

Strategies and Approaches for Successful Pad Print Decoration in the Modern Marketplace

Presented by:

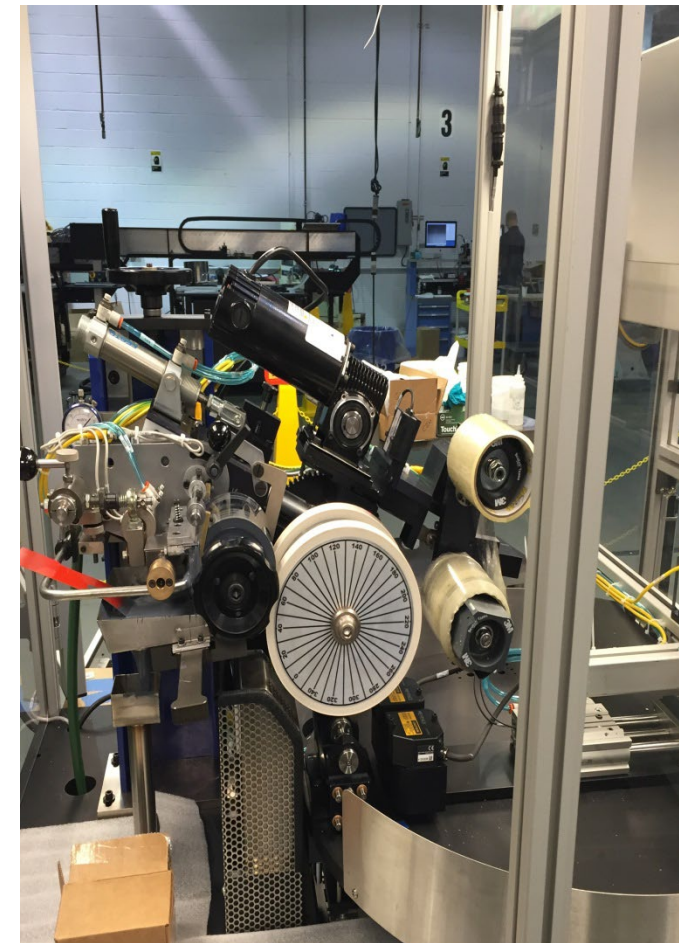
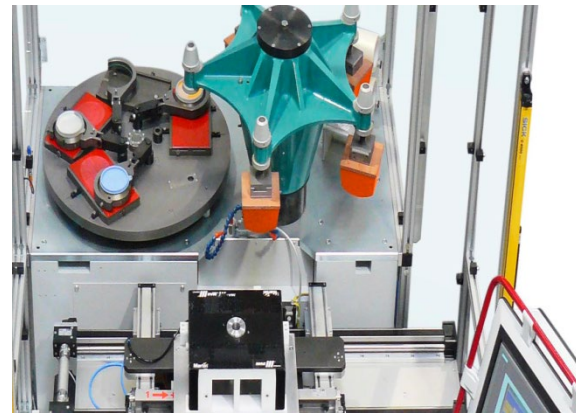
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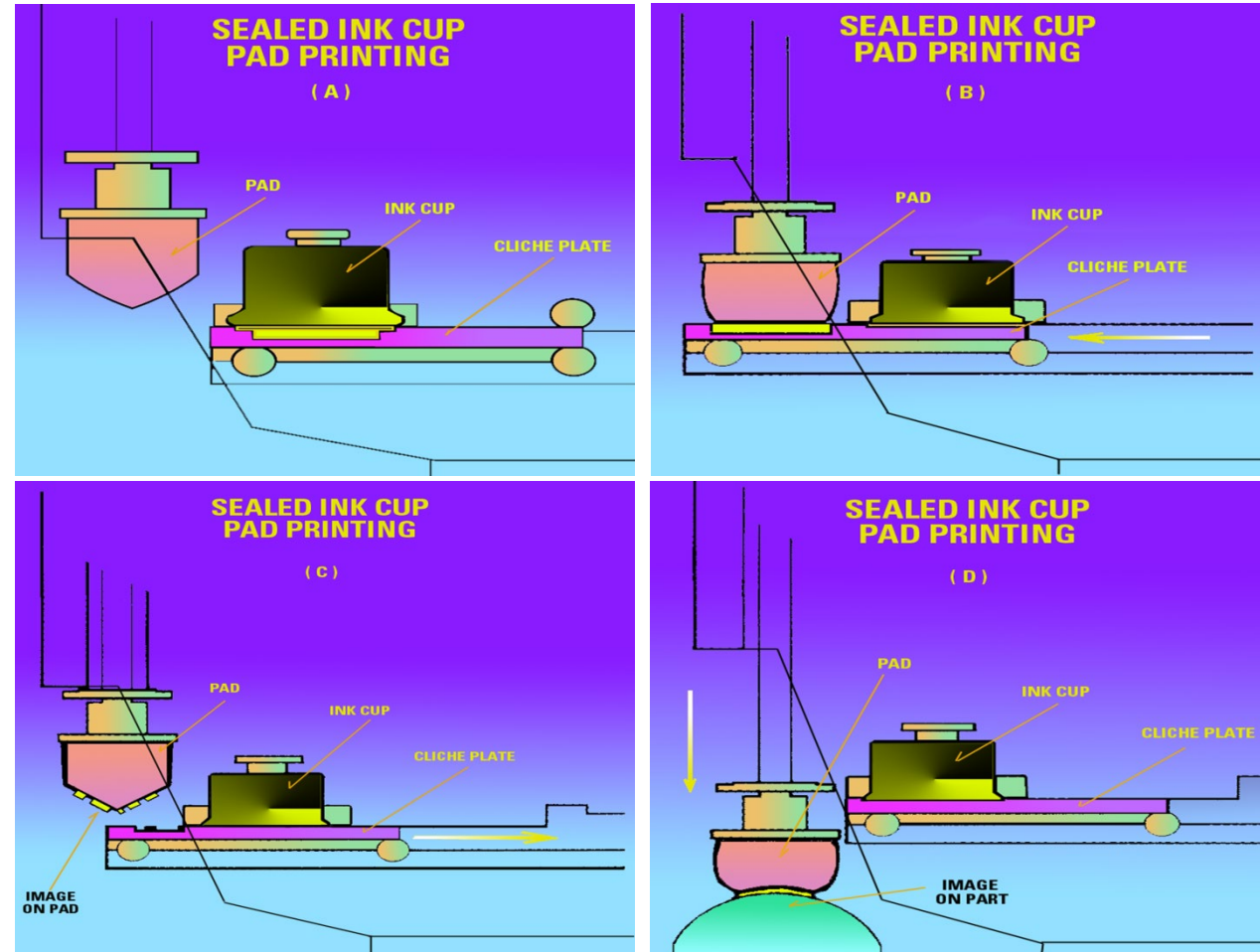
Pad Printing Technology



- Pad printing is a “flexible” printing technique that applies ink to a variety of substrates
- Ink can be applied to almost any substrate, from foam to glass with plastics being the most common
- It is ideal for single concave, convex, cylindrical and flat objects

General Overview – Pad Printing

- Wet ink process
- Similar to gravure printing
- Can be operated stand-alone, semi-automation, or full turnkey automation
- Ideal for 3D surfaces



Pros / Cons – Pad Printing



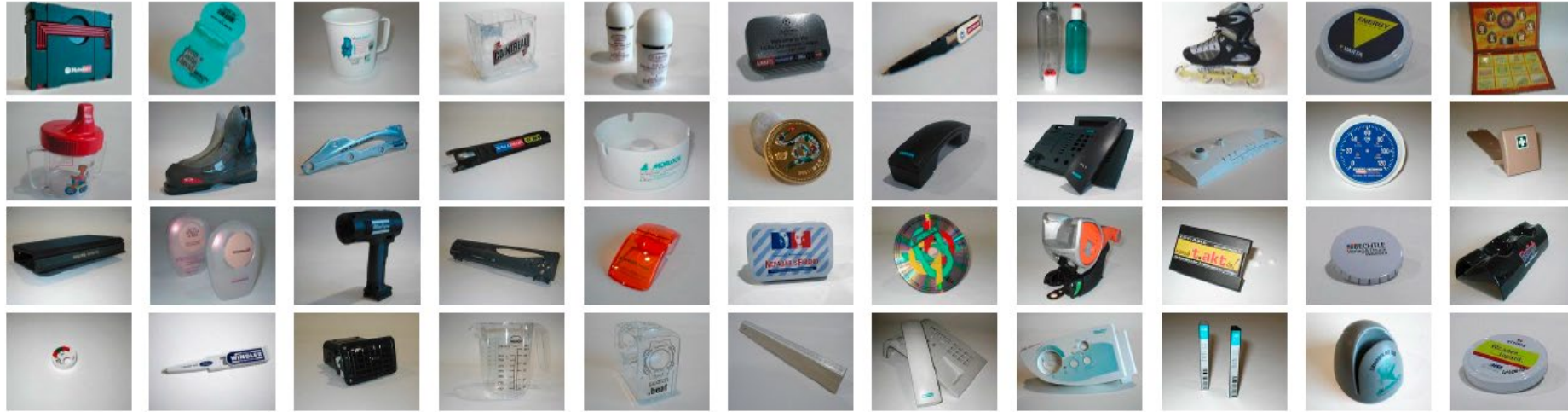
Pro's

- Ideal for irregular and compound shapes
- Inks available to print on a wide variety of substrates
- Fine detail capability
- Very low cost per image
- Multi-color capability
- Ideal for clean room applications
- Process is forgiving of part-to-part variation

Con's

- Wet process means ink cleanup and disposal
- Cannot do variable data
- Cannot print chrome metallic gloss look
- Longer runs recommended to be cost effective

Markets



Decoration for various substrates

- Medical
- Cosmetics & Personal Care
- Electrical
- Ad Specialty
- Sporting Goods
- Appliances
- Automotive



Choosing the Right Pad Printer for the Job

- Budget
- Image size
- Part considerations
- Number of colors
- Number of ink hits
- Target cycle rate
- Annual volume
- Number of operators
- Special considerations



Types of Pad Printers

Compression Drives

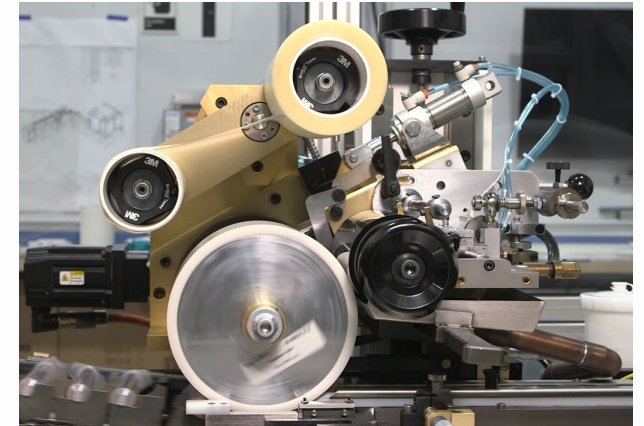
- Vertical Pneumatic
- Horizontal Pneumatic
- Vertical Servo
- Vertical Electromechanical
- Rotary

Ink Cup Size

- Typically 60mm, 90mm, 130mm
- Others available depending on system origin (ex. Europe varies, Some larger systems available)

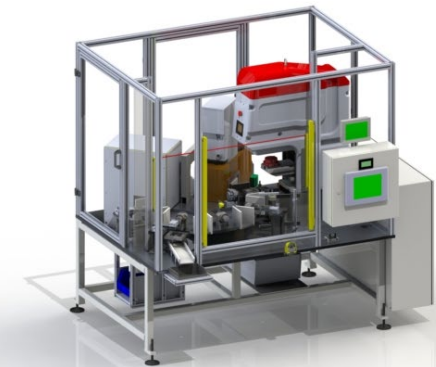
Print Heads per system

- Single head most common
- Multi-head from 1 – 4 typical
- Combination systems



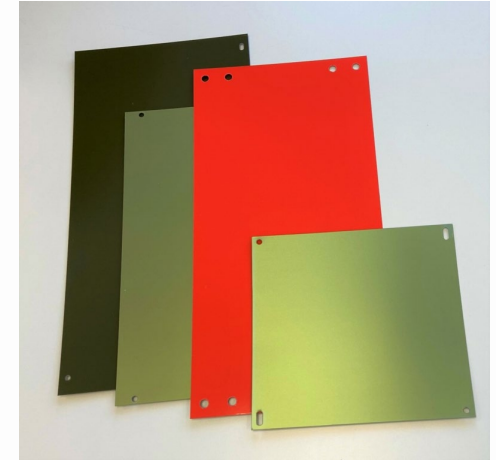
Automation

- Semi automated to full turnkey systems
- Limits labor costs
- Maximize throughput
- Initial investment offset through long term cost savings
- Multiple options for system transport and feeding
- Stand alone systems -> Integrated systems



Choosing the Proper Cliché

- Correct cliché material for the application
- Correct cliché based on the artwork
- Correct cliché based on the machine
- Determining the artwork position on the cliché
- Determining etch depth
- Image quality required



Ink Considerations

- Chemical resistance (Cleaners, solvents, cosmetics, etc.)
- Wear resistance (Push buttons, high abrasion, impact resistance)
- Sterilization – Autoclave, ETO (gas), Gamma radiation
- Adhesion requirements vary
- Regulatory considerations
- Material compatibility
- Environmental impacts



Pad Printing Ink Considerations

Single Component Inks

- Limited chemical and wear resistance (excluding UV)
- Longer pot life
- Some have strong temperature and UV resistance
- Fewer components reduce mixing errors
- Increased stability when used in high temperature environment



Two Component Inks



Advantages

- Increased chemical and wear resistance
- Increased adhesion to chemically resistant materials (ex. Metal and Glass)

Challenges

- Limited pot life
- Requires exact measuring and mixing of additional components with scale
- More sensitive to warmer environments
- Can out-gas and expand in a sealed cup

UV Inks



Advantages

Single
component ink

Outstanding
chemical and
wear resistance
(Most durable)

Long pot life

Full cure with
exposure to
curing UV

Easily cleaned
prior to curing

Immediate use
after curing

Challenges

- Requires UV curing equipment (must be guarded)
- Ink is wet until cured
- Cured ink cannot be removed with solvents
- Limited formulations and substrate compatibilities
- Less flexible

Dry versus Cured

- UV inks dry in nano-seconds and are fully cured
 - Can handle, assemble or drop to bulk immediately
- Single component solvent inks will dry quickly, however curing takes time
 - Must have oxygen to continue the curing process
 - Post cures such as air or heat can accelerate
- Dual component inks with hardener typically take longer to cure
 - Often combined with a post heat cure
- Specialty inks available for specific use
 - Polypropylene inks designed for use without pretreatment
 - IR inks instantly cured with IR lights (black only)



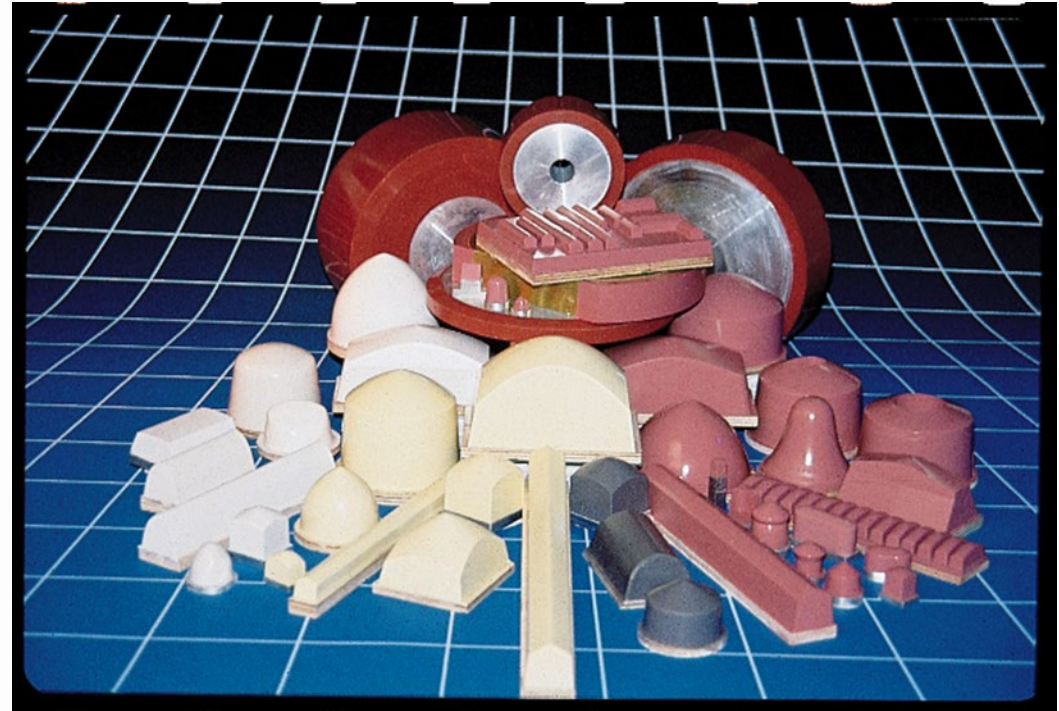
Special Considerations



- Regulations
 - Toy Compliance, Med Class VI, etc
- Materials
 - Polyolefins, Nylons, ABS PC
 - Pre and post cure options
- Environment
 - Temperature, Humidity, Air Flow
 - Optimal: Clean, 68-72 degrees, 40 – 60% humidity

Choosing the Proper Transfer Pads

- Correct cliché material for the application
- Correct cliché based on the artwork
- Correct cliché based on the machine
- Determining the artwork position on the cliché
- Determining etch depth
- Image quality required



Transfer Pad Basics

- Typically constructed of silicone
- Two basic shapes – Cone and V Pad
- Sizes range from a few ounces to over 50 pounds
- Range of Durometers to meet specific applications



Transfer Pads - Shape

Cone Shape Transfer Pad

- Most common – pad body with a defined tip
- Pad radiates down and away from tip at a specific angle

V Shaped Transfer Pad

- Resembles a “rooftop”
- Pad radiates outward and downward from linear apex

Pads compress on plate with a rolling effect

- Pushes air away

Greater the pad angle, the less air entrapment

- Eliminates pin holes

Avoid having image contacting the tip of pad

- Could result in ink voids

Transfer Pad - Size

Must be sufficiently large enough to avoid image distortion

3 Key Factors

- Must fit machine and clear obstacles (doctor blade, etc..)
- When compressed, can't stretch to ink buildup near cliché perimeter
- Machine must be able to fully compress the pad



Transfer Pad - Hardness

- Five levels of durometer from 30 shore – 70 shore (increments of 10)
- Generally, the harder the pad the better the image quality
 - Harder pads maintain shape when compressed resulting in better roll and less air



Transfer Pad Considerations



Pad Maintenance

Lifespan of pad 10K – 100K

- 50K transfers is the average

Pads dry over time making it harder to release image

- Silicone oil treatments extend life
- Alternating pads in multishift operations helps

Choosing the Right Pad

- Flat/Smooth Standard
- Flat/Textured Hard
- Smooth/Radius Softer

Choosing the Proper Cliché



Correct Cliché Material

- Long production runs require thick steel
- Intermediate to short runs can utilize steel foils or temporary cliché
- Plate cost considerations

Correct Cliché Based on Artwork

- Fine text or small images may require depth / fine screen
- Large open areas require optimizing art direction
- Screening can eliminate air traps and pinholes

Choosing the Proper Cliché



Correct Cliché Based on Machine



Must fit the specific printer



Foils and Temporary cliché require magnetic plate



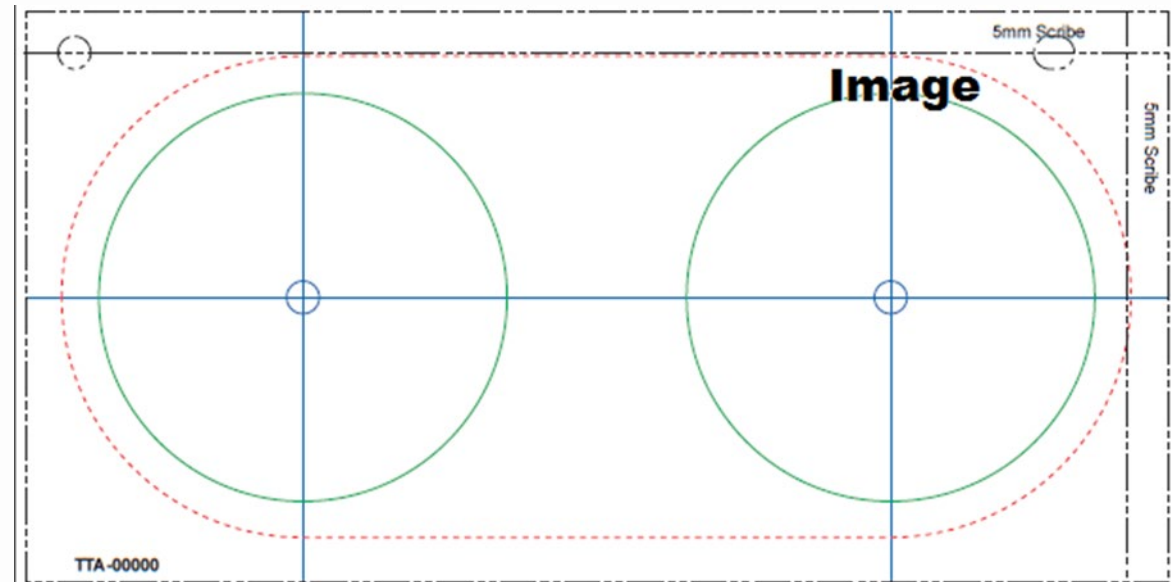
Must determine centerline of specific printer

Determining Etch Depth

- Shallow
 - Printing deep textures
 - High Cycle Speeds
 - UV Curable Inks
- Deep
 - Very fine images
 - Slow cycle speeds
 - Increased wear protection

Determining Artwork Position

- **Determining the artwork position on the cliché.**
- **Always avoid the tip of the transfer pad.**
- **Always confirm the boundaries of the ink cup.**
- **Understand the pad limitations.**



Cliché Characteristics

Thick Steel Plates

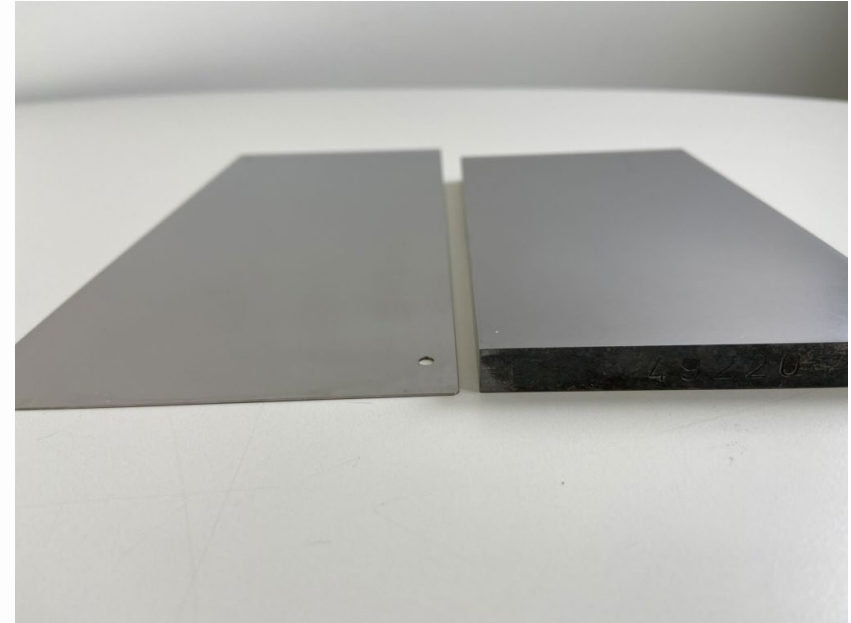
- Up to 1 million impressions
- Most durable and resistant option
- Highest precision image
- Critical Image Alignment for high tolerance applications
- Acid wash



Cliché Characteristics

Thin Steel Foil Plate

- 150,000 impressions
- Critical image alignment for high tolerance applications
- Crisp, clean lines
- Acid wash



Cliché Characteristics

Red Polymer Plates

- 100,000 impressions
- Highest quality print and highest longevity of all plastic plates
- Alcohol wash
- Red color
- Variable depth

Express Plates / Orange Plates

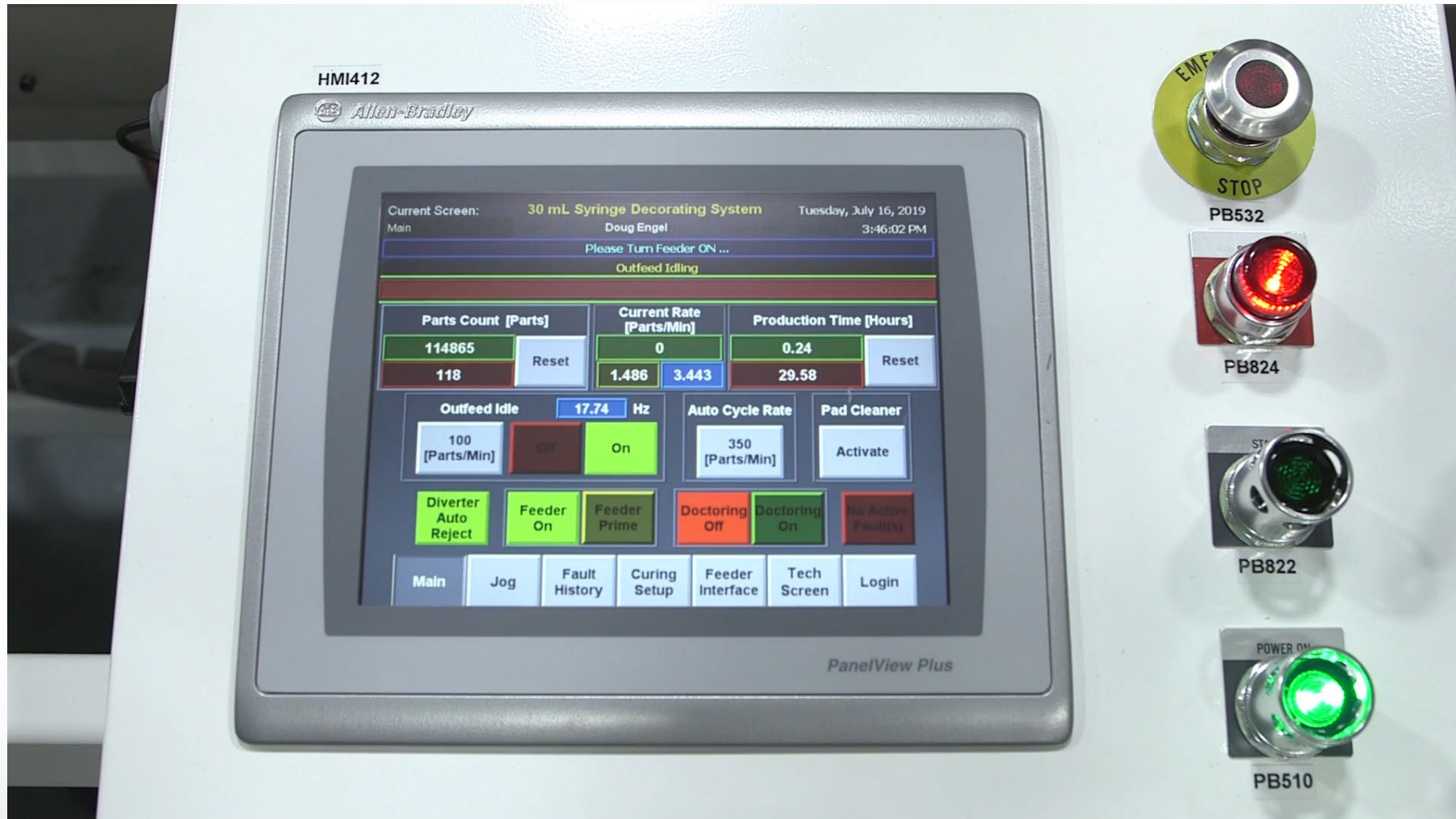
Express Plates

- 20,000 impressions
- No screen, green color
- Alcohol wash 20 – 30 microns

Orange Plates

- 15,000 impressions
- Finer detail due to small particle
- Water wash, variable depth

Video – RTI Syringe Printing System



Video – Medical Part Printing

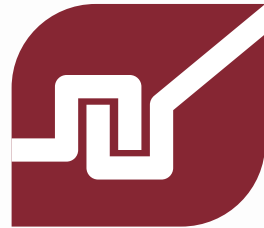


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