DuPont Soy Polymers

DuPont™ Pro-Cote®
renewably sourced™ soy polymer*

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Cost Efficiency & Sustainability

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Introduction

Macro Trends:

- Stricter regulatory requirements
  - Driven by the EU REACH implementation
  - Similar regulations under development across the globe
- Increasing raw material costs
  - Oil price impacts synthetic products
  - Energy costs

Impact on the Paper & Board industry:

- Steep rise in cost of binders, rheology modifiers, etc.
- Increasing concern on effect of potentially hazardous components in food packaging

DuPont Soy Polymers offers a high performance alternative:

- Lower total cost
- Equal or better performance
- Sustainable solution

Background - Regulatory Trends

- REACH: Designed to encourage elimination of harmful materials and being mimicked worldwide:
  - Safe Chemicals Act, introduced to the US Senate April 2010.
  - Turkish, Chinese etc. legislation is being implemented.
- Consumers are demanding ingredients that minimize impact on the environment.
- New laws: requiring more transparency of ingredients in consumer non-durable goods.
  - Example: concern of leaching of coating components in food-products.

Source: S&P Industry Surveys Dec 2010.

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Introducing a New Product Series

- High Performance products with…
  - Increased binder strength
  - Enhancing effect on pigment performance
  - Improved water-holding

- Process improvements … leading to elimination of potentially harmful components.

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Fully **REACH** Compliant Products

High Molecular Weight

Low Molecular Weight

1. More sustainable than alternatives such as; synthetics, PVOH, sodium caseinate, etc.

2. Cost effecitve partial or complete replacement of alternative binders.

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Formulation Example

Input	Reference	Trial	
Coating Formula	Parts	Parts	$/lb
CaCO3	100.00	100.00	0.08
TiO2	0.00	0.00	1.10
Clay	0.00	0.00	0.07
Plastic Pigment	0.00	0.00	1.20
Latex	14.00	8.00	1.18
Pro-Cote® Soy Polymer	0.00	3.00	1.45
Starch	0.00	0.00	0.20
Thickener or Co-binder	0.50	0.00	3.00

Results

US$ / metric ton of Coating	-$61.89	Cost Savings
US$ / mt of Coated Paper	-$6.19	Cost Savings
US$ / Year of Production	**-$928,278**	**Cost Savings**
Pro-Cote Volume, (MT/year)	405	

Input

mill data

	Production, (t/day):	500.0
	Days Production/year	300.0
Reference	Basis Weight:	300.0
Reference	Coat weight:	30.0
Trial	Basis Weight:	300.0
Trial	Coat weight:	30.0

Try our Interactive Model at Booth #430. Input in yellow and see results in blue based on your input.

Properties of Pro-Cote® Soy Polymers

As a result of composition and structure, you have more coating design options:

1. **Large hydrated volume:**
   - alters viscosity and water holding
   - increases resistance to depletion
2. **Highly cross-linked structure with low degrees of freedom:**
   - non-thermoplastic (high Tg)
   - rigid (can improve stiffness versus emulsion polymers)
3. **Amphoteric / Amphophilic:**
   - increases resistance to depletion and can be used to alter surface energy

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Our products are based on soy proteins:

Biodegradable

Renewable

Lower CO_2 & energy impact then synthetic alternatives

Per 1000 lbs of Binder (dry basis)

Impacts	Units	Pro-Cote	SBR Latex	Pro-Cote Vs. SBR
Global Warming	g CO2 equivalents	1,033,571	1,397,781	**- 36%**
Fossil Fuel Depletion	MJ surplus energy	2,769	5,786	**- 52%**

Based on life cycle assessment from "bean" to the delivered product at your plant. Does not include the impact on the final coating.

How We can Assist Your Business

- Technical support -> Joint development
  - Equal or better performance
  - Lower cost
- Environmental claims supported through LCA and 3rd party reviews

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Thank You

Visit Booth 430 at the Exhibit Hall for more information.