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Water based coating solutions; a sustainable alternate to plastic

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ABSTRACT

The Plastic waste Management (PWM) Regulation make paper the best replacement option to plastic and can be used for packaging of several products. The limitations of paper can be overcome by the use of barrier technology. Barrier coatings can improve paper's barrier properties which is a crucial step in increasing its viability as a packaging material. The packaging combines the best aspects of two materials, environmentally friendly paperboard and good barrier properties of water-based coatings. Water based Coatings can be recycled and repulped. These green solutions are eco-friendly and can also improve and impart Oil & Grease resistance on paper, water repellency on paper, it can also improve the aesthetics of paper used for packaging, Some coatings can even impart heat seal properties to paper.

Water based coating solutions; a sustainable alternate to plastic.

Plastic is one of the widely used material and the most ideal form of packaging, It is also the most convenient. However recyclability is the major challenge in the use of plastics for packaging. Plastic is not biodegradable and hence accumulates in landfills, polluting the environment. Paper has gained tremendous popularity since it can be recyclable and is environmentally friendly, renewable and biodegradable. Paper provides a versatile and responsible packaging solutions for product manufacturers, retailers, and consumers. This along with the Plastic waste Management (PWM) Regulation make paper the best replacement option to plastic and can be used for packaging of several products. However paper has several limitations compared to plastic. Some of the limitations of paper can be overcome by the use of barrier technology. Improving paper's barrier properties is seen as a crucial step in increasing its viability as a packaging material. The missing performance and barrier properties of paper can be compensated by Water-based coatings.

Cost effective paper bag solutions: An alternative to Plastic Bags

Plastic bags take a huge toll on our planet. It is non-biodegradable, chokes rivers, oceans, clogs drains, causes floods, and pollutes land, soil, water and air. An eco-friendly alternative to plastic bags are paper bags. Benefits of paper bags are plenty, however the only drawback of paper bags are that they are porous and lack the barrier properties that are required.

Challenges faced by Ecommerce companies

One of the biggest challenges faced by a leading ecommerce company in India is their packaging, they use plastic, paper, bubble wrap, air packets, tape and cardboard cartons for their packaging which has to be bulkier than usual to protect the product throughout the journey to avoid the damages. The PWM regulation has forced these companies to explore sustainable & recyclable alternatives to replace their existing packaging structures.

Water-based coatings solutions

With the push towards sustainability, repulpability and recyclability, water-based technologies are gaining acceptance .Barrier coatings can improve paper's barrier properties which is a crucial step in increasing its viability as a packaging material. The packaging combines the best aspects of two materials, environmentally friendly paperboard and good barrier properties of water-based coatings. Water based Coatings can be recycled and repulped .These green solutions are eco-friendly and can also improve and impart Oil & Grease resistance on paper, water repellency on paper, it can also improve the aesthetics of paper used for packaging, Some coatings can even impart heat seal properties to paper. This can completely eliminate the use of adhesives in bag manufacturing process.

Ecommerce brand's existing packaging products:

- Plastic bags for pantry items/ whole foods
- Transparent plastic envelope for receipts (glued onto their outer cardboard /plastic packaging)
- Plastics bags for dry items, electronics etc.

Ecommerce brand's switch to Michelman coated paper bags

1) Michelman Heat seal coating (Inner side of the bag)

Product details

Recommended coat weight	3-4 gsm / dry
Solid Content	43%
pH	8.0-10.0
Brookfield Viscosity Spindle #2 RPM 60	<500 cps
Suggested coating method	Gravure, Rod coater
Suggested drying condition	Hot Air Dryer
COBB Value	<10

Benefits

- Heat sealable at 140 C
- Recyclable
- Repulpable
- Print receptive

2) Michelman water repellent coating (Outer side of the bag)

Product details

Recommended coat weight	5-6 gsm dry
Solid percent	50%
pH	10.0 - 11.0
Brookfield Viscosity Spindle# 3 RPM- 60	<500 cps
Suggested coating method	Rod coater, Air Knife
Suggested drying condition	100 C, Hot Air dryer
COBB Value	<5

Benefits

- Water repellent
- Recyclable
- Repulpable
- Print receptive

Other Applications

- Envelopes for invoices.
- For fresh fruits/ vegetables etc.
- Paper bags for bakery items, dry foods etc.

(Image is for representational purpose only)

Oil & Grease resistant coatings for paper & paperboard

Coatings can impart oil & grease resistance to paper and this can be used for many applications like disposable take away boxes, which are most commonly used in restaurants, sweet boxes, sea food applications, etc. These coatings are FDA complaint and are completely recyclable and repulpable.

Bakery Brand's existing packaging

- Paper boxes coated with PE for bakery items
- Disposable plastic containers for food items

Drivers for change

- Replacement of PE
- Government regulation
- Environment conscious

Bakery Brand's switch to Michelman coated paper boxes/containers

Michelman Oil & Grease resistant coating

Product details

Recommended coat weight	3-5 gsm
Solid Content	39%
pH	8.2 - 9.2
Brookfield Viscosity Spindle# 2 RPM- 60	100-500 cps
Suggested coating method	Gravure, Flexo
Suggested drying condition	100 C Hot Air dryer
KIT Value	10
COBB Value	<5

Benefits

- Oil & Grease resistance
- Water repellancy
- Recyclable
- Repulpable
- FDA certified for direct food contact

Other applications

- For take-away containers
- Ice cream boxes
- Sweet boxes

(Image is for representational purpose only)

Replacement to PE with barrier & functional coatings

1) Paper cup Coatings

Paper cups are an alternative to plastic cups. However the disposable paper cups is a major sustainability issue because contrary to common belief, they are not recyclable. Their plastic lining ensures that they almost never make it to a recycling plant and they are not biodegradable.

Current paper cups are made out of paper and are coated with low-density polyethylene (LDPE) or wax to prevent liquid from leaking out or soaking through the paper. With water based technology, the PE in paper cups can be replaced with coatings, this not only eliminates the plastic lining used in conventional paper cups, but also eases the recycling and repulping process. Along with its recyclable and repulpable properties, it also provides excellent water, oil & grease resistance and a very high seal strength. It has been tested successfully for hot, cold, and deep freeze applications. Coating can be done by a gravure or rod coater. This solution is suitable for frozen foods, hot and cold beverages, fried snacks etc.

(Image is for representational purpose only)

Benefits

- Plastic waste management (PWM) regulation compliant
- Water-based, green chemistry
- Recyclable &Repulpable
- Water, Oil & grease resistance, Oxygen/moisture barrier.
- Heat Sealable
- FDA approved
- Down-gauging

2) Water Based coatings for Paper plates

Paper plates are alternatives to plastic plate, however similar to paper cups, they are not easily recyclable as they are coated with low-density polyethylene (LDPE) or wax to prevent food items from leaking out or soaking through the paper.

Product details

Recommended coat weight	4-5 gsm dry
Solid Content	36-38%
pH	8.0 - 9.5
Brookfield Viscosity Spindle# 2 RPM-60	<600 cps
Suggested coating method	Gravure, rod
Suggested drying condition	100 C, Hot Air dryer
KIT Value	*10*
COBB	*<10*

Benefits

- Oil & Grease resistance
- Water repellent

- Can sustain high temperatures during thermophilic moulding process
- FDA Complaint for Direct food contact
- Recyclable & Repulpable

(Image is for representational purpose only)

Innovations in Medical Packaging

Medical packaging is crucial and has its set of safety and security concerns, Packaging protects a product from harm or tampering during transit but can display critical product information and brand marketing. However, medical packaging is in a class all of its own, due to the important equipment it carries. This makes safety and security measures top priority for this type of packaging.

Michelman coatings for Medical device packaging

Due to their convenience, easy to use practicality, and semi-low cost, single use medical device products, including syringes and catheters, are increasing in popularity. Performance of medical packaging is critical and must have an optimal performance. In order to do so, the packaging materials must be strategically made. Materials which can last in a variety of situations and temperatures are carefully chosen to improve the shelf life of products. Water-based coatings have been successfully tested for medical packaging. These coatings can impart the necessary barrier for packaging of medical devices.

Product details

Recommended coat weight	2-3 GSM
Solid Content	24.3-25.2
pH	8.4 - 9.4
Brookfield Viscosity Spindle# 2 RPM- 60	50 – 400 cps
Suggested coating method	Gravure, rod
Suggested drying condition	100 C, Hot Air dryer

Benefits

- Heat sealable
- Resistant to sterilization process like Gamma & E-beam sterilization.
- Provides outstanding adhesion to both metallic and cellulosic substrates
- Can also be used as a thermally active binder in thermal transfer release coatings.

(Image is for representational purpose only)

Michelman Innovation Centre for Coatings (MICC)

Michelman's dedication to innovating a sustainable future is well represented in their investment in the Mumbai-based Michelman Innovation Centre for Coatings (MICC). Dedicated to developing recyclable and sustainable solutions, this state-of-the art packaging incubator is strategically designed to serve the needs of India and its surrounding markets to allow for the fast & efficient development of sustainable packaging. Their holistic approach of **dedicated space, collaborative innovation** and **technology** allows all members of the packaging value chain, including brand owners, film producers, and converters to access the tools needed to develop innovative and sustainable solutions for the natural environment and their businesses.

Dedicated Space

Michelman's state-of-the-art packaging incubator provides the opportunity to evaluate new technology, prototype innovative structures and quickly commercialize superior packaging. Their application and materials experts are ready to help develop solutions when new opportunities arise.

Collaborative Innovation

Michelman has a long tradition of innovation and sustainability with water-based chemistry. Because of this, their technology experts offer all members of the packaging value chain the ability to collaborate and decrease the time it takes for the commercialization of improved and environmentally-friendly flexible packaging.

Businesses can partner with their technology experts to become Plastic Waste Management compliant. Collaboration with Michelman's technical and market experts accelerate the concept-to-commercialization cycle with innovations can produce packaging that offers:

- Recyclable structures
- Brand appeal and enhanced graphics
- Increased shelf life, food safety
- Increased productivity and efficiency
- Compostability
- Waste reduction and down gauging

Technology for India

They also have deep application and water-based formulation expertise that supports the packaging incubator. Optimized for India's ever-changing packaging market, their technology is a complete product portfolio enabling environmentally friendly and sustainable packaging solutions.

Michelman coatings are developed to work together, but flexible enough for individual technologies to work with existing coating systems to create superior packaging.