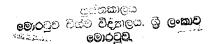
## DESIGNING OF A PROFILE EXTRUSION DIE

BY

### U. de A. SAMARAWICKRAMA

A RESEARCH PROJECT DISSERTATION SUBMITTED IN PARTIAL FULFILLMENT OF MASTER OF SCIENCE IN POLYMER TECHNOLOGY.



72265

DIVISION OF POLYMER TECHNOLOGY, DEPARTMENT OF CHEMICAL ENGINEERING, UNIVERSITY OF MORATUWA, SRI LANKA.

**OCTOBER - 1999** 

TH



#### Abstract:

Designing of the proposed profile extrusion die had few main tasks. One was to find out the most suitable type of die and the other was to calculate important operating parameters like pressure drop. The next is to calculate the land and calibration dimensions. Due to complex nature of the proposed profile, it was approximated to a slit die for the purposes of calculating pressure drops and die swell / draw down effects. Based on the thickness calculated for die, product and equilibrated swell state were used to calculate the dimensions of the complex die land and calibrator. When designing the die, due consideration was given to phenomenon like ,melt flow instabilities and shrinkage on cooling.

Only top half of the PVC trunking profile was designed in this exercise, as trials are needed to validate the models selected and based on these values only, progress onwards could be envisaged.

### **ACKNOWLEDGEMENT**

I owe a big thank you to:

Mr. Newton Wickramasooriya (General Manager, Central Industries Ltd.,), who assigned me the task of designing a profile extrusion die and gave me all the encouragement and guidance to achieve the objective.

Prof. (Mrs.) Sivagurunathan (M. Sc. Course coordinator), who constantly gave me advice and guidance to complete the project in time in a difficult period of time.

Dr. P. Y. Gunapala (Project Supervisor), who accepted me as a student and gave the necessary instructions & direction to overcome the many obstacles in solving the technical problems related to the project.

Mr. K.K.G. Ranaweera (Factory Manager, Central Industries Ltd.,), all Managers, Executives and Technicians at Central Industries Factory, who spent their valuable time and extended their cooporation in support of the project.

Mr. Sarath Chandrapala (Senior Technical Officer), who helped me in various ways in testing of materials at the Materials Testing Laboratory.

Mr. Lal Motha ( ITI), who gave me lot of spade work during the project.

U. de A. Samarawickrama.

# **CONTENTS**

	Page number
1.0 OUT LINE OF THE PROJECT.	3
2.0 LITERATURE SURVEY.	5
3.0 MARKET SURVEY AND PRODUCT IMPROVEMENT.	41
4.0 METHODOLOGY.	44
5.0 PRESSURE DROP CALCULATIONS.	51
6.0 CALCULATION OF DIE DIMENSIONS ( SLIT ).	57
7.0 CALIBRATION THERMAL DESIGN.	65
8.0 CALCULATION OF DIE DIMENSIONS ( PROFILE ).	69
9.0 DISCUSSION. University of Moratuwa, Sri Lanka. Electronic Theses & Dissertations	77
10.0 ANNEXTURES	87