

solidThinking Click2Extrude® Polymer is a simulation environment designed to help polymer extrusion companies meet the ever increasing demands to produce complex profiles with tight tolerances, quality surface finishes and high strength properties at reduced cost. Click2Extrude is a virtual press where users can visualize material flow and temperature inside a die during extrusion, and make necessary changes to ensure balanced flow, while identifying and eliminating product defects.

Product Highlights

- Test and validate new die designs
- Improve productivity
- Optimize/correct die designs and process conditions
- Determine product quality
- Automated, easy to learn, extrusion-specific user interface

Benefits

- **Validate new die designs:** Creation of virtual die trials using Click2Extrude can determine potential issues in the die design and help to correct them even before manufacturing the first die.
- **Troubleshoot problem dies:** Determine causes for the poor performance of a die using Click2Extrude analysis.
- **Improve die designs:** Click2Extrude can correct and improve the existing die design automatically by adjusting the die dimensions to achieve the desired extrudate conditions.
- **Manage thermal conditions:** As a coupled solver, Click2Extrude accounts for the effect of heat transfer conditions on the material flow in the die. It is also used to study cooling of the extruded profile in calibration dies.
- **Improve productivity:** Optimize process conditions to increase productivity using Click2Extrude.

- **Improve quality control:** Product quality can be improved by eliminating extrusion defects and the effects of die deflection on the product shape. Through determination of recirculation zones, residence time, and excess heating, potential degradation of polymer can be inferred.
- **Reduce overall product development time:** Combining all benefits, the overall product development time is greatly reduced.

A Complete Solution

Die design Engineers:

- Test and validate new die designs
- Determine correct land lengths
- Adjust mandrel and spider dimensions

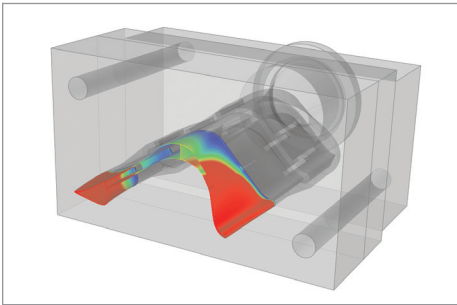
Simulation Engineers:

- Design proper tool support
- Predict tool wear and failure
- Troubleshoot problem dies
- Manage thermal conditions

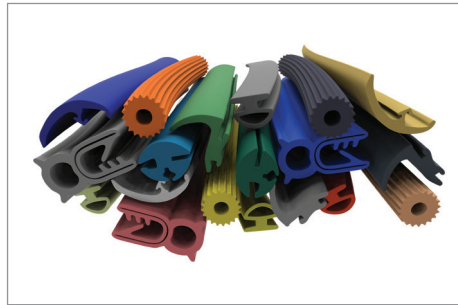
Production Engineers:

- Determine optimum process conditions
- Determine optimum cooling and calibration set-up
- Maximize recovery

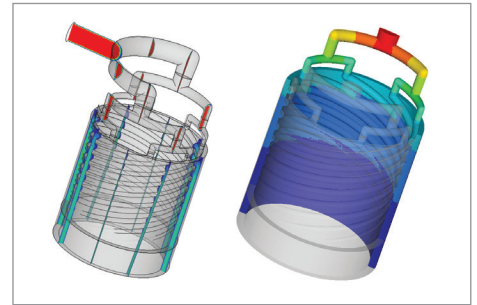
Learn more:
solidthinking.com/click2extrude



Hollow profile deformation



Extruded polymer parts



Velocity and pressure distribution in a spiral die

Quality Engineers:

- Determine product quality
- Optimize surface quality and profile shape
- Calculate profile yield strength

Capabilities

Click2Extrude is a CAE tool used for virtual testing, validation, correction and optimization of the extrusion process and die designs. Using Click2Extrude's broad capability set, engineers can identify design errors before they become costly problems.

Extrusion specific utilities for:

- Plate meshing
- Coextrusion
- Tool deflection for die stress analysis
- Polymer melt flow

Support for all die types:

- Plate dies
- Coextrusion dies
- Film and sheet dies
- Spiral dies

Predict extrusion defects:

- Extrudate swell prediction
- Profile shape prediction
- Coextrusion layers interface deformation
- Deflection/shift of inserts
- Dead zones and recirculation zones

Thermal management:

- Coupled flow and thermal solution
- Profile cooling in calibration dies

Virtual die trials:

- Visualize material flow
- Determine causes for profile deflection
- Study responses to design changes

Tool deflection analysis:

- Perform coupled flow, thermal and stress analysis
- Determine die deflection
- Predict the effect of die/insert deflection on product shape

Comprehensive material database:

- Database of commonly used polymers and tools
- Built-in module to fit material models using viscosity table data
- Material models using user defined subroutines

Wall slip:

- Power law model
- Slip velocity model

Optimization with solidThinking Click2Extrude:

- Optimize and improve die designs
- Optimize process conditions

Polymer viscosity models:

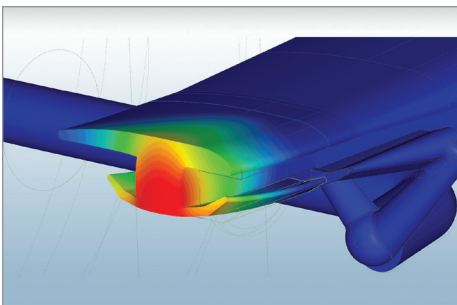
- Power law
- Carreau-Yasuda model
- Cross and Modified Cross model
- Herschel-Bulkley model
- Criminale-Ericksen-Filbey model (viscoelastic)
- Viscosity table data

Temperature dependence:

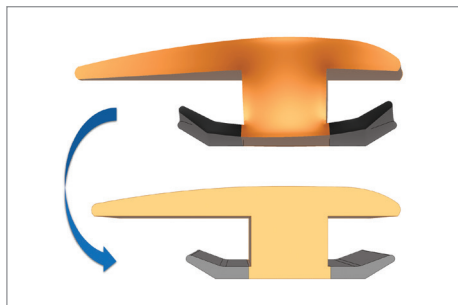
- WLF model
- Arrhenius model
- Exponential model

Results:

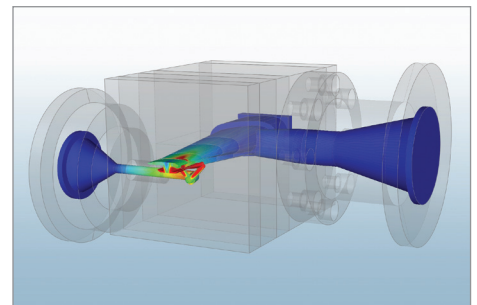
- Velocity distribution
- Temperature distribution
- Particle traces and velocity vectors
- Residence time
- Strain
- Strain rate
- Profile deformation
- Viscosity
- Stress tensor
- Tool deflection and stresses
- Profile calibration
 - Cooling time
 - Degree of cooling
 - Solidification layer
 - Solidification time



Velocity distribution in automobile door trim



Problem dies and corrections



Temperature distribution in automobile door trim