Proofing Technology

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Defining proofs

- Content proofs
  - Preliminary pro ofs to verify wh ether text or graphics are po sitioned corre ctly on the pa ge
  - Imposition proo fs to verify a rrangement of p ages on plate in ref erence to the full sheet, and bleed , trim, registration marks, lead edg e, etc.

Contract proofs

- A prediction of final reproduction on press
  The standard for contract color approval have historically been photomechanical proofs（Matchprint，Cromalin，Waterproof)

Digital Convergence

- Today in an all-digital environment, we're seeing a convergence of these two types of proofs
  - As level of an "acceptable" contract proof is redefined
  - As technology advances and quality of digital proofing devices improve

Categories of Proofs

- Press proof
- Off-press photo mechanical pro ofs (Analog pro ofs)
  - Integral (sing le-sheet) proofs
  - Overlay proofs
  - Laminate proofs
  - Adhesive polym er/dry powder p roofs
  - Single-color ph otomechanical proofs
- Digital proofs
  - Soft proofs
  - Hard proofs

Press Proof

- The first proofing method was to actually put the job on press! The press used was often a small offset press, called a "proof press"

- This small press attempts to simulate the reproduction characteristics of much larger offset, gravure, or flexo presses

Analog Proofs – Overlay Proofs

- These proofs are made by exposing and processing dye-coated sheets of clear plastic
  - Each sheet shows one of the process colors
    - *Black*
    - *Cyan*
    - *Magenta*
    - *Yellow*

Overlay Proofs

- These sheets are taped down in register to either a very reflective white base, or sometimes to the actual paper to be used for the pressrun
- Unfortunately, all these layers of plastic absorb some of the light—making overlay proofs appear darker than the printed page

Analog Proofs – Laminate Proofs

- This is most common analog proof still in use
- Laminate proofs (such as Imation's Matchprint system) use dye-coated sheets of very thin plastic which are laminated to a carrier (or base) sheet
- Each colored sheet is laminated, exposed photomechanically, and then developed

Adhesive Polymer/Dry Powder Proofs

- Adhesive polymer/dry powder proofs obtained popularity by allowing virtually any spot color to be represented
  - DuPont's Cromalin requires mixing a small quantity of dry powder (toner)
- Printshops often created a Matchprint and then placed one or more layers of Cromalin on top to show the spot colors

Single-color Photomechanicals

- An example of a single-color proof is DuPont's polymer-based DYLUX material, also known as "blueline" material
  - According to Dupont, bluelines are still the most widely used proof for final sign-off in the world today

Leading digital proofing technologies

- In terms of rep lacing analog p roofs for cont ract (or final approval) qua lity prepress proofs, the lea ding technolog ies are:
- Thermal laser ab lative
  - These are scree ned halftone di gital proofing devices
- Inkjet
  - Drop on Demand (DOD) inkjet
  - Continuous Flo w inkjet

Thermal Laser Ablation

- Laser ablative devices use the energy of a tightly-focused laser beam to ablate (remove) dots of pigment from a donor sheet
- These dots of pigment are then transferred to the proofing substrate

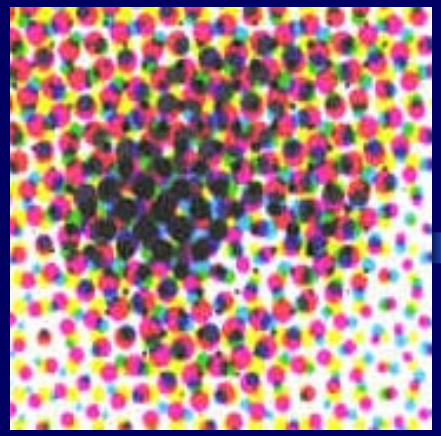
Benefits of ablative technologies

- Proofing color s are determined by ink sheets and can use th e same pigments as CMYK standard offset inks.
- Ink sheets var y little, making a stable stand ard.
- Color manageme nt not required
  - as with inkjet systems.
- Little calibratio n needed. Only adjustment need ed is setting dot gain curve .
- Pigment is trans ferred directly to paper and pa per from actual press run can be used.
- In RIP-once-out put-many enviro nment, dots will be identical to th ose on the prin ting plate.
  - You can see th e dots and catc h moire patterns.

Downside of ablative technologies

- The cost of consumables is almost the same as analog proofing systems about $12 per sq/ft.
- There generally aren't donor sheets for all spot colors - makes packaging work difficult to proof.
- The manually-operated systems are very labor intensive.
- Cost of the equipment is high - can go over $100,000 for some systems. This includes the same high replacement costs for solid state lasers that you see in the CTP market - could be up to $30,000 to replace a laser.

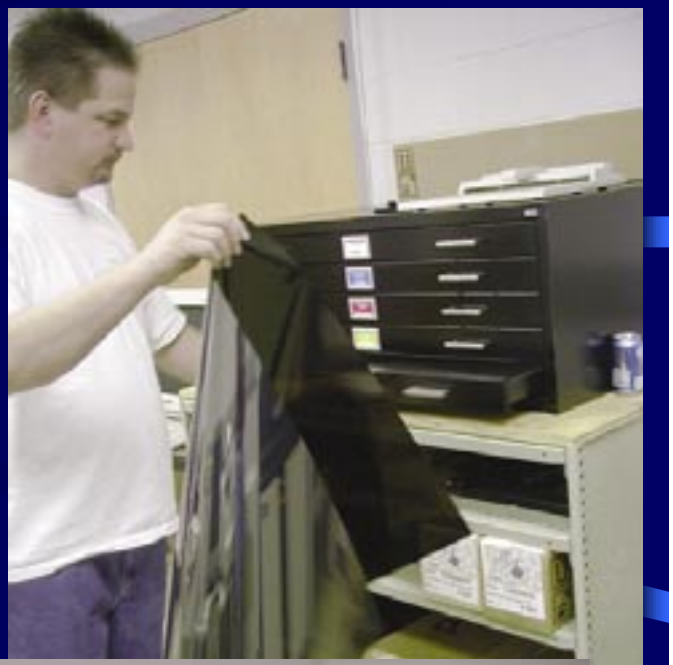
Polaroid's PolaProof



- Polaroid introd uced it's first lase r ablation halfto ne proofer in 1997
- The laser prod uces a 10 micro n spot, which c an simulate halfton e dots with freq uencies up to 400 lpi with resolutio ns of 2400 or 2540 dpi
- Polaroid donor sheets contai n a "dynamic rele ase layer" which co ntains molec ular aluminum. Th is is expanded b y the laser's he at, which literal ly explodes the p igment onto t he substrate

Polaroid's PolaProof

- The original PolaProof line require manual loading of substrate and colorant sheets
- After the proof has been imaged it must be laminated using a separate device



Inkjet: the next big thing

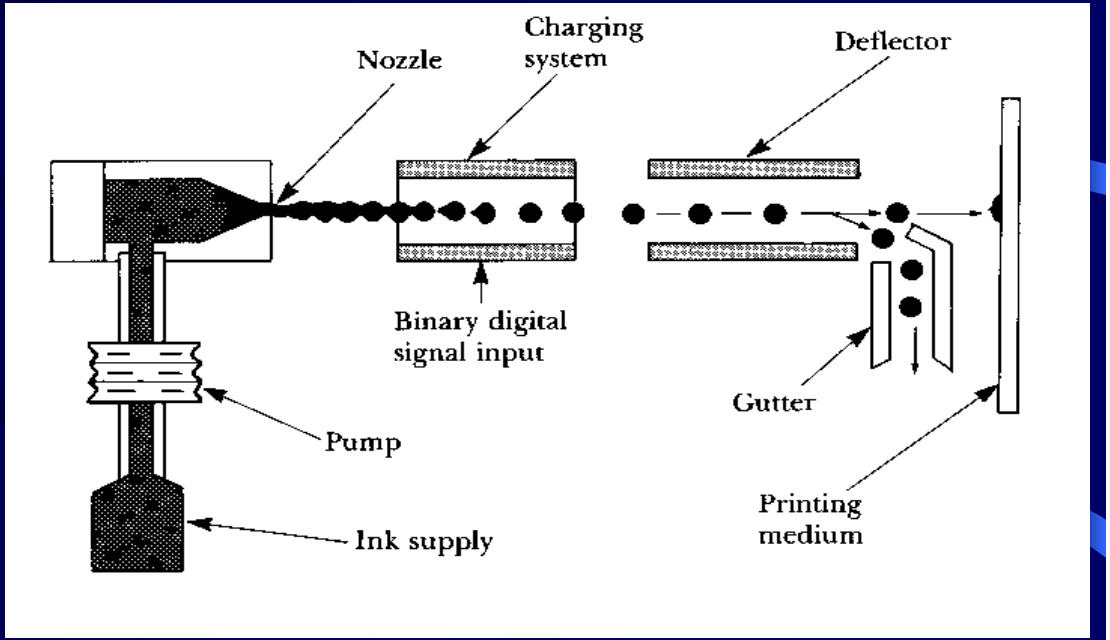
- Inkjet technology - is rapidly overtaking the digital proofing market
- Let's take a look at the two technologies
  - Continuous F low Inkjet
  - Drop-on-Dema nd

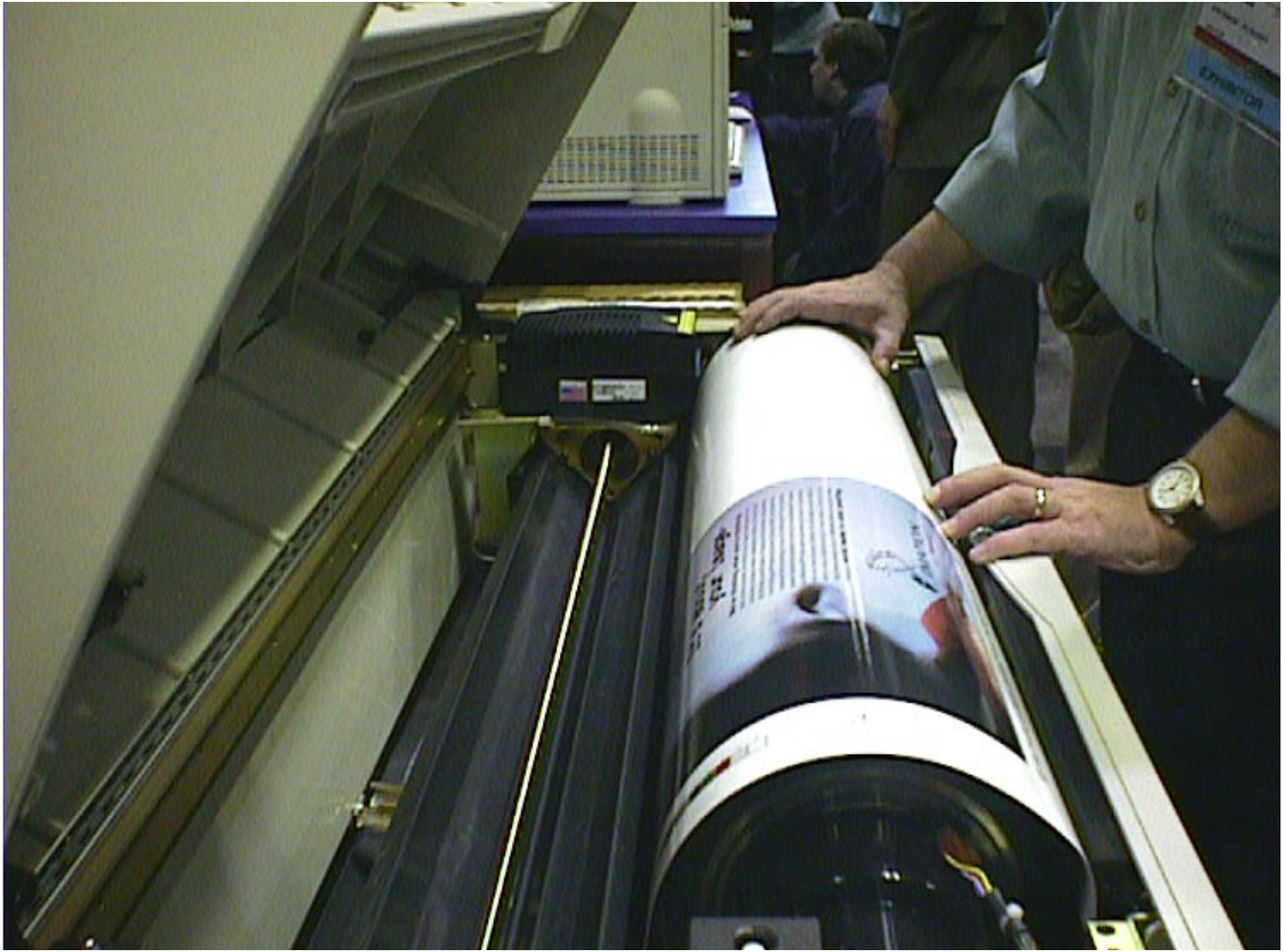
Continuous Flow Inkjet (CFIJ)

- CFIJ is the technology behind long time professional digital proofing systems CreoScitex Iris and Dupont Digital Waterproof
- System manufacturers claim CFIJ proofers produce smaller droplets than DOD systems
- Systems have been around for years, so

Continuous Flow Inkjet: how it works

- ***Continuous Flow*** ink jet systems a pply a static charge to the droplets intend ed for the substrate
- Uncharged dro plets are collected and recycled





Dupont Chromalin iG2 and iG4

- Currently offer ed CFIJ inkjet pr oofing system
- Media sizes:
  - iG2 - 15.75 x 22” media
  - iG4 - 28.3” x 22” media
- Resolution opt ions
  - 304.8 dpi
  - 609.6 dpi
- With ChromaNet Proof server, RIP and color man agement

CreoScitex (Iris Graphics) IrisPrint

- Continuous flo w inkjet proofer with variable- sized droplets o f ink
- Improvement to the ink nozzles - IrisPen technology re duce clogging
- Resolution opt ions
  - 300 - 600 dpi
  - The variable si zed droplets are claimed to produce a perceived reso lution of up to 2400 dpi.

Drop-on-Demand Inkjet (DOD)

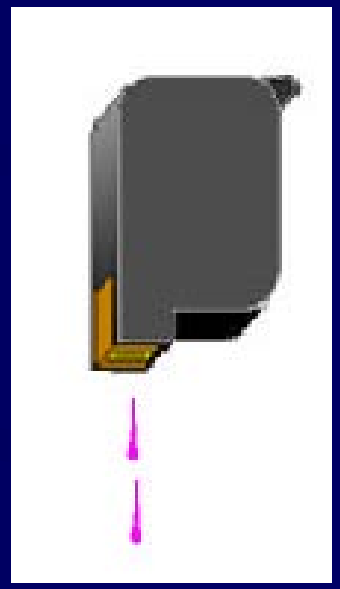
- Large format DOD inkjet systems have been around for years in the "print for pay" market where the final product is the proof itself
- Until recently large format DOD systems have had a home in prepress and printing facilities mostly as imposition proofers
  - Imposition proofs mean that precise color doesn't matter, the proof is used to show how the print job is imposed for the press

Drop-on-Demand Inkjet (DOD)

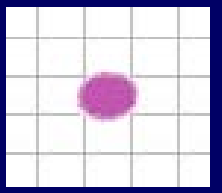
- With the introd uction of the E pson 9000 in 1 999, DOD systems began to gain accept ance as color c ontract proofers
- Most systems to day use more th an the 3 or 4 colors earlier DOD systems used
- 6 color and ev en 8 color dev ices improve co lor gamut and ability to repr oduce Pantone , hexachrome or HiFi color matches
  - But color manag ement software m ust be used for accurate color reproduc tion

Drops and Dots

- A drop, or drop let, is the smallest amount of each color of ink fired from the printhead
  - Sizes are measured in Picoliters (pl)
- A dot is the cluster of ink drops that look like a small dot on the page. A dot is made up of one or more colors and is measured in microns
  - But these are <u>not</u> screened halftone dots!



A droplet of ink



A dot


ENCAD
Ink Jet Cartridge
60
ENCAD
Ink Jet Cartridge
ENCAD
Ink Jet Cartridge
60
GRILLED BURGERS

Epson Stylus Pro 7000 & 9000

- First DOD system t o be able to ou tput what was co nsidered contract quali ty inkjet color proofs
- Media sizes:
  - 7000 up to 24” wide,
  - 9000 up to 44” wide
- Resolution opt ions
  - 1440 x 720 dpi
  - 720 x 720 dpi
  - 360 x 360 dpi
- With EFI Fiery RIP
  - Postscript leve l 3 & PDF capable
  - Full Pantone color seps internal to RI P

Hewlett Packard HP 5000

- Introduced at Seybold 2000, the HP 5000 raises the bar in color inket with addition of wider 6 colo r printheads and high nozzle v olume
- HP color thermal inkjet print te chnology
- Resolution opt ions
  - 1200 x 600 dpi maximum
- Media widths
  - 42” and 60” wi de for roll-base d
- Speed
  - 8-up proof ima ges in 6 minute s!
  - Compare to 25 minutes for Epso n 9000 or 38 minutes for IR thermal ha lftone proof

Agfa Sherpa 43/54/62

- Multi-density 6 color Piezo drop-on-dema nd systems
- Resolution opt ions
  - 1440 x 720 dpi
  - 720 x 720 dpi
  - 360 x 360 dpi
- Media widths
  - 42” and 60” wi de for roll-base d
- Speed
  - 8-up proof at 720 x 720 images in 8 min utes
- Comes with dedic ated spectroph otometer and ColorTune color management sys tem

Benefits of inkjet technologies

- Major cost sav ings!
  - Consumables, m uch, much less expensive
  - Proofing devic es much less ex pensive than th ermal ablative
- They are gener ally faster than other proofing methods
  - Roll-based uni ts can be queue d up to run un attended
- They can be co lor managed
  - Thermal ablativ e technology, l ike analog pro ofs, are fixed by their color ant sets, so yo u cannot really color manage them
  - Inkjets, with th eir more than 4 color capabili ties, allow for the reproducti on of a number of color gamuts
  - Can color mana ge to match the press!

Downside of inkjet technologies

- Screening metho d is stochastic - no halftone dots
- Without color management, it i s difficult to co ntrol the color on inkje t proofers
  - Much wider gamu t than an offse t printing pres s
- Still some marke t perception th at inkjet proof s can't be true contract q uality
  - Will have to "s ell" the concep t to clients and maybe pres s operators
- They must be re gularly maintai ned
  - Calibration is a 15 minute to 1 /2 hour proces s
  - Clogging of no zzles has been an issue in pa st

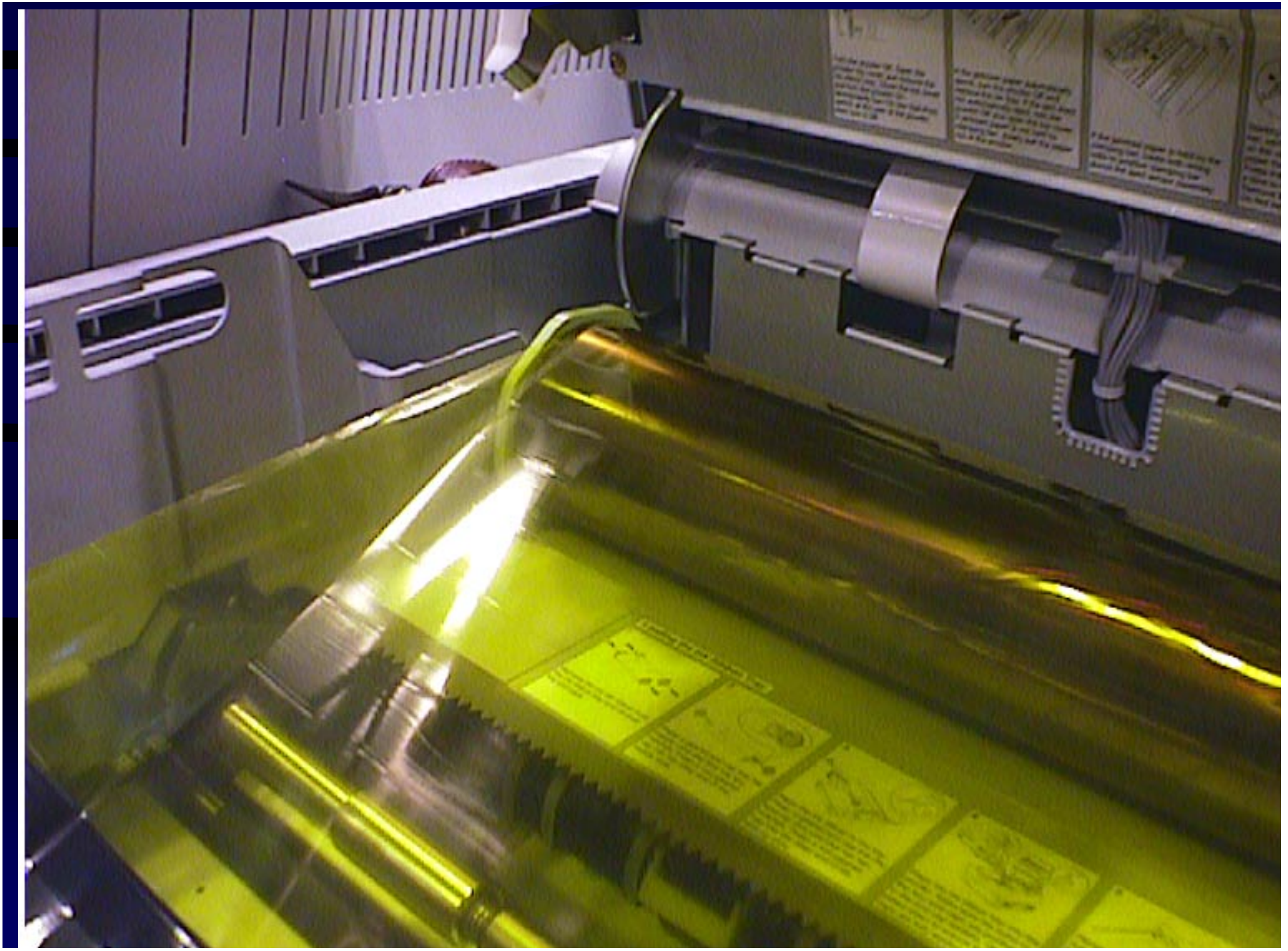
Dye Sublimation

- Also called Ther mal Dye Diffusion , these proofers utilize thin plastic co lor donor in th e form of a roll , usually referred to as a ribbon
- A single ribbo n carries all fou r process colo rs
  - the first quart er of the ribbon is yellow, the second quarter is mage nta, the third q uarter is cyan and the final section is bla ck
- Signals from th e microprocesso r cause a motor to fast-forward throug h the ribbon to the appropriat e color section

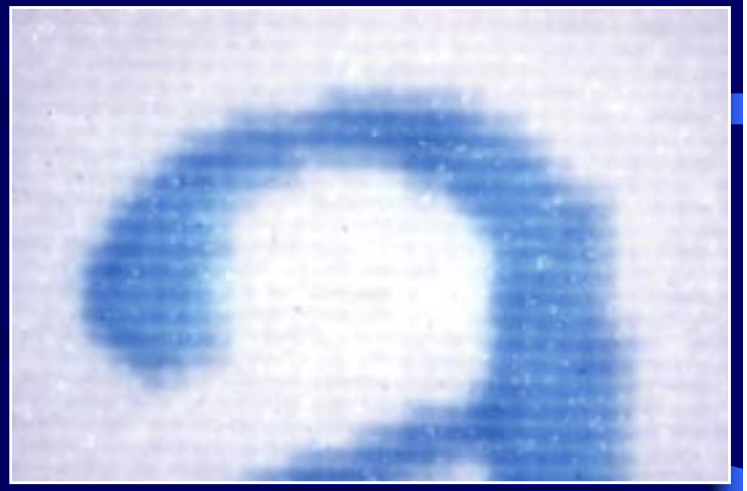
Kodak DCP 9000

Dye Sub: How it Works

- The dyes on th is ribbon are turned into gas by the application of thermal energy
  - not a laser beam !
- A small metal stri p is heated to on e of 256 different tempera tures to produc e the needed thermal energy
- This vaporizatio n occurs in close proximity to the special receiver paper, which a bsorbs (or sublimates) the c olored gas



Dye Sublimation



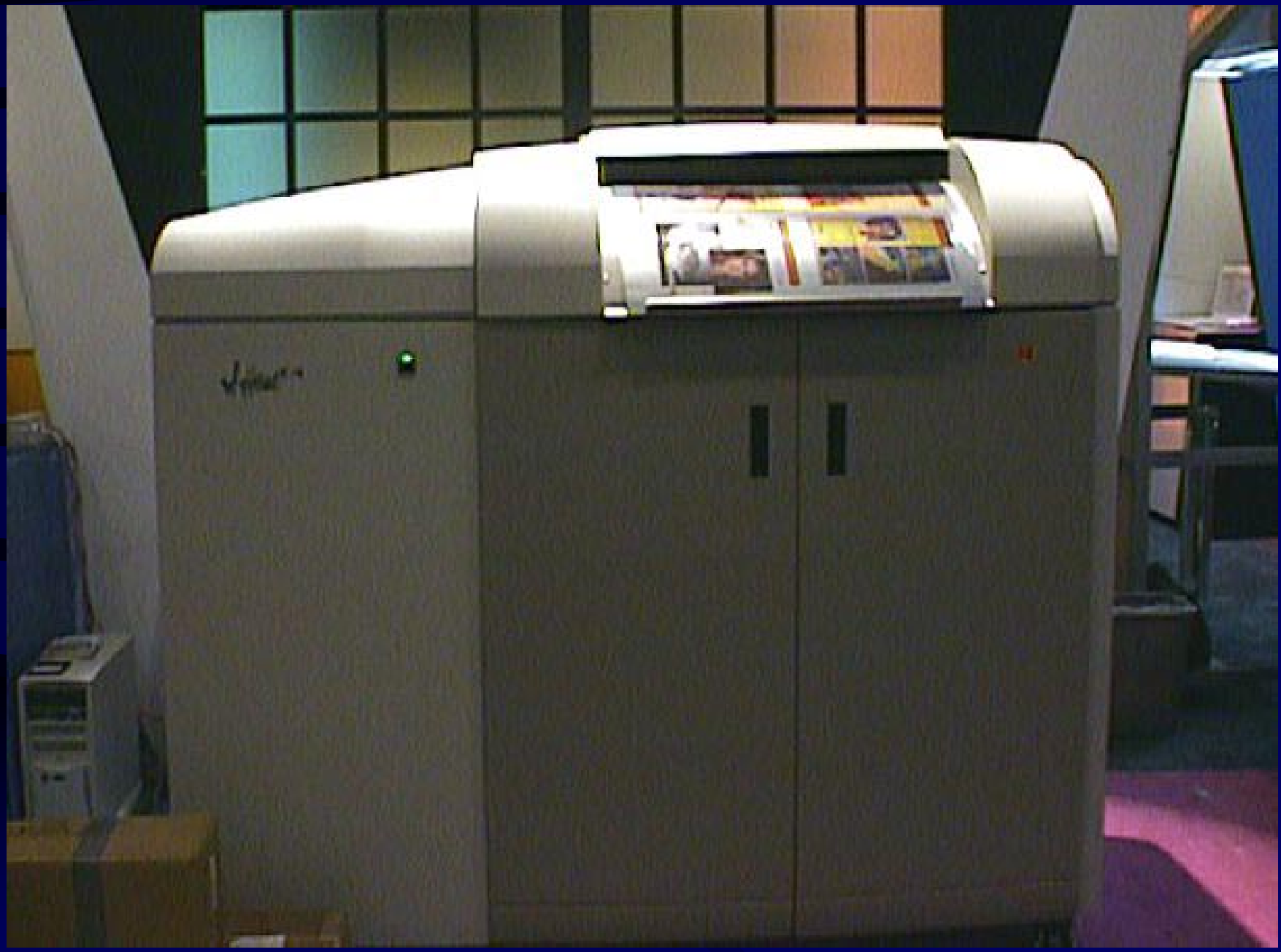
- Until the adve nt of quality in kjet, one of the majo r digital proofin g technologies used
- Advantages in clude:
  - Low cost of b oth the device a nd the consu mables
  - easy to set up and maintain
- Disadvantages include:
  - low resolution (300 to 400 DPI maximum)
  - difficulty rende ring certain co lors in shadow a reas

Laser Dye Sublimation

- This term refers to the Kodak Approval's method of imaging proofs
  - the principle is similar to laser ablation
- The Approval images proofs by using a laser beam to vaporize varying amounts of colored dye from a donor sheet
  - The laser turns each spot of color into gas, which is quickly deposited onto a sheet of silver mylar
  - After all colors have been sublimated, the mylar sheet transfers the CMYK image onto the final substrate

Kodak Approval XP-XP4

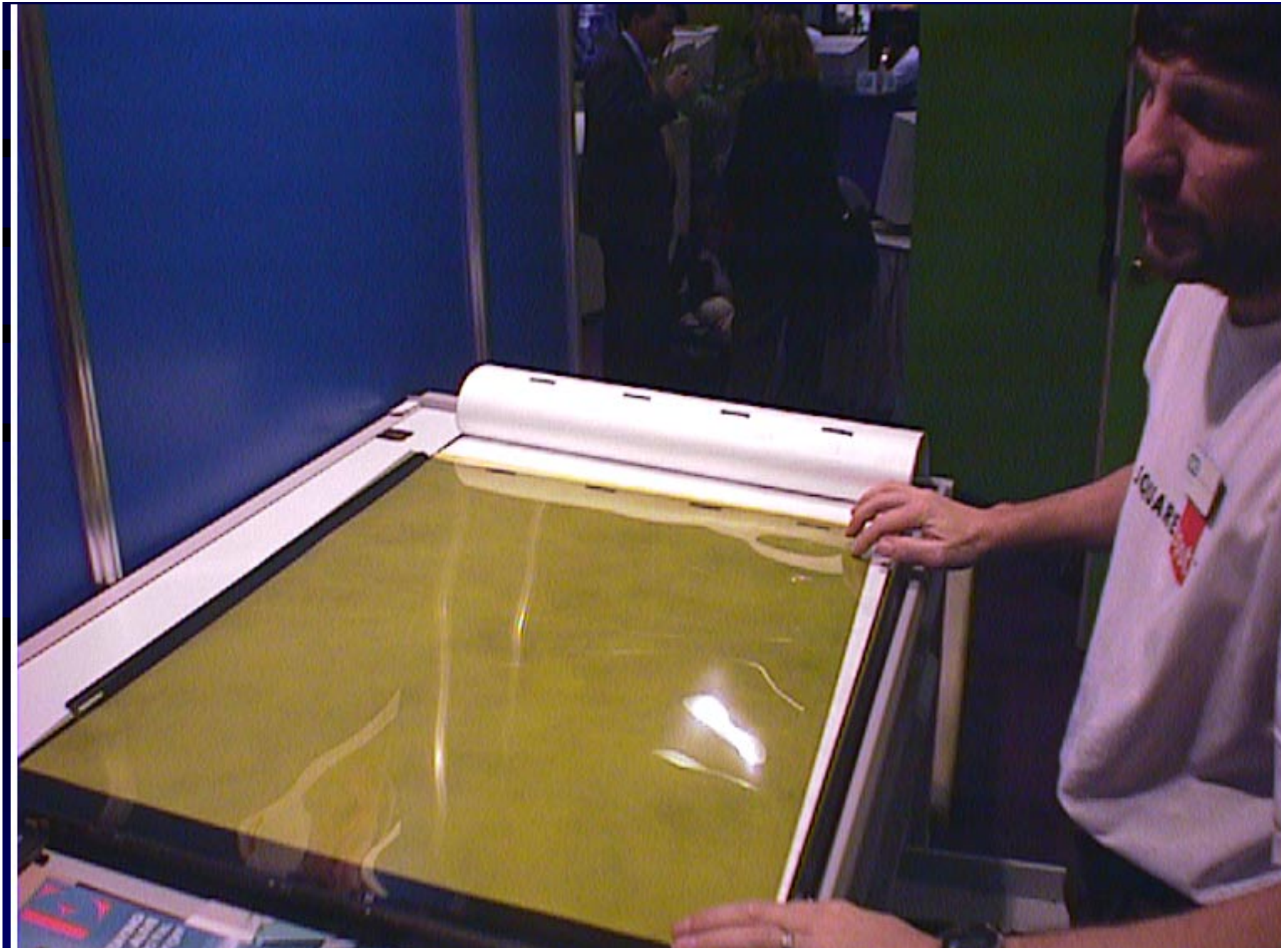
- Produces true h alftone dots
- Resolution
  - 2400 or 2540 dpi (must be selected at time of purchase)
- Media size
  - XP - 2 page, XP4 - 4 page on man y different sub strates
- Interface & spe cial features
  - Can interface wi th many differen t RIPS, ROOM
  - With Recipe Col or - metallics and full Pantone set can be reproduced



Kodak Approval XP4

IR Thermal Laminate Proofs

- Imation's Matchprint Laser Proof allows the creation of proofs with exactly the same halftone dots that will appear on the plate
- Using your platesetter, you'll image heat-sensitive materials with a thermal laser
  - CreoScitex uses Imation Matchprint LaserProof for the **Spectrum** proofing option on Trendsetters
  - Presstek has also integrated this material to work with it's platesetters - the system is called PEARLhdp




1700

Dot Do's

- Once school of thought believes that halftone dots are required on contract proofs as the only way to show moire patterns and complex trapping
- There is a comfort level associated with dot-based proofs; we're used to seeing them
- Dot-based proofing systems, like laser ablative or IR thermal laminate proofs use colorants that more closely match printing inks

Dot Don'ts

- The other scho ol of though t holds that the re is no advantage to d ots, especially in a digital pro ofing environment
- print buyers ca re about colo r accuracy, wh ether the printed produc t matches the pro of
  - Many wouldn' t even know h ow to examine dot structure
- Advances in p rint heads, prin t engine techn ology and color manageme nt systems mean color fidelity of inkjet systems is only growing and is predicted to soon pass that of la ser ablation tec hnologies

Bottom line: Money talks!

- The main reason that inkjet proofs, and most particularly, drop-on-demand inkjet system will continue to gain market share is that they are must cheaper than other quality systems
  - Equipment:
    - DOD inkjets engines can be had for $10,000 - $15,000
    - CFIJ systems can go for up to $ 70,000
    - Thermal ablative systems range from $80,000 to $200,000
    - Extras, like service contracts are priced accordingly, too
  - Consumables:
    - DOD inkjet proofs are about 1/4 the price of analog or halftone digital proofs!

Some dollar figures

	List Price per sq /ft finished
Analog Proof (average)	$12.50
Thermal Ablativ e (average)	$11.75
Digital Waterp roof	$ 5.00
DOD with special papers	$ 3.50

Assuming a usage of:
10 4-up (22" x 28") proofs per day or 42.78 sq/ft/day
If 261 days of operation, total square ft usage per year
Would be 11165 sq/ft per year

	Avg Sq ft	*Total Sq ft/yr*	*Annual $$*
Analog proofi ng average	$12.50	11165	$139,563
Thermal ablati ve average	$11.75	11165	$131,189
Digital waterp roof	$ 5.00	11165	$ 55,825
DOD with special papers	$ 3.50	11165	$ 39,078

Savings of $100K per year just in mater ials!

Remote Proofing

- When we talk a bout remote pro ofing, we mean providing som e kind of a pro of to the clien t at their site.
- This can take the form of a sof t proof, an on-screen only rep resentation o f a piece
- Or, it can be a h ard proof, whic h will print ou t on a printing devi ce placed onsi te with the clien t

RealTimeProof

Netscape: Demo Project Contents

RealTimeProof™

Guest User | Logged in since: Mar-12-2001 20:22 Log-Out | Recent | My Profile

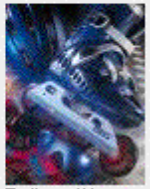
Workspaces | Address Book | Events | RTP Applications | Search | Help

RealTimeProof Demonstration (Click Here to Begin) / Demo Project

Workspace: RealTimeProof Demons Project: Demo Project

Role: Reviewer

New Folder | Move | Copy | Delete | Rename | Upload/Download | Invite | Manage

File Name	Folder/File	Publishing Status	Reviewing Status	Type	Size	Uploaded	Modified	Annotations
 Rollers.tif	Annotations History Information Versions (1) 1 Page	In Progress	Apply Corrections	TIFF	75.373 mb	Mar-09-2001 01:50	Mar-09-2001 19:11	5
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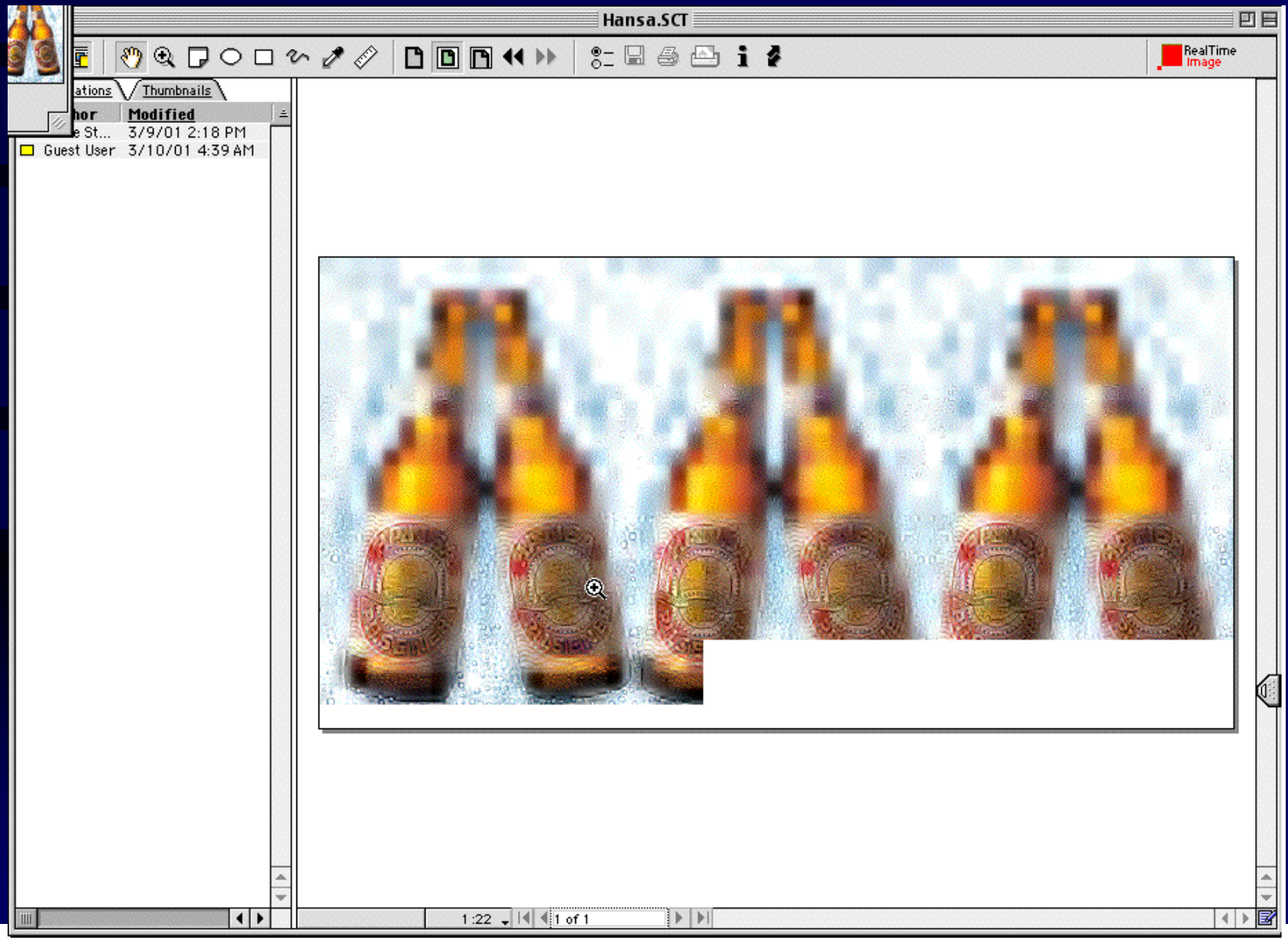
RealTimeProof



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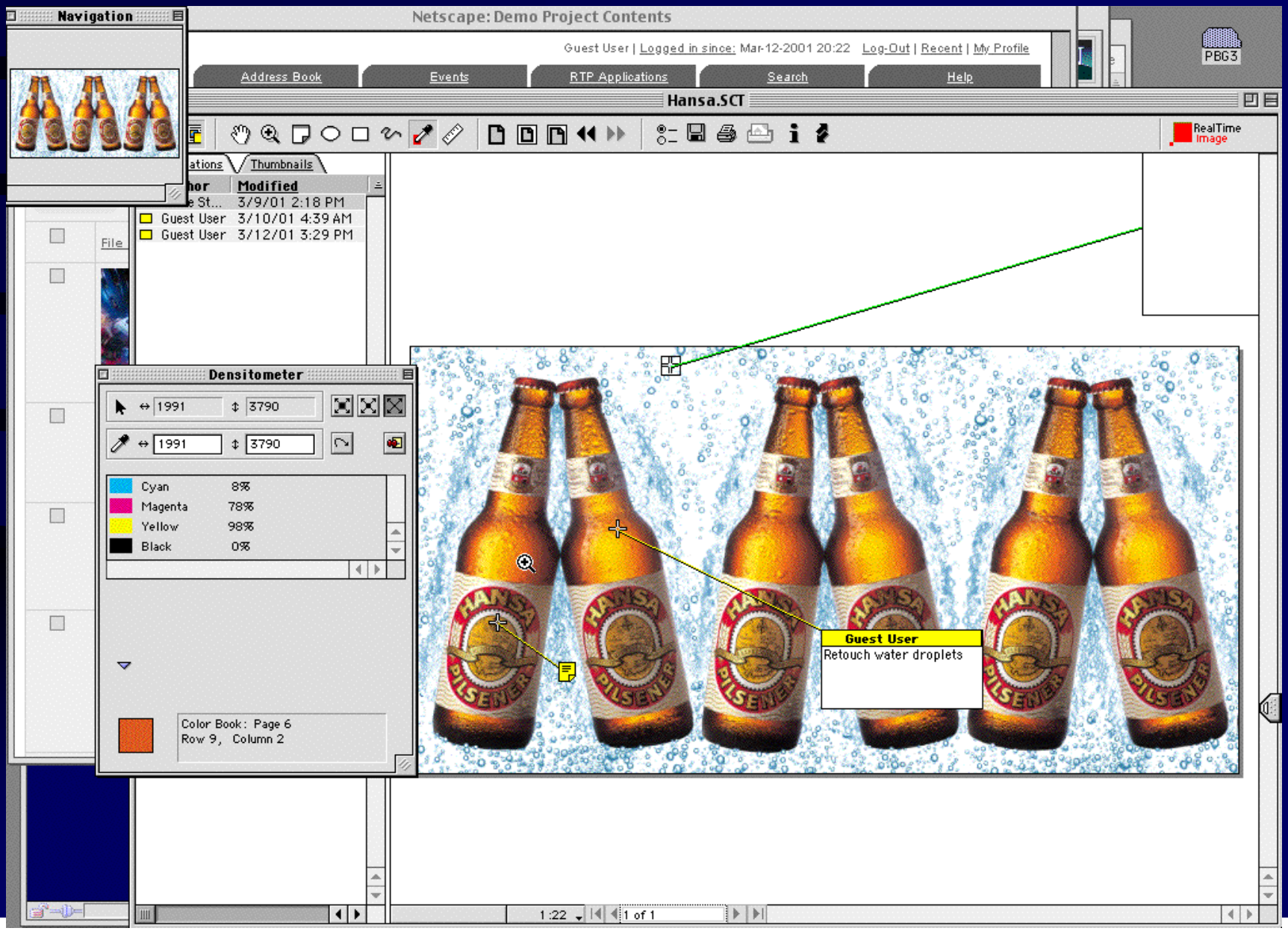

Communication considerations

- The type of co mmunication meth od used depend s upon the number of proo fs which will be generated on a daily basis
  - More obviousl y means a faster protocol will b e needed
- Must be high s peed connectio n
  - ISDN direct singl e line= 50 mega bytes per hour
  - ISDN direct multip le line= 200 megabytes per ho ur
  - SDSL = speeds ran ge from 50 mb to 400 mb per hour
  - Tier 1 internet T1 line= 400 me gabytes per ho ur
  - Private direct T1 = 600 megaby tes per hour

Remember…
a reliable, consistent, accurate digital proofing system is the cornerstone of an all–digital workflow

Thanks for Listening!