Case Study: MMNA and PPG

Applying BC4200NP Paint Detackification Chemistry at the Normal, Illinois, MMNA Automobile Assembly Facility

CMS Forum
10/25/06
• The company’s only North American manufacturing facility began construction in 1985 and is located about 150 miles south of Chicago, IL
• The automobile assembly plant is one of the most technologically advanced in the world, utilizing nearly 1000 robots housed under 2.4 million ft²
• Body parts are stamped and bumpers molded in house to produce the Mitsubishi Galant, Eclipse, Endeavor, and Spyder
• Part of an elite group of manufactures to be both ISO 9001 and ISO 14001 Certified
Mitsubishi

Environmental Stewardship

- ISO 14001:2004 certification in 2005
- 3.1 acres of IL natural prairie grass established, increasing tri-county content by 400%
- One of first OEM’s to introduce lead free rust prevention coatings
- Fully recyclable TPO bumper systems
- VOC emissions 68% beneath EPA limit and 15% less than 1995 levels
- In a five year period, landfill waste reduced by 35%
- On pace recycle 20 tons of material in 2006, generating $4.1 million in revenue.

Protecting the Environment for Our Families
Our Friends
Our Future!
PPG Industries, Inc.

- Founded in 1883 in Pittsburgh, PA
- About 31,000 employees worldwide
- Employees are largest stockholder group
- 2005 sales approximately $10.2 Billion
- Markets served:
  - Coatings: OEM Auto, Industrial, Refinish, Architectural (Pittsburgh Paint), Wood Protection (Olympic Stains)
  - Glass: OEM Auto, Replacement Glass, Architectural, Aerospace Transparences, Optical (Transition Lenses)
  - Chemicals: WWT, ChlorAlkali, Metal Treatment, Specialty Chemicals
- Down draft/water wash booth
- Numerous robotic/manual zones
- 100’ – 300’ Long
Paint Detackification
Chemicals

- Introduced to “detackify” or render the paint non-sticky / non-tacky
- Further introduced to coagulate paint and solvent particles
- Flocculants added to agglomerate smaller particles
- Specialized form of wastewater treatment
Mechanism of Paint Detackification

- Chemical Interaction
  - Charge neutralization (coagulation)
  - Favorable at low pH
- Physical Interaction
  - Chemical flocs encapsulate or coat atomized paint particles
  - Favorable at high pH
- Joint Physical/Chemical Interaction
Mechanism of Treating Solvent Borne Paints

Atomized Paint

Detackifier

Chemical Interaction

Physical Interaction

Enhanced Physical Interaction

Chemical Flocs

Detackified Paint Sludge

Flocculant (Latex Polymer)
Mechanism of Treating Water Borne Paints

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Detackifier
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Chemical Interaction

WB Solution

Flocculated Sludge

Flocculant
(Latex Polymer)

Enhanced
Physical Interaction

Coagulated Paint
Feed Points for Treating Solvent Borne Paints

- Spray Booth
- Flocculant
- Foam Depressor
- Sludge Pit
- pH Adjuster
- Clean Well
- Sludge Removal System
- Detackifier
Feed Points for Treating Water Borne Paints

Spray Booth

- Flocculant
- Detackifier

Sludge Pit
- Flocculant
- Sludge

pH Adjuster

Clean Well

Sludge Removal System
- Foam Depressor
Evolution of Paint Detackification Technology

- 1\textsuperscript{st} Generation – Clay/Amine
- 2\textsuperscript{nd} Generation – Melamine/Formaldehyde
- 3\textsuperscript{rd} Generation – Solution Polymer/Al Salt
- 4\textsuperscript{th} Generation – Emulsion/Dispersion Technology
- 5\textsuperscript{th} Generation – Naturally Occurring Polymers (chitosan, tannin, starch, etc.)
Environmental Advantages of Chitosan Technology BC4200NP

- A linear polysaccharide derived from exoskeleton of crustaceans
- Main component, chitosan, is similar in composition to keratin and cellulose
- Does not include melamine-formaldehyde resins (residual free formaldehyde)
- Is not derived from acrylic acid or other petroleum derived raw materials (ethylene, propylene)
- Is made from a waste product of food production (shrimp, crab, and lobster shells)
- Technology protected by US Patents #6,673,263 B2 and #6,858,093 B2
The Deacetylation of Chitin to Form Chitosan

\[ \text{Chitin} \rightarrow \text{Conc. NaOH} \rightarrow \text{Chitosan} \]
Advantages to MMNA of BC4200NP Technology

- Hands off, low maintenance working system
- Runs day in, day out with very little MMNA involvement
- Consistent, low suspended solids and low turbidity detackification pit water
- System Performance is Optimized
# Typical Data from MMNA

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Financial Advantages of BC4200NP Program

- Cost per pound of product is revenue neutral vs. other detackifiers
- Paint to Chemical ratio is increased with program, i.e., less overall chemical is required
- Reduced use of caustic (pH adjuster) since product is less acidic than other detackifiers
Cultural and Technological Changes at MMNA

- First Auto OEM to use this product
- Other Auto OEM’s are conducting trials
- Preliminarily installed as revenue neutral product however additional advantages have surfaced
  - Decreased water content of sludge – less time drying before disposal
  - Decreased operator input – less time needed to maintain operation
  - Decreased out of range lab analysis – less time in investigation and remediation
  - Increased dig-out intervals – lower suspended solids in pits yield less settling
  - Increased usable equipment life – lower suspended solids in return streams yield less coating, plugging, and maintenance of equipment
BC4200NP Environmental Awards

• 2005 recipient of Environmental Achievement Award from Environmental Management Association

• Nominated for 2006 Facility of the Year Award by Environmental Protection Magazine
THANK YOU CMS FORUM!