

Process Simulator (PS)

EXTRUSION PROCESS MADE SIMPLE

Process Simulator (PS) is a unique programme to predict piston force and temperature during extrusion press cycles. PS is quick, easy-to-use and reliable. The PS finite element meshing and analysis are fully automatic and invisible to the user. PS takes the main tool and press geometry factors into account in a parametric way, thus permitting quick aluminium flow and temperature simulation.

The *MTD* Process Simulator (PS) shows extrusion process operators how to design and optimize their process parameters. PS also permits to predict the extrudability of any complex profile, and to work out its expected productivity.

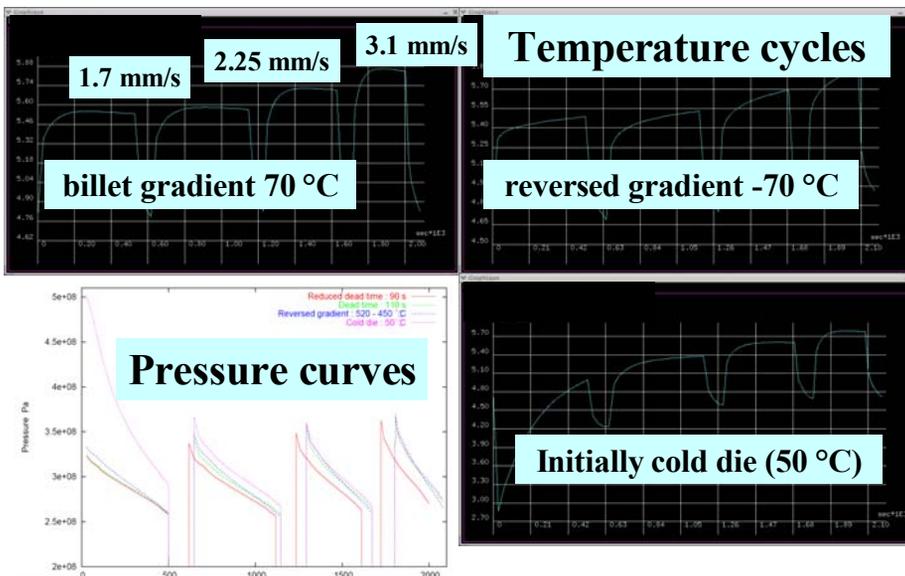
Accurate process control: traditionally, the selection of pertinent press parameters essentially relies on process know-how. The knowledge of aluminium flow, pressure and temperature evolution inside the tooling system during the press cycles is important for an optimal process control. Thanks its finite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

Numerical trials and personnel training: PS permits quick cycle simulation, and shows the sensitivity on initial conditions. For example, PS predicts the exit temperature and piston force, and the effect of billet temperature, taper, alloy, initial recipient and tool temperature, extrusion speed, die geometry, bearing length, etc.

Improve quality and reduce production costs: for any given complex profile, PS permits a quick prediction of extrudability, thus helping in production planning and decision making. PS also predicts the limit extrusion speed to be expected of given press installation and tooling system, for improved control and optimization of the production costs.

User-friendly, & quick: 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:

- geometry parameters of tooling system, profile, recipient, etc are given by the user, on the basis of 2D drawings or 3D CAD.

Finite element mesh:

- invisible automatic meshing option
- mesh control and visualisation possible (not compulsory)

Method:

- the *MTD* Multiparametric Reduction Mappings (MRM) reduces the complex 3D geometry to a few key parameters which are important for the simulation. This permits to compute press cycles in minutes, also for the most complicated profiles (full / hollow)

Initial conditions:

- initial temperatures of press elements, die, recipient;
- thermal regulation of recipient;

Billet:

- alloy, constitutive law
- initial temperature
- taper
- billet length

Process conditions:

- number of press cycles
- extrusion speed for each press cycle
- dead times

Solver:

- finite element flow and thermal transient solver
- power law model
- temperature dependent material properties

Result visualisation:

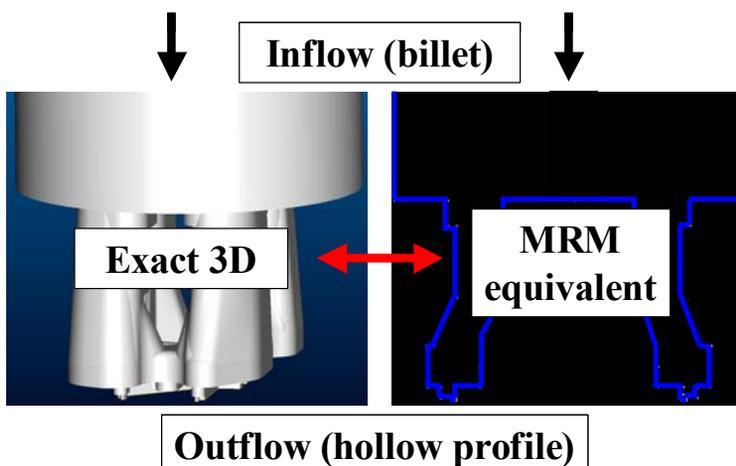
- exit profile temperature and piston force curves during the press cycles
- iso-color maps of temperature, pressure, and aluminium flow
- dynamic viewing (animations)

Solution export:

- standard ascii files
- Paraview
- other standards on demand

System requirements:

- Pentium or AMD Athlon class processor
- Microsoft Windows XP, Windows 2000, Windows NT, or Windows 98
- 256 MB RAM or greater
- 200 MB disk space or greater
- OpenGL hardware graphic support is recommended but not required



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