On Press Anilox Roll Laser Cleaning - Pros and Cons -

Jeff Paduano
President
ARCS – Past and Present

• Company founded 1984; Headquartered in Hatfield, PA
• Pioneered Soda Method for On Press Roll Cleaning
• Experience cleaning thousands of rolls over 3+ decades:
  ✓ Narrow web, Wide Web, Corrugator, Ceramic, Chrome
  ✓ Water based ink, UV, Solvent, Adhesive, Glue, Cross-linked
• Cleaning Service Options:
  1. On Site: On or Off Press (East Coast and Midwest)
  2. Off Site: Philadelphia / Greensboro / Grand Rapids
• Systems too: Laser Systems and Baking Soda Equipment

• Visitors Welcome! Roll Cleaning Demos, Anicam, Other cleaning technologies (dry ice blasting, vapor blasting, parts cleaning, eco-friendly paint and rust removal methods, metal finishing cabinets)
ARCS + Lasers Timeline

- Involved with technology for over 9 years
- Affiliated with linear laser technology for 2 years
- Witnessed first hand pros and cons of laser cleaning
- European research
- Decided to build a better mouse trap HERE!
- Same Laser Source technology also in use today for ongoing restoration effort at Notre Dame Cathedral
- Cleaned hundreds of anilox AND chrome rolls using our laser technology to date
Laser Cleaning Advantages

• A Better “Clean”
• Energy Efficient
• Low daily operating costs
• Low Maintenance
• No chemicals, No water
• No Media
• No Solid or Liquid Waste = Sustainable
Effective and Precise

• Effective – Often only Solution that works:
  ✓ Heat Sealed Ethylene Acrylic
  ✓ Acrylic Coating W/ Wood Finish
  ✓ Co-Polyester
  ✓ 2% solids primer & platinum based silicon
  ✓ Nylon-based Epoxy Ctg
  ✓ High-Bond Abrasion Resistance Ctg
  ✓ Silicone Rubber
  ✓ Metallic-based coatings (tin, platinum, rhodium, others)

• Precise – Chrome Rolls too!
  ✓ Careful - Wrong Settings will cause Chromium Oxide build up
How Does a Laser Work?

1) Laser energy absorbed by unwanted material
2) Excites molecules
3) Molecular bonds break
4) Atoms / molecules get “ejected”
5) Contaminants vaporized / “ablated”
6) 3 Concurrent Processes
   ✓ Photomechanical
   ✓ Photothermal
   ✓ Photochemical
Safety: Laser Classes

- **Class I:** *Low Power*; Safe from all potential hazards (DVD player, Laser printer, **OFF-PRESS ECLIPSE LASER**)
- **Class II:** *Low Power*; avoid prolonged exposure to eyes; human “reaction” is sufficient safety measure (laser pointers, range finding equipment)
- **Class IIIR / IIIB:** *Intermediate Power*; may need to wear protective eyewear (spectrometry, light shows)
- **Class IV:** *High Power*; engineering and administrative controls must be followed; protective eyewear required (most industrial lasers fall into this category, **PORTABLE ECLIPSE**); safety requirements governed by OSHA
Safety First... Portable System

- Eyes....................YES
- Ears.....................NO
- Lungs...................YES
- Skin......................YES

PPE & Containment Gear

Safety Laser glasses

Safety Beacon

Special Portable Partitions
Class 1 VS. Class IV

Laser Safety Glasses Required
Containment

- **Objective:** Keep anyone around work area from being exposed to laser light if not wearing glasses.

- **How?**
  - Opaque Portable partitions
  - “Curtain-style” partitions
  - Whole Press vs. each station?
  - Off hours vs. regular shift work
Containment Examples
“Built-in” Containment

Gopfert Press
# Eclipse Filter System

<table>
<thead>
<tr>
<th>Item</th>
<th>Portable</th>
<th>Enclosed (R1000/R2000)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-Filter #1</td>
<td>35% @ 5 microns</td>
<td>N/A</td>
</tr>
<tr>
<td>Pre-Filter #2</td>
<td>MERV 11 (85% @ 3 microns)</td>
<td>MERV 11 (85% @ 3 microns)</td>
</tr>
<tr>
<td>HEPA (not washable)</td>
<td>99.97% @ .3 microns</td>
<td>99.97% @ .3 microns</td>
</tr>
<tr>
<td>Gas / Odor filter (not washable)</td>
<td>Blended bonded carbon (superior)</td>
<td>Blended bonded carbon (superior)</td>
</tr>
<tr>
<td>Sensors ?</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>
Laser-Safe Cleaning

• Laser Scan Shape
• Laser Power (Watts – more is better)
• Laser Pulse Frequency (critical value)
• Other Parameters that Matter
  – Traverse Speed
  – Surface Speed
• Auto Shut-Off Feature
Line Scanner vs. Circular Scanner

NO hot spots **AND**
2x as fast: Leading **AND**
Trailing Arches

vs
Auto Shut Off Feature

The Surface Speed is Slower than the Minimum Speed!
On Press Set Ups
Easy Focus System
Laser Guided Focusing System
Triangulation Ensures Proper Laser Focal Distance

Two Laser “Pointers”

Roll

Laser Head
Intuitive focusing system enables quick, precise focal depth each time.
Laser Guided System
Once 2 pointer beams become 1 System in Focus…
1 Line = Perfect Focus
(critical for optimal cleaning results)
And now a Short Video...
What about my presses?

- Cable length 15’ (can shift system as needed)
- Focal distance 25 cm (+/- less than 1 cm)
- Similar to soda set-up – sometimes more room needed
- Can laser light be contained 100%?
Portable Laser System Recap

- **Pros**
  - Leave “Problem” rolls in-press
  - Tackle tough residues / “A Better Clean”
  - Flexibility (Off Press option too…)
  - Easy to use and maintain equipment
  - No consumable inventory to manage or purchase
  - No secondary waste stream

- **Cons**
  - Additional Safety Requirements
  - Extra Large Rolls not good candidates
  - “Thick” Build Up will take longer…
  - Initial Capital Investment
Questions?

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