printing. That leads to a more cost- effective and efficien production environment and revenue stream.

- Direct to Proof (vs. analog)
- **Direct to Plate (vs. analog)**
- Direct to Plate Cutting (vs. hand cutting)
- Direct to Video Mounting (vs. optical)
- **Direct to Digital Printing (vs. conventional printing**)

Is The Time Right For You??

Why Not All Digital, All the Time?

- Technical Fit

- Economic Fit

Technical Fit

• Cyrel® TDR is the industry standard for high quality corrugated printing.

• However, digital plates have a tendency to flute more than analog plates in certain printing applications.

• **Recent testing indicates success showing significant improvements in fluting with a new digital technology.**

• Following are slides showing the printing conditions and fluting differences.

Printing Conditions

- .112” digital plates (.112” TDR also printed as benchmark)
- .070” Rogers foam
- Bobst Flexo 160 press (Clemson University)
- Anilox – 500 – 3.0bcm; 60 degree angle
- BCM Inks - pH – 9.6
- Viscosity – 17 - #4 din cup
- Board – Kemiart B-Flute – 200g/m2
- Press speed – 3600 SPH (sheets per hour)

- Minimum impression = optimizing anilox-plate and then plate-stock
- Over impression = + .020” plate to stock

Dot Size Comparisons

Plate Type	Physical Dot Size
• TDR	42.1%
• DPC	39.4%
• New Technology	41.2%

Notes:

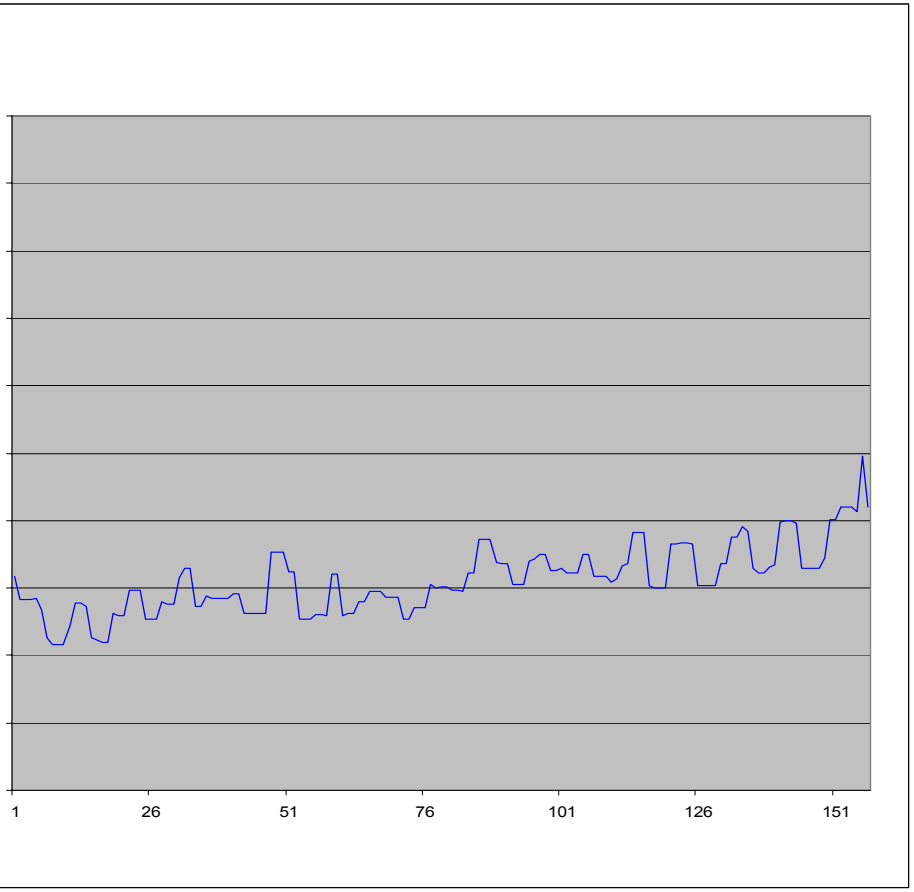
Measured with a Betaflex 334

35% area measured

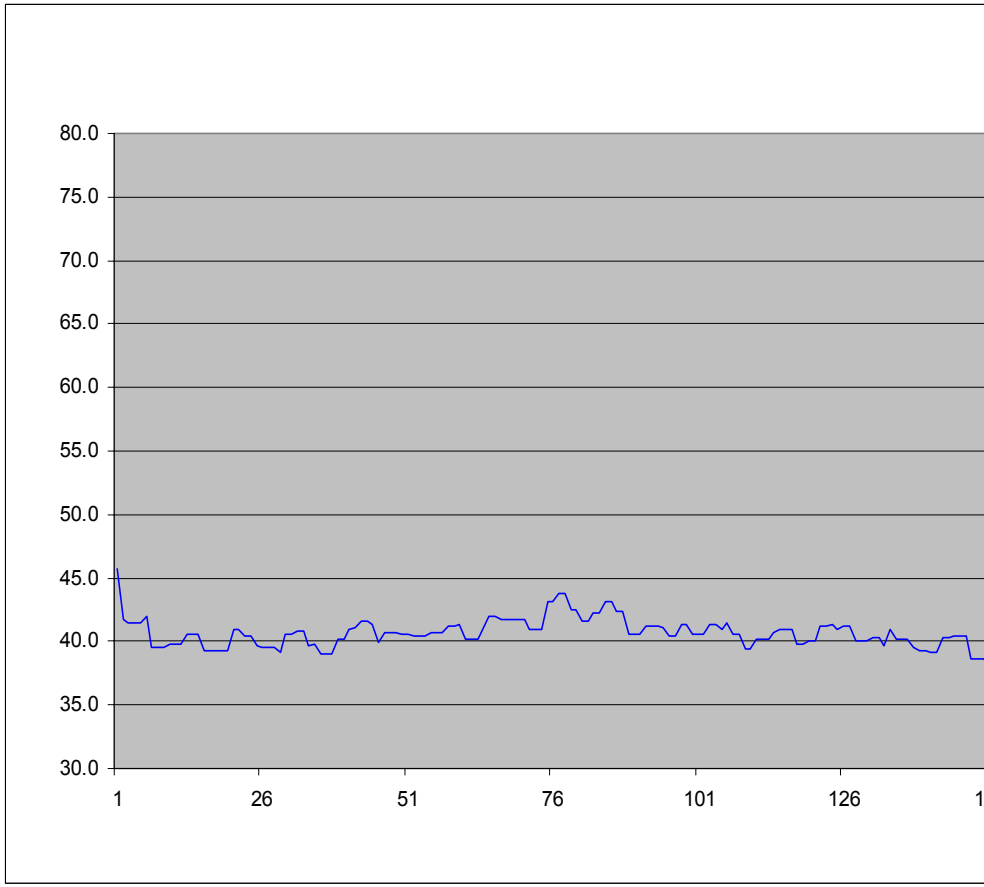
Dots were purposely sized the same for true comparison

Fluting Analysis – 35% Tint; 100LS

DPC



New Technology

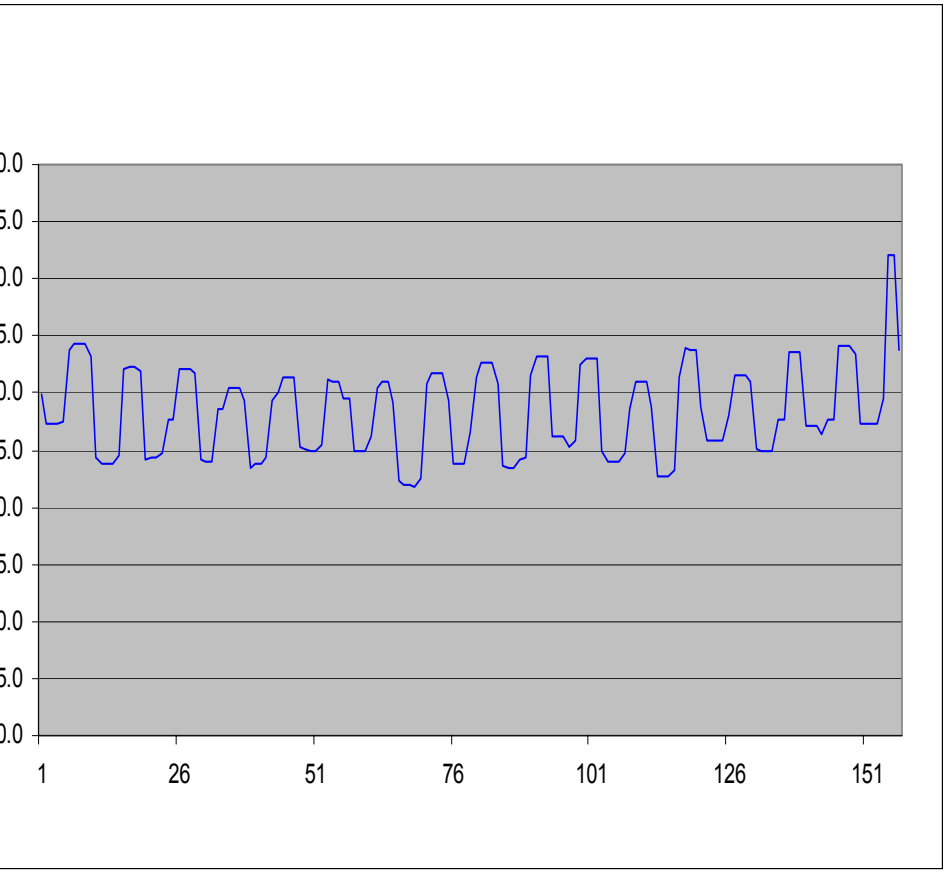


Minimum Impression

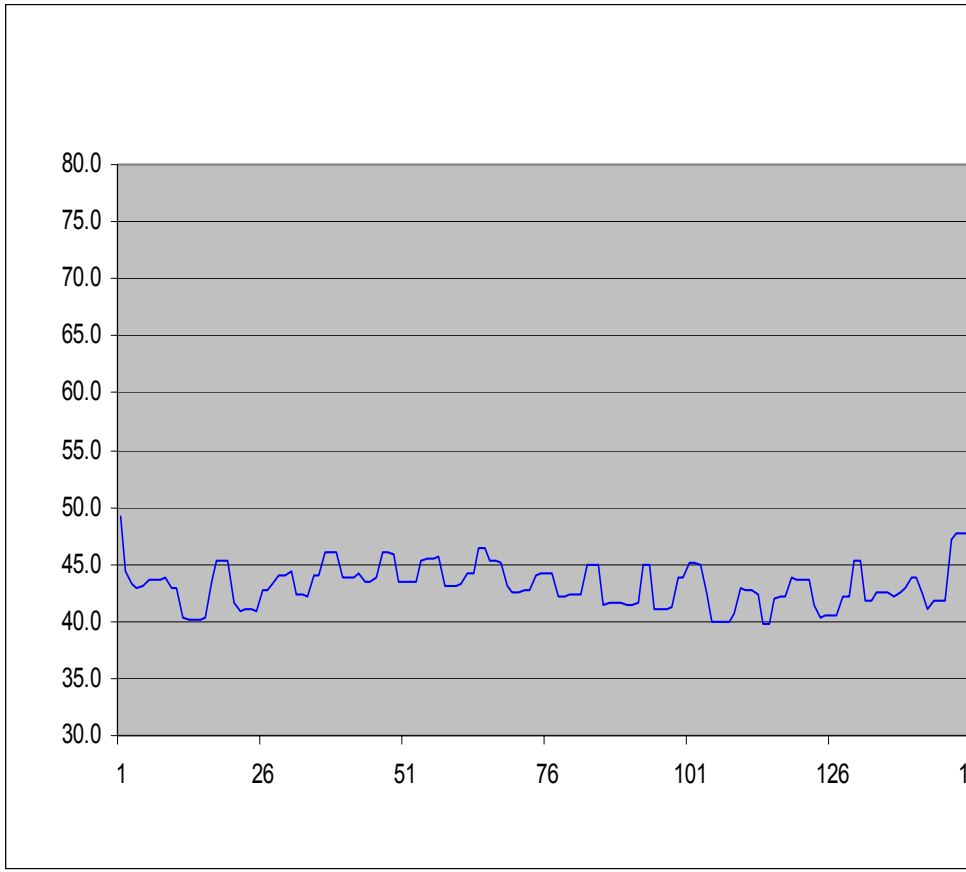
Minimum Impression

Fluting Analysis – 35% Tint; 100LS

DPC



New Technology

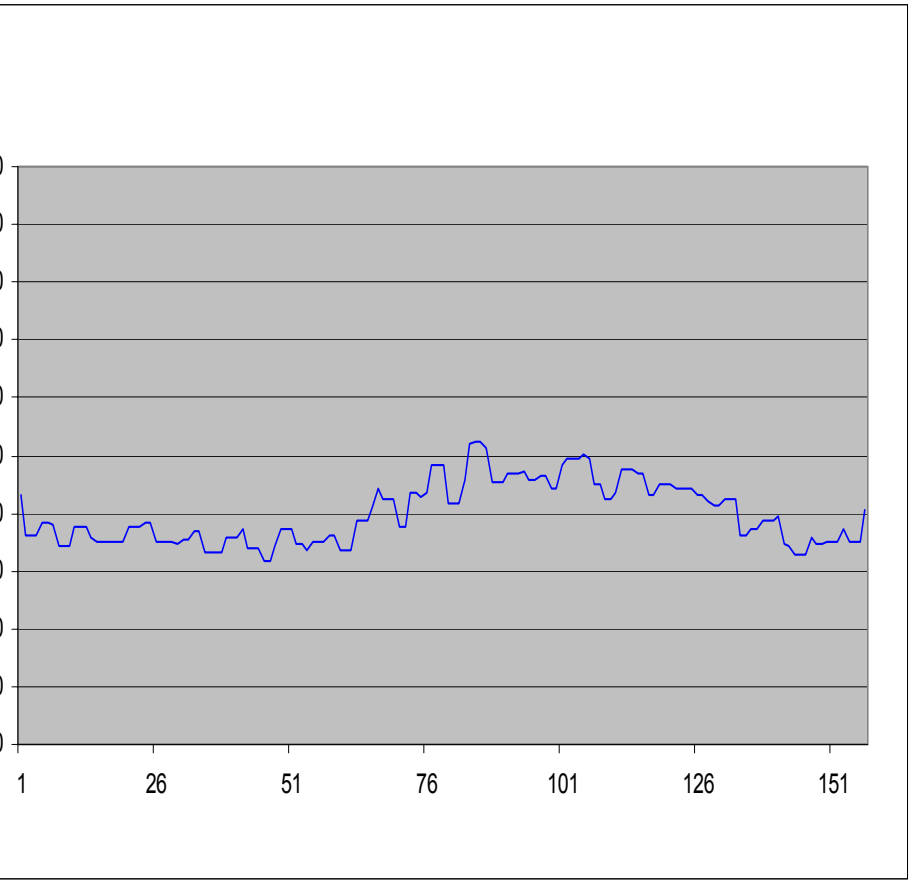


Over Impression

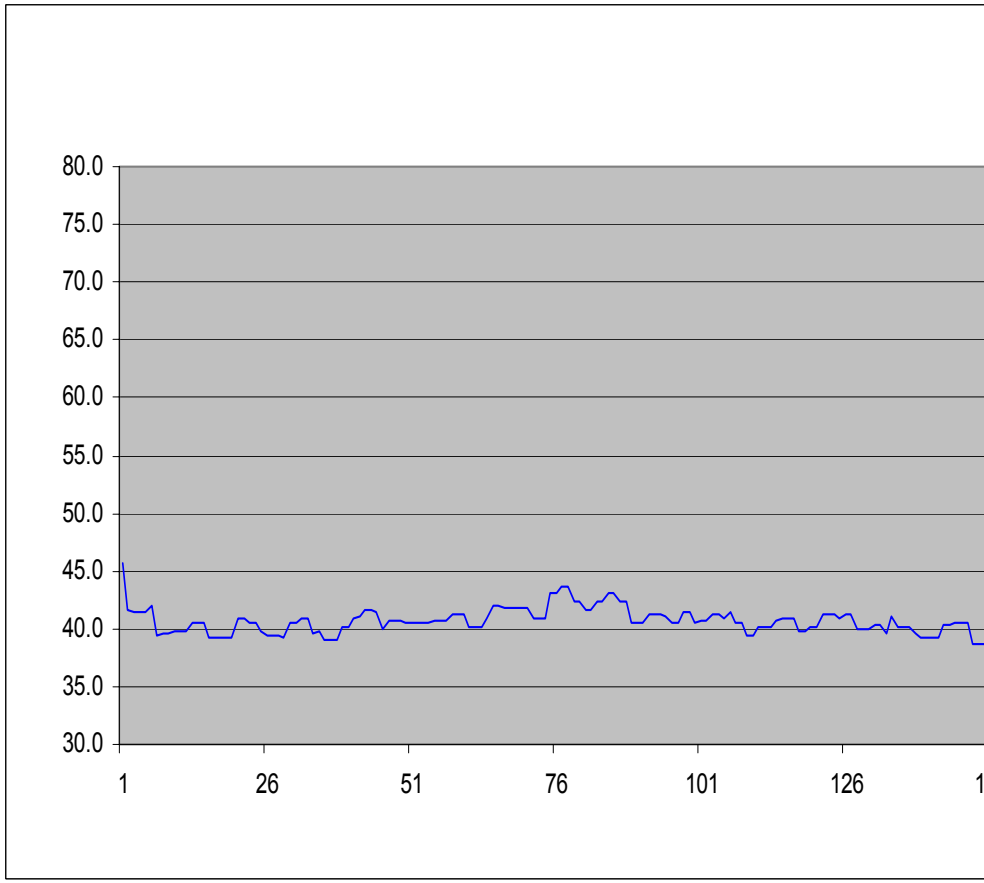
Over Impression

Fluting Analysis – 35% Tint; 100LS

TDR



New Technology

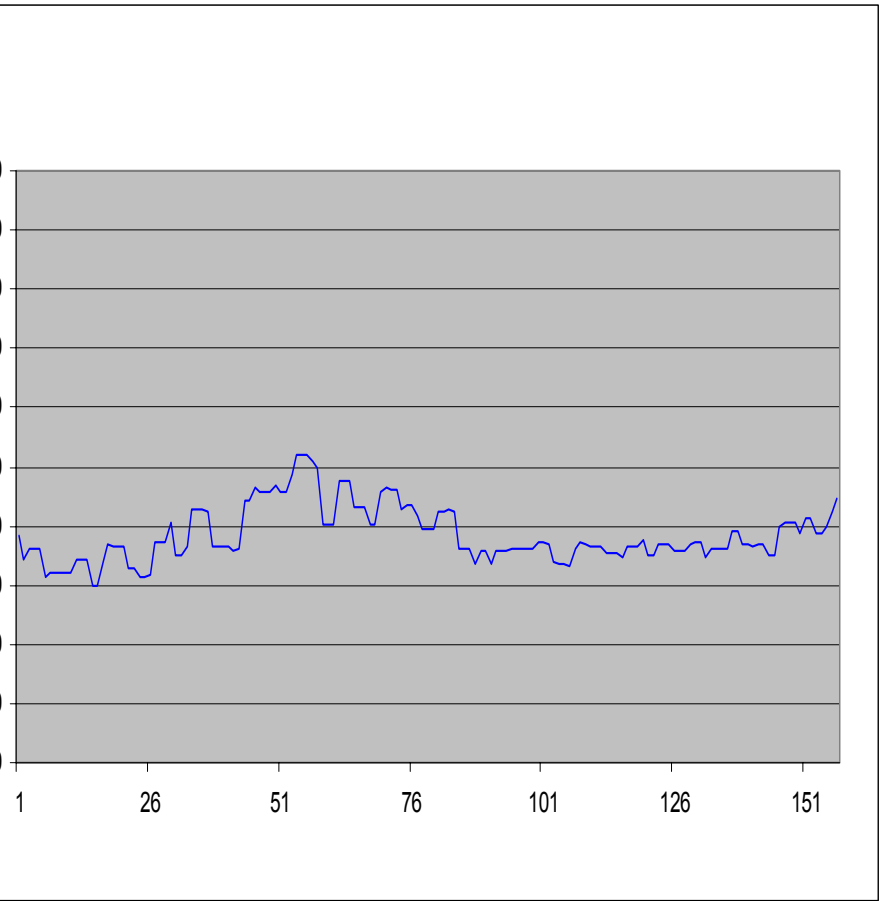


Minimum Impression

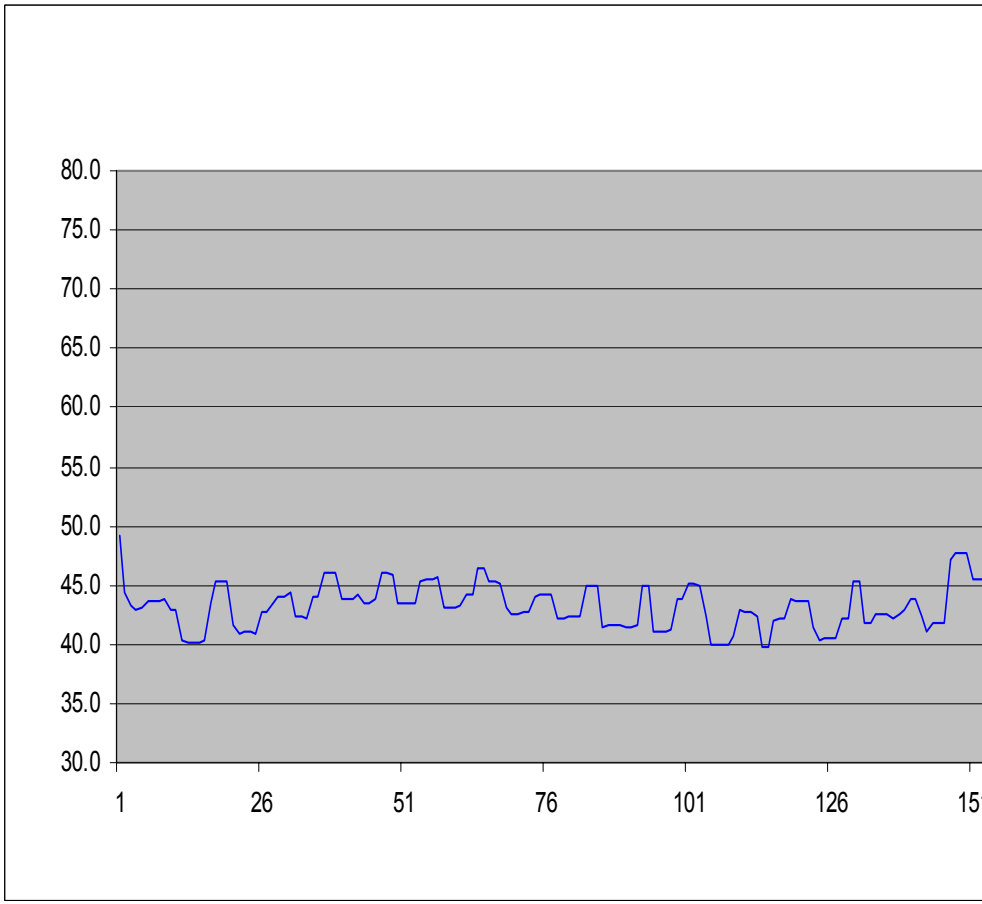
Minimum Impression

Fluting Analysis – 35% Tint; 100LS

TDR



New Technology



Over Impression

Over Impression

Dot Gain

- Initial dot gain results also show less dot gain with the new digital technology.

- Next steps are to have these plates printed in a production environment on different board types and with different plate thicknesses for comparison.

Economic Fit

Total Costs

• As we all know, on a line item basis digital plates are more expensive than analog plates.

• What's most important though, is that the total delivered cos needs to be competitive with your current cost position.

• What are your total costs to make an analog plate vs. a digital plate? A liquid plate vs. a digital plate? The paradigm i that it is too costly to go digital for corrugated. Is it?

Costs To Consider

Digital Plate Material

- List price from all suppliers is higher than analog plate

Graphic Arts Film/Imagesetters

- Raw material costs of film and chemistry will continue rise (double digit increases in 2006)
- Platemaking errors inherent with using film (dust, dirt, kinks, wrong exposure times)
- No new imagesetters are being produced
- Spare parts will become an issue in 5 years
- **This is in an end-of-life technology**

Costs To Consider

Labor

- Film retrieval and storage
- QC and inspection of all films prior to platemaking
- Additional time to prep an analog plate with film vs. digital
- Film stripping - could be very costly

Plant space

- How much space is required to accommodate film?
- Do you value this space?

Costs of Not Going Digital

- Competitive advantage – marketing position with your customers
- Ability to compete in other market segments
- Not able to take advantage of workflow efficiencies
- Platemaking consistency cannot be realized

Prove The Fit

- Let DuPont work with you to better understand your total delivered cost of an analog sheet or liquid plate in compariso to a digital solution

- The economics need to make sense for everyone and they need to be believable

Digital Printing

DuPont™ Cromaprint™ UV Product Line

Cromaprint 22 UV

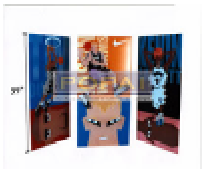
Cromaprint 18 UV

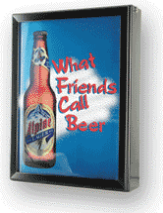
DuPont™ Cromaprint™ digital printing systems

Graphics & Signage Inkjet Applications

- P-O-P Signage and Displays (retail in-store)
- Display Advertising
- Pressure-sensitive Decals (Window Graphics, etc.)
- Indoor & Outdoor Flags & Banners
- Posters
- Vehicle Graphics
- Transit Advertising (Back-lit/Front-lit)
- Building Graphics
- Exhibition and Trade Show Graphics
- Billboards



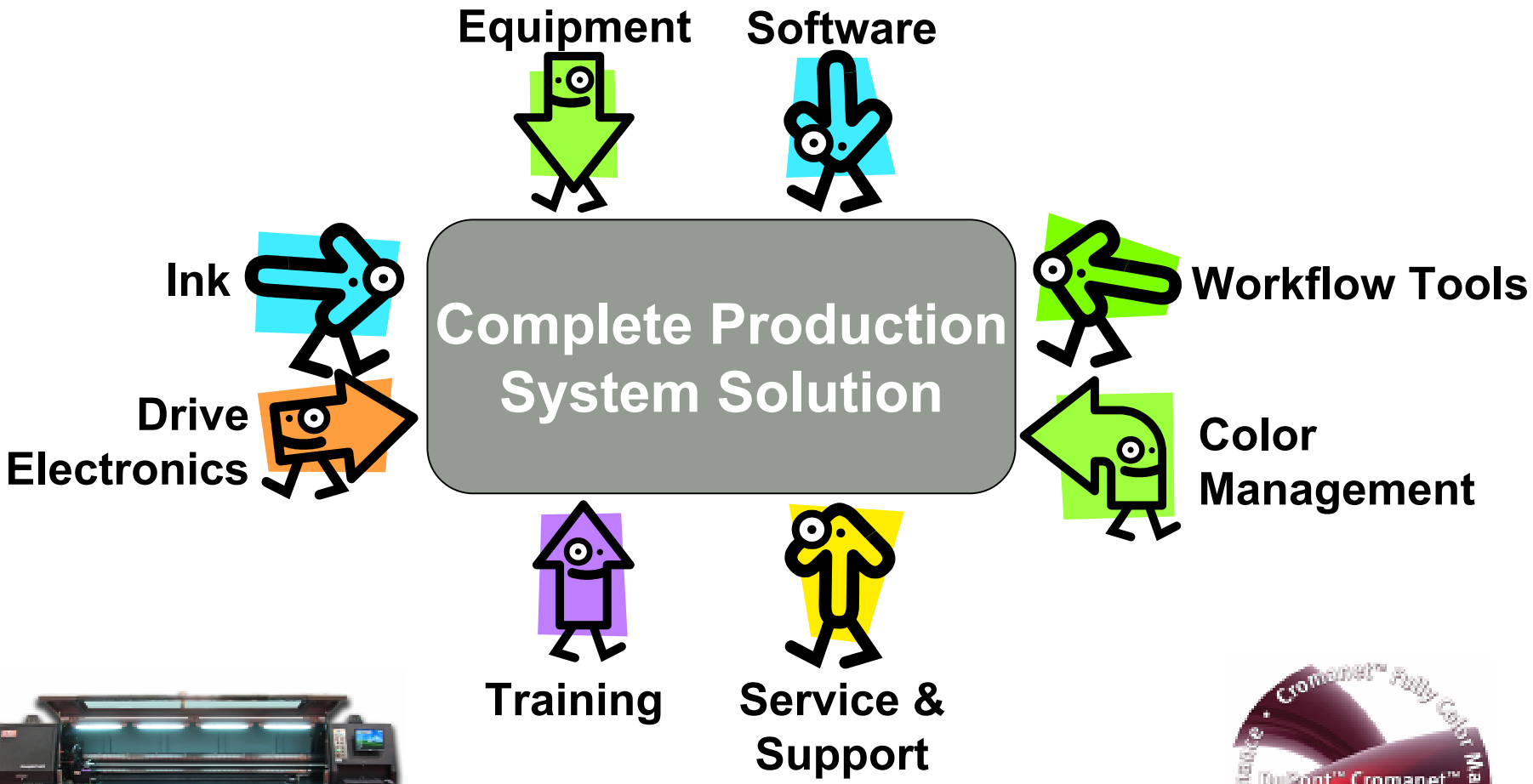



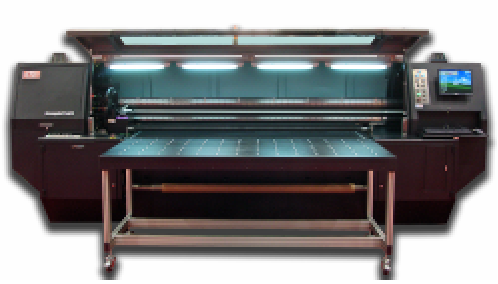

DuPont Digital Printing Systems – Knowledge Intensity Skills

DuPont Strengths

- Workflow, Color, Applications Expertise
- Inkjet Inks / Fluids / IRL Coatings
- Proven System Engineering & Integration
- Safety Engineering
- Software Development & Integration
- Direct Marketing & Channel Development
- Service, Training, & Support
- Business Development Partners

DuPont™ Cromaprint™ UV System Solutions Include:





The miracles of science™