Università degli Studi di Pavia
Computational Mechanics & Advanced Materials Group - DICAr

3D@UniPV
Virtual Modeling and Additive Manufacturing for Advanced Materials

SEMINAR

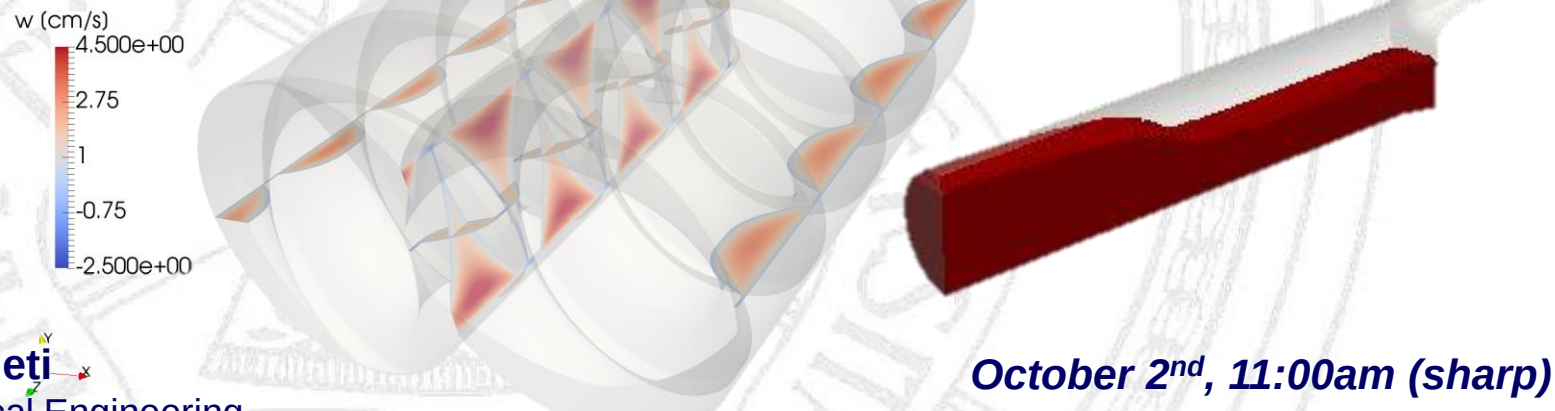
Numerical Design for Manufacturing Processes

The starting point of product development is the customer wish, based upon which the product specifications are designed. This leads up to the design of the manufacturing process: from choice of process, via tool or mold design up to processing conditions.

The category of primary shaping manufacturing processes have in common that — using a mold or die — they form material from an initially unshaped state (usually melt) into a desired shape. A general challenge in primary manufacturing is that the exact design of the mold cannot be determined directly and intuitively from the product shape. This is due to the nonlinear behavior of the material regarding the flow and solidification processes. Consequently, shape optimization as a means of numerical design can be a useful tool in mold development.

The core of our optimization tool is the in-house flow solver XNS, which is based on the finite element method with GLS stabilization. It is able to exploit the common communication interfaces for distributed-memory systems. XNS has been coupled with the optimization framework Dakota. Furthermore, a geometry kernel has been developed, which internally describes the geometry of the mold in a CAD-based fashion.

The optimization tool has been applied to three melt-based manufacturing processes: plastics profile extrusion, injection molding and high-pressure die casting.



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October 2nd, 11:00am (sharp)
DICAr MS1 Meeting Room
Via Ferrata, 3 – Pavia