

An Investigation to produce suitable low cost Eco-Friendly Polyethylene film for packaging of Wheat flour by using Multilayer Co-extrusion techniques.

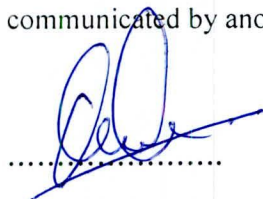
By

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This thesis was submitted in partial fulfillment of the requirements for the Master of Science in Polymer Science and Technology to the Faculty of Graduate Studies of the University of Sri Jayewardenapura, Sri Lanka.

Date of Submission: -

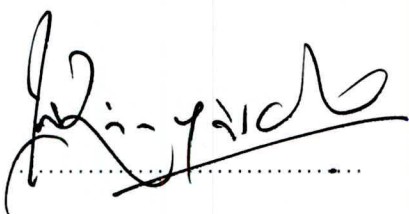
The work described in this thesis was carried out by the undersigned at the University of Sri Jayewardenepura and Polyfilms (Ceylon) Ltd, under the supervision of Dr.Sudantha Liyanage, and a report on this has not been submitted to any university for another degree. Also, I certify that this thesis does not include, without acknowledgement, any material previously submitted for a Degree in any university and to best of my knowledge and belief it does not contain any material previously published, written or orally communicated by another person except where due reference is made in the text.



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Date: 24-jan-06

I certify that the above statement made by the candidate is true and that this thesis is suitable for submission to the university for the purpose of evaluation.



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ABBREVIATIONS

<i>PE</i>	: Polyethylene
<i>LDPE</i>	: Low Density Polyethylene
<i>LLDPE</i>	: Linear Low Density Polyethylene
<i>HDPE</i>	: High Density Polyethylene
<i>PVC</i>	: Poly Vinyl Chloride
<i>BOPP</i>	: Bi-Oriented Polypropylene
<i>BOPET</i>	: Bi-Oriented Polyethylene Terephthalate
<i>CPP</i>	: Cast Polypropylene
<i>COF</i>	: Co-efficiency of Friction
<i>MDPE</i>	: Medium Density Polyethylene
<i>MFI</i>	: Melt Flow Index
<i>ASTM</i>	: American Standard Testing Manual
<i>FDA</i>	: Food and Drug Administration
<i>RPM</i>	: Revolutions per minute
<i>BP</i>	: Boiling Point
<i>MWD</i>	: Molecular Weight Distribution
<i>ESCR</i>	: Environmental stress crack resistance.
<i>PET</i>	: Polyethylene Terephthalate
<i>DMT</i>	: Dimethyl Terephthalate
<i>TPA</i>	: Terephthalic Acid
<i>BUR</i>	: Blow up Ratio
<i>FLH</i>	: Frost Line Height
<i>MD</i>	: Machine Direction

TD : Transverse Direction
WVTR : Water Vapor Transmission rate
TS : Tensile Strength
Mpa : Mega Pascal

DEDICATION

This thesis is dedicated to my wife and best friend Nalin with love.

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ABSTRACT

At present polymer packaging industry is compelled to use PET based polymeric materials to manufacture packaging materials for food packaging including wheat flour. But these PET based materials are very expensive. Therefore many researchers are investigating the possibilities of manufacturing polyethylene based packaging materials (Though currently used HDPE based materials specially for manual packing system), which are eco-friendly to replace expensive PET based materials.

However in polymer packaging industry, especially in flexible packaging, applications to produce a low cost product is a big challenge while keeping the required properties constant. There is a great possibility of rejection of the product by the market simply due to unavailability of required properties. Then the manufacturer has to bear the losses due to rejection and it might be a cause for loosing the customer and the goodwill of the company. Therefore when manufacturing packing materials, it is important to ensure that required properties continue to exist.

In this project an effort was made to identify good quality low cost eco-friendly products for packaging of wheat flour.

Both field trials and laboratory trials were used to analyze the samples. In the field trials a sample was prepared and was sent to customer's plant. The main objective was to check whether the sample was able to reach the required runability at form-fill seal machine. The reason is most efficient packaging system of flour is form-fill seal machine system.

The physical properties such as tensile strength tear strength and puncture resistance were checked as a laboratory testing. The main objective of checking the tensile strength and tear strength was to check whether the material could be subjected to down guaging and effective cost reduction and also the plastic film was strong enough to contain up to 1kg

relative dense products. Since the product has occasional sharp edges, puncture resistance is also important.

The main objective of measuring the Water Vapor Transmission Rate (WVTR) of the film is to select the film with least WVTR because the shelf life of a product depends on its water activity.

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