A TECHNOLOGICAL FRAMEWORK FOR PACKAGING FILM SUBSTRATE DEVELOPMENT

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The **UFLEX** Group is India’s leading specialist Packaging Conglomerate

- Focussed on **Flexible Packaging**
- World’s only **fully vertically integrated** Flexible Packaging group
- **Product Range**: Plain and Metallised Films, Laminates, Pouches/Bags, Holographic Materials, Resins, Packaging Machines, Conversion Equipment, Inks & Coatings, Adhesives, Rotogravure Cylinders, Flexographic Plates and Multilayer Tubes
The UFLEX Group is one of the world’s leading specialist Packaging Conglomerates

- All products are manufactured in-house in state-of-the-art global scale facilities
- Offers customised end-to-end solutions
- In-depth domain knowledge of every link in Flexible Packaging value chain
- Global manufacturing and marketing footprint
- Strong emphasis on Sustainability.
Performance:

• Present annual revenue is over INR 60 billion (about US$ 1.2 billion)
• The Group is just over 25 years old and has consistently been one of the fastest growing companies in the global Packaging business
• Major international player in Flexible Packaging – present in 115 countries and growing
• One of the world’s largest manufacturers of Plastic Films and Flexible Laminates
• Plants in India, Dubai, Mexico, Egypt, Poland and USA
• Impressive record of innovations and prestigious international awards
Focus of this presentation is on high-end substrates like BOPET, BOPP and CPP Films.

Films supplied as transparent, matte, pigmented or cavitated substrates with or without coatings, metallisation or surface treatment.

Films supplied mainly to Flexible Packaging Convertors for conversion by printing, lamination, coating, metallisation, embossing, bag & pouch making, slitting and sheeting.

Film manufacturers constantly striving for “specialty” products by fine-tuning, upgrading, or customising films for competitive edge or by developing new variants for new applications.

Run-of-the-mill products rapidly become commodities >> pressure on margins. Development has to be an ongoing exercise.
Flexible Packaging business is fiercely competitive.

Key to success is identification of opportunities, fully understanding customer requirements in potential niche application areas and getting in there ahead of competition with suitable products. This requires a highly focused approach.

Designing and laying down a technological framework is imperative and assumes cardinal importance.

Has to be an ongoing process as specialties of today rapidly degenerate into commodities. Technological edges tend to be short-lived.
FRAMEWORK DESIGN

Framework design is driven by need-based fundamentals.

Model framework has to be based on following key objectives:

- Improved or new functional or end-use properties including aesthetics
- More sustainable and “greener” products
- Safety and better suitability for food contact
- Cost reduction for end-users

Cost reduction, improved margins and increased market share encompass all of the above.

Each objective discussed in detail with relevant case-studies.
First step is always sound primary analysis.

Sequence of analytical activities:

- Identifying the opportunity
- Quantifying the opportunity
- Fully understanding all requirements >> film properties, machineability, processes across the board, end-users/markets, costs, regulatory, sustainability
- Translating basic requirements into film specifications and process requirements
- Reviewing ability to produce the goods >> costs and effort
- Taking a primary “go” or “no-go” decision
Key considerations and factors for success:

- Packaging is ultimately about delivering tailor-made optimum solutions
- Solutions need to be end-to-end system packages
- Very close working with customers and ultimate end-users required
- Insight and in-depth domain knowledge of every link in Flexible Packaging value chain are required
Film manufacturers constantly work on improved properties for existing products and new properties for new end-use applications.

- Improves competitive edge and expands usage base
- Replace other substrates
- Shift other packaging systems to flexible packaging
- Develop new packaging formats

Flexible Packaging materials and systems have immense potential due to light weight, optimum material use, sustainability credentials and overall cost-effectiveness. >> huge opportunity, key is to find ways to overcome existing constraints.
Development of BOPET Film for Twist Wrapping

• Used extensively in Confectionery industry

• Very demanding high-speed application

• Needs ability to retain twist >> films have problems with dead-fold, memory, spring back

• Also needs static-free surface to suit high speeds

• Long dominated by cellophane and foil laminates, subsequently by PVC films
Development of BOPET Film for Twist Wrapping

• Some BOPP Films used but they need a hot air jet to seal in the twist >> slows operation

• Truly twistable BOPP film patented and available from only one manufacturer

• Tasks: Develop dead fold and static-free film

• BOPET Film was established that retained twist and delivered higher packing speeds

• This new film is much more environment friendly
OBJECTIVES

More Sustainable and Greener Products

Development today needs intense focus on Sustainability:

- More efficient energy management
- Reducing and replacing non-renewable inputs with renewable and plant-based inputs
- Reducing wastages across the supply chain
- Reusing and recycling all wastages
- Maximising usage of post-consumer recyclate >> no land-fills
- Recovering energy from non-recyclable waste through in-house waste-to-energy systems
SUSTAINABLE GREENER FILMS

Case Study 1

Green PET Films >> Award-winning product for Innovation

• World’s first “green” polyester product

• Primary analysis revealed that a vital input MEG made from Ethanol based on non-renewable petro-based sources could be replaced by one made from renewable plant-based sources

• MEG makes up 30% of input for PET resins

• Plant-based MEG successfully established for all film variants

• Process parameters successfully developed to convert “green” PET resins into BOPET films of good quality

• Green films have same properties as conventional petro-based films

• Green films fully approved by USFDA and EU for direct food contact
rPET Films >> Another award-winning product

- Up to 30% of their content is made up of post-consumer recyclate (PCR resin) that replaces virgin PET resin
- PCR resin obtained from used PET bottles and industrial film scrap
- Task was to develop suitable PCR resin and to develop process parameters to produce films of good quality
- rPET films have properties as good as those made from virgin PET resins and are available in all variants
- Fully approved by USFDA and EU for direct food contact
- Enables recycling of post-consumer waste that is mostly land-filled
OBJECTIVES

Safety and Food Contact Suitability

• Many substrate developments are driven by the need to make them safer and more suitable for direct food contact

• Some packaging materials contain minute traces of potentially toxic substances or are attacked by products that contain aggressive or sensitive ingredients

• Recent controversies on products like BPA have brought this issue into the spotlight
Antimony-free Polyester Films

- Antimony conventionally used as catalyst in PET resin manufacture >> minute residual content
- Antimony and its compounds potentially toxic
- Leach out in contact with liquids or when microwaved
- Extraction levels normally well below safety threshold but nevertheless an area of concern for some products like fruit juices and drinking water
- Recently established totally antimony-free BOPET films
OBJECTIVES

Cost Reduction for End-Users

- Substrate manufacturers need to constantly work on delivering cost savings to end-users

- New products or modified existing products that perform better

- Sometimes it may also mean better equipment design for conversion or end-user packaging machinery

- Cost savings usually delivered through lower material consumption, higher throughput and lower wastages or through lower costs for existing substrates through in-house technological developments
Lowering Thicknesses of Films >> Downgauging

- Over a period of time, film manufacturers have effectively downgauged film thicknesses by 20% or more for equivalent application capability.

- Ensuring functional and barrier properties remain adequate for the application.

- Ensuring operational properties like machineability and web handling capabilities remain unaffected.

- Ensuring no loss of productivity or effect on costs while producing lower thicknesses.

COST REDUCTION

Case Study 1
Direct Extrusion Coatable BOPET Film

- Extrusion coating and lamination is the preferred process used by the Conversion industry to produce multilayered laminate structures

- Conventional BOPET films need primer coating before extrusion coating/lamination for good bond strength

- New film has modified surface that eliminates the need to primer-coat

- Delivers operational flexibility, simpler equipment design and significant cost savings for convertors

COST REDUCTION

Case Study 2
LEVERAGING KNOWLEDGE

Developing New Systems

Domain knowledge can be leveraged by developing new Packaging systems

Case Study – Multilayer tubes:
- Developing new laminate structures customised for specific applications
- Building in unique special features
- Development of tube-making and delivering ready-to-use tubes
CONCLUSIONS

- Substrate manufacturers need to constantly develop new “specialty” products for competitive edge and to prevent falling into the “commodity” trap

- A sound framework for packaging substrate development is essential

- Framework design has to be based on need-based fundamentals

- The development of new substrates or improving existing ones has to be an ongoing exercise

- Framework design has to be constantly reviewed and altered in keeping with changing and up-to-date requirements
THANK YOU