

3D Simulator (3DS)

SIMULATION OF THE EXTRUSION PROCESS MADE SIMPLE

3D Simulator (3DS) is a unique software to simulate the flow of material and mechanical properties in a die of complex shape. Key parameters like the ram force, temperature in the profile and maximum stress levels in the die can be readily obtained. 3DS is fast, easy-to-use and reliable. The 3DS finite element meshing and analysis are automatic and can be easily performed by a user without prior knowledge of simulations.

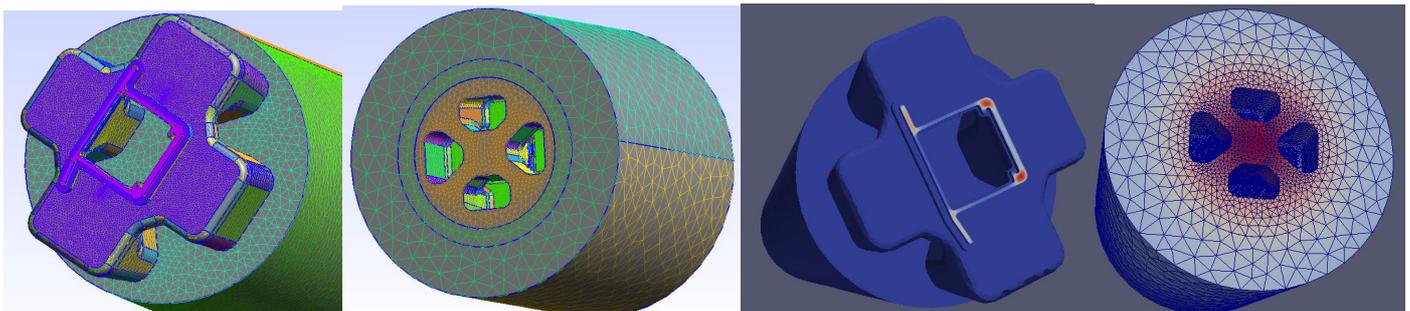
The *MTD* 3D Simulator (3DS) enables users to check and optimize their design and drastically reduces the number of required trials. It can be used with the ABC software in order to determine the geometry of the bearings.

Accurate process control: traditionally, the selection of pertinent press parameters essentially relies on process know-how. The knowledge of aluminum flow, pressure and temperature evolution inside the tooling system is important for an optimal process control. Thanks its finite element solver, the 3DS predictions are accurate, also for the most complicated profile and die shapes.

Numerical trials: 3DS enables the user to perform fast simulations, and to test various designs or modifications.

Improve quality and reduce production costs: for any given complex geometry, 3DS enables one to obtain a fast prediction of the , thus helping in production planning and decision making.

User-friendly, & fast: PS takes advantage of the finite element technique's accuracy, but without its usual drawbacks: the user does not have to bother about finite elements, which remain hidden. PS guides the user in defining key die and press geometry parameters. On that basis, a pseudo (equivalent) geometry is generated and meshed automatically, without intervention of the user. Cycle computations (both flow and thermal), only take a few minutes on ordinary PC's, also for the most complicated die and profile shapes



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Geometry input:

- Two 3D STP files of the die and aluminum parts must be provided by the user. These files can be obtained from most popular CAD softwares, including PTC CREO/ WILDFIRE, SolidWorks, Catia, AutoCAD, Think Design.

Billet:

- material constitutive law
- initial temperature
- taper
- billet length
- container diameter

Process conditions:

- press specific pressure or force
- extrusion speed
- initial temperatures of press elements, die, recipient;
- thermal regulation of recipient;

Finite element mesh:

- automatic mesh generation from STP input file
- mesh control and visualization

Solver

- finite element method
- temperature dependent material properties
- velocity, pressure and temperature solver
- stress, temperature and deformation solver
- power law model

Result/Visualization:

- evaluation of key parameters like piston force, temperature in the profile and maximum stress levels in the die
- generation of iso-color maps of temperature, pressure, velocity of the processed material and of stress, temperature, deformation of the die

Solution export:

- standard ascii files
- Paraview
- other standards on demand

System requirements:

- Pentium or AMD processor
- Microsoft Windows 7 & 8, Linux
- 4 GB RAM or greater
- 1 GB disk space or greater
- OpenGL hardware graphic support is recommended but not required



Problem	Mesh	Flow	Pressure	Press.+Temp.	Mech.+Temp.	Post-proc.
Problem size (M elements)	0.3-2.8	0.3-2.8	0.3-2.8	0.3-2.8	0.3-2.4	0.3-2.8
Computer	Time (mn)	Time (mn)	Time (mn)	Time (mn)	Time (mn)	Time (mn)
ACER predator AG3620, 16 GB RAM, i7-3770, 3.4 GHZ	0.3-80	6-60	5-50	15-100	9-45	30
Dell inspiron 5720, 8 GB RAM, i7-3612QM, 2.10 GHz	0.5-110	8-150	6.5-130	18-260	12-90	40
HP pavilion HPE-410ch, 16 GB RAM, i5-650, 3.20GHz	0.6-130	10-180	8-160	20-320	15-120	50