

12th Asia Pacific Conference on

Polymer Science and Engineering

October 25-26, 2021 | Webinar

Design and development of polymeric extrusion die

Extrusion is one of the most useful processes for making long polymeric product profiles. The profile deforms while extruding due to die swell based on the geometry of the die, thermal and rheological properties of the material, and predominantly on the thermal and rheological boundary conditions. The die swell behavior of the polymer is a critical characteristic in processing operations such as extrusion and injection molding. There are different kinds of swelling during the extrusion process. One is a recoil mechanism due to the elastic nature, and the other is a reorientation of the velocity profile from die inlet to free surface outlet. The soft polymeric compounds while flowing through a complex-shaped die it compresses and shears intensely, causing die-swelling phenomena on die exit. Moreover, the complexity of the rheological model for non-Newtonian fluids and boundary conditions for the fluid flow domain further intensifies the problem of die swell prediction. Extrusion industries usually design the die using conventional methods. These methods typically involve: 1) making the physical prototype of the die, 2) tuning it for flow balancing, and 3) repetitively testing it until attaining the desired product shape. Due to the recursive nature of this three-step designing process, it is relatively expensive and time-consuming. To address the issues mentioned above, and to achieve the desired shapes of the product, the Non-Newtonian fluid flow phenomena is of paramount importance to the die designers and engineers. Nowadays, computational fluid dynamic is becoming the most popular way to visualize the fluid flow behavior even for the complex die design as it quickly generates an indicated set of results. The various challenging profile shapes which are used to manufacture automotive parts can be studied easily by using the proper rheological parameters utilizing the FEA technique.

Biography

Mr. Sujit Sharma is a research scholar at the prestigious Indian Institute of Technology, Kharagpur, India. He completed his Bachelor of Technology degree in Chemical Engineering from the National Institute of Technology, Durgapur, India, in 2015. He acquired a Master of Technology in Rubber Technology from the Indian Institute of Technology, Kharagpur, India, in 2018. He did his B-tech project from Indian Oil Corporation Ltd. (Haldia Refinery), India, and M-tech project under IIT Kharagpur and ALP Nishikawa, Lalru, Punjab.

sharma.sujitt92@gmail.com



Sujit Sharma

Indian Institute of Technology Kharagpur, India