

GUJARAT TECHNOLOGICAL UNIVERSITY
M.E.in Rubber Engineering
Semester: I

Subject Name: **Rubber Processing Equipment Design (Major Elective-I)**
Subject Code : **714005**

Sr. No	Course Content
1.	Introduction: Rubber processing equipments for mixing, extrusion, molding, fabrication and curing, importance of rheology of rubber for design.
2.	Twin screw extruder: History and development of the co-rotating twin screw extruder, geometry of co-rotating twin screw extruder-conveying and kneading, pressure generation and energy inputs, mixing and dispersing, degassing, screw elements.
3.	Computational fluid dynamics: Introduction, applications for design.
4.	Rubber Extruder die design : Fundamentals, thermodynamic and rheological material data for design, computation of viscous press losses, formulas for isothermal computations, approaches to non-isothermal computations, estimations of the peak temperature, consideration of the elastic behavior of the material, design of distributor die and slotted die, pressure losses, extrudate swelling.
5.	Mechanic design of extrusion die: Design of a breaker plate, design of a die with axially symmetrical flow channels, design of a slit die, general design rules, materials for extrusion dies.
6.	Cure of Rubber in Mold : Rubber–Mold Relation, Process of Heating and Cure, Mathematical Treatment, Numerical Treatment of the Problem, Effect of the Position of the Heating System, Mold–Rubber System, Results Obtained for the Cure of the Rubber Sheet, Effect of the Thickness of the Rubber Sheet, Effect of the Enthalpy of Cure, Effect of the Temperature on the Cure, Effect of the Kinetic Parameters of the Cure, Effect of the Order of the Overall Reaction, Effect of the Activation Energy, Effect Post cure of a Rubber Sheet, Cure of Rubber–Metal Sandwiches, Theoretical Study of the Process of Cure, Theoretical Approach of the Process.

7.	Cure of Rubber with Injection Molding: Principles of the Technique, Evaluation of the Operational Conditions in the Injection System, Theory, Heating Stage in the Reservoir before Injection, Injection Stage of the Rubber in the Mold, Results for the Heating Stage in the Reservoir, Heating Stage and Cure in the Mold, Theoretical for the Stage of Cure in the Mold, Results by Calculation, Conclusions on Injection Molding.
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Note: Practicals based on above topics

Text Books:

1. Rubber Curing and Properties by Jean-Maurice Vergnaud and Iosif-Daniel Rosca
2. Co-rotating twin screw extruder: fundamental technology and Applications by Hanser

Reference Book:

1. Extrusion Dies for Plastics and Rubber: Design and Engineerin Computations by Walter Michaeli