

**DRAFT REPORT FOR THE PLASTINDIA INTERNATIONAL UNIVERSITY WEBINAR ON
“INTRODUCTION TO INJECTION MOLDING SIMULATION & ITS APPLICATIONS”
JULY 21ST, 2022**

As per part of a joint program between Plastindia International University, PIU, and UMass Lowell, the fifth webinar on “Introduction to Injection Molding Simulation & its Applications” was delivered by Prof Davide Masato on July 21st, 2022 06:00 PM (IST) / 08:30 AM (EST) onwards.

Ms Pratiksha Jaipal on behalf of Plastindia International University, welcomed all the attendees. She briefly reviewed the earlier webinars presented by Prof Wan Ting Grace Chen, Prof David Kazmer, Prof Stephen Driscoll & Prof Amir Ameli.

Jacqueline White, Manager of Corporate Training & Education introduced Prof Davide Masato who was the speaker for the fifth webinar. He presented the webinar on Introduction to Injection Molding Simulation & its Applications. Dr. David Masato has his B. S., M. S. and Ph. D. in Mechanical Engg from University of Padova, Italy. He was also a Post-Doc researcher at this Univ. He was a visiting researcher at the Univ. of Bradford, UK, where his research was in Nano technology. He is Assistant Professor at UMass Lowell since 2018. His research area is polymer processing, product design and computer aided engineering. He has published more than 30 research papers, 3 patents, 1 book chapter more than 40 presentations at prestigious conferences.

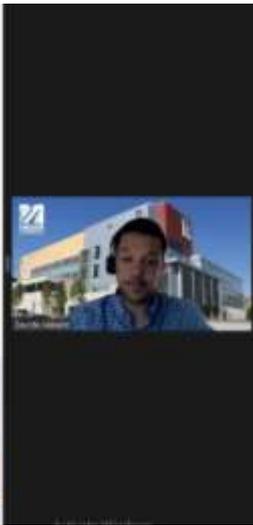


Prof Masato introduced the historical developments on Injection Molding Simulation from 1970 onwards. Initially, the software was for one dimensional simulation, which now is modelling almost a three-dimensional simulation. He also listed some of the major providers for simulation software. He mentioned the 5P (Polymer, Processing, Product, Performance & Post Consumer Life) approach to molding simulation. Applications of molding simulation are in plastic product design, mold design and process simulation. The inputs for simulation tool black box are user inputs, such as geometry, mesh, relevant properties of the polymer melt (rheology, conductivity, density and glass transition temperature, etc.) and the assumptions made. He overviewed the simulation workflow. He briefly explained the governing theoretical equations concerning mass, momentum and energy balance. He pointed out the analysis sequence in terms of time taken for mold opening (7%), part ejection (10%), mold closing (7%), and mold filling (6%), packing (20%) and cooling (50%).

LEARNING OBJECTIVES

This webinar will introduce injection molding simulation, its main components, and its use for mold design, analysis, and optimization. Learning outcomes:

- (1) Understand the use of injection molding simulation for plastic part and mold design;
- (2) Understand what are the main outcomes of a simulation and their use;
- (3) Develop awareness of simulation possibilities and limitations.

Go beyond pushing the buttons!

Learning with Purpose 

2 Dr. Davide Masato

For good success in simulation, accuracy and experience play an important role. He explained the various guidelines and steps followed for part and mold design. Different types of mesh are triangular, tetrahedral, prismatic, hexahedral and the mesh quality is aspect ratio while size of mesh decides mesh density. The results exhibit the cooling time estimation, cooling system efficiency, warpage and temperature profile. Analysis also understands the capability and limitations of the software as it identifies the key inputs and outputs. He demonstrated the results of some case studies where metal was replaced by plastics in a bicycle component. He briefly explained the analytical approach and iterations through using product design, process simulation, interface to FEA & structural analysis. The simulation process can be used for number of thermoplastics and thermoset plastics.

The learning points of the webinar are ease of simulation process in product development, mold design, troubleshooting and sustainability.

Post Prof Davide Masato's informative presentation, there was an interesting Q&A session moderated by Prof Dr DD Kale. He pointed out during Q&A session that the shift from one polymer to other for the existing product can be very useful in understanding the state of product with new material in mind. The major property of importance is rheology of polymer melt. He also pointed out that the co-injection molding process is also being simulated.



Mr Raju Desai, Director of Jyoti Plastics and Vice President of Plastindia International University summarised the lecture. He mentioned that this topic is of interest to Indian processors. Mr Raju Desai thanked Prof Masato and colleagues at UMass Lowell, PIU & Polymerupdate for a successful webinar presentation.

The next webinar will be on Aug 4th, 2022 by Prof Ramaswamy Nagarajan on Biobased Plastics and Sustainability – Aspirations and Reality.

Dignitaries from Plastindia International University and University of Massachusetts, Lowell, USA