Press Felt Optimization
Chemical Strategies and Trends in Recycled Board

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ASHLAND
With good chemistry great things happen.
Agenda

• Application Strategies
  – Passivation
  – Batch-on-the-Fly/Batch Down
  – Continuous/Semi-continuous

• Chemistry Strategies
  – Alkaline
  – Acid
  – Solvent
  – Enzyme

• Trends in Recycled Paperboard Treatments
Felt Chemical Application Strategies
Why Do We Chemical Treat Felts

- Uniform water removal
- Uniform CD moisture profiles
- Reduced press section deposition
- Reduced press related defects/breaks
- Increased felt life
- Increased paper/board production

- **Improved machine efficiency**
Felt Passivation

Felt Fibers Are Surrounded With A Layer Of Polymer and Surfactant Molecules Which Block Contaminants From Contacting And Adhering To The Felt Structure
Wet Felt Chemical Passivation

1 - High Pressure Shower
2 - Uhle Box Lubrication Shower
3 - Passivation Application Shower

High Pressure Shower
Angled 15-30 degrees
Chemical Passivation Application

• Most common on forming fabrics and sheet side felt rolls

• Chemistry Options
  – Straight Cationic Polymers
  – Cationic Polymer/Surfactant Blend
  – Non-ionic polymer
    • Allows for Recycled WW Use in Application
Batch Felt Cleaning Options

• Batch On The Fly Cleaning
  — Pros
    • Clean felts on the run (no downtime needed)
    • Cleaning on regular basis keeps felts more open
  — Cons
    • Proper Control Needed to Avoid Operational Issues

• Batch Down Cleaning
  — Pros
    • Higher Concentration— Most thorough way to clean felts
  — Cons
    • Downtime required
Press Felt Conditioning Showering (Chemical Application Shower)

- **Best possible location**
- **Reasonable location**
- **HP shower acceptable for some conditioning applications but not for batch cleaning**
- **Lube shower and fan shower worst performance**
“Fingerprinting” a Batch on the Fly Wash

- Recommended Conditions - Alkaline
  - pH shower 11.5 -12.5 (to low end on mechanical grades)
  - uhle box discharge pH 10.5 -11.5
    - change chemical feed concentration accordingly
    - immediate increase and taper-off of turbidity in effluent
    - Optimize time of chemical feed
  - maintain shower flow after chemical for rinse
    - monitor pH, conductivity back to pre - BOTF levels
Batch on the Fly Fingerprint

#8PM Batch on the fly

![Graph showing changes in turbidity and pH over time. The x-axis represents time, ranging from 8:05 to 8:49, with specific time points marked. The y-axis represents turbidity and pH, ranging from 0 to 3500. The graph includes bars for turbidity and a line for pH, showing a trend over time.]
FELT CONDITIONING PROGRAM MONITORING

• Uhle Box Vacuum
  – Indicates Degree of Felt Openness
  – Increasing Vacuum May Mean Felt Filling, Compaction or a Wetter Felt
  – Loss of Vacuum May Indicate batt loss or uhle box cover issues
Batch Wash Uhle Box Trends – Impact of Washing

- No Wash
- Batch Down Only
- Batch Down & BOTF
- BOTF Only

Uhle Box Vacuum vs Time (days)
FELT CONDITIONING PROGRAM MONITORING

• Felt Perms
  – Indicates Porosity by Jet Water Flow
  – Can do Cross Directional Scans to Identify Problem Areas
  – Relative Measurement Based on Felt Design
  – Correlation to Vacuums May be Beneficial in Determining Felt Wash Need or Cleaning Results
FELT CONDITIONING PROGRAM MONITORING

#3 PM 1st Bottom Felt
Cross Direction Scan

Permeability (ml/min)

Front                                          Middle                                          Back

Permeability (ml/min)

FELT CONDITIONING PROGRAM MONITORING

Felt Life VS Permeability

Permeability (ml/min) vs Felt Life (Days)

- Felt 1
- Felt 2
FELT CONDITIONING PROGRAM MONITORING

• Uhle Box or Nip Weir Flow
  
  – A Direct Indicator Of Water Handling Capacity
  – Affected By:
    – Compaction
    – Wear
    – Porosity
    – Permeability
    – Uhle Vacuum

With Felt Conditioning

Without Treatment

Flow gpm

0  Time

Graph showing the comparison of flow with and without felt conditioning.
Felt Conditioning Equipment

DCS Controlled BOTF/BD System
Parameters That Impact Felt Cleaning Performance

- Shower pH (10.5 – 11.5 for alkaline in uhle)
- Shower Temperature (Sheet Temperature or Greater)
- HP Shower Pressure (250-300 psi)
- Shower Coverage and oscillation stroke length/rates
- Shower Water Solids
- Uhle Box Vacuum pump capacity - CFM
- Wet End Chemistry
- Chemical Feed System
- **Shower Position**
Felt wash Chemistry Options
What Are the Contaminants Your Dealing With

- **Solvent Extracts**
  - Stickies
  - Amide
  - Grease
  - Oil
  - Latex
  - Wax

- **Alkaline Extracts**
  - Fatty Acid
  - Fatty Ester
  - Rosin Size
  - Alkaline Size
  - Biological Slime
  - Cellulosic Derivatives
  - Starch
  - Lignin
  - Dry Strength
  - Calcium Carbonate
  - Wet Strength Resin
  - Aluminum Hydroxide

- **Acid Extracts**
  - Acid Extracts
  - Calcium Carbonate
  - Wet Strength Resin
  - Aluminum Hydroxide
Felt Analysis History - Recycled Paperboard

[Bar graph showing percentages of 2:1 CH2Cl2:EtOH Extracts, Alkaline Extracts, and Ash, with categories High, Medium, and Low represented by different colors.]

Percent of Recycled Paperboard Content by Type:
- **2:1 CH2Cl2:EtOH Extracts**
  - High: [Percentage]
  - Medium: [Percentage]
  - Low: [Percentage]
- **Alkaline Extracts**
  - High: [Percentage]
  - Medium: [Percentage]
  - Low: [Percentage]
- **Ash**
  - High: [Percentage]
  - Medium: [Percentage]
  - Low: [Percentage]
Felt Conditioning Chemistries

• Building Blocks
  – Solubilizers
    • alkali acid solvent
  – Surfactants
    • cationic anionic non-ionic
  – Polymers
    • cationic anionic non-ionic
  – Metal ion complexing agents
    • sequestrants chelants
Trends in Recycled Paperboard
Felt Conditioning Trends – Recycled Paperboard

• **Batch-On-The-Fly**
  - Most common approach with or/ without Batch Down
  - Alkaline/surfactant chemistry
  - Alkaline/Solvent Blends less common

• **Continuous or Semi-Continuous**
  - Less common as a felt cleaning practice
  - Mild Acid semi-continuous for nozzle cleanliness
Felt Conditioning Trends – Recycled Paperboard

• Surface Passivation Treatment
  • Common practice on Forming Fabrics
  • Common practice on Sheet Side Roll Surfaces
  • Traditional Cationic Polymers - NEW Nonionic Chemistries
  • Press Fabrics – currently not common

• Environmental Constraints – Desire for “Green” Chemistry
  • NPE Free Surfactants – across entire North America
  • Petro based Solvents (High VOC and Flash Point)
    • Agricultural based solvent chemistries
    • Enzyme blends
THANK YOU!

Questions?