Simulation Services for Injection Molded Plastic Components

Who we are:
The Plastics Engineering Group is supplier of engineering services for the development of plastics products and the simulation of plastic part manufacturing processes.

Advantages for our Customers:
- improved product quality
- reduction of development time
- optimized manufacturing processes
- cost savings
- increase of customer satisfaction

What we offer:
Our scope of activity is the optimization of injection molded parts, the associated molds and the injection molding process using leading finite element based simulation tools (MOLDFLOW, ANSYS, ...).

- MOLDFLOW analyses
- meshing services (midplane modelling, shell meshes, solid meshes)
- CFD modelling
- structural analyses
- design of experiments (DOE)
- consulting service for the development of plastic parts
- training
- anisotropic structural analysis

Our philosophy:
Our daily mission on behalf of our customers is shaped by our commitment to best service and highest quality standards. We develop secured and practice-relevant solutions considering the technical goals and economic interests of our customers.

Facts:
- MOLDFLOW users since 1989
- proven record: > 9000 projects
- MOLDFLOW experience > 120 years
- access to all MOLDFLOW applications

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Meshing Services

Models for all Application Areas:

- midplane models
  - shell meshes for
    - Moldflow, Ansys, Abaqus, LS-Dyna, Nastran, ...
- solid meshes for
  - Moldflow analyses
  - structural analyses
  - acoustics analyses
  - CFD applications

Our Strengths - Your Advantages:

- day to day service
- guaranteed intime delivery
- flexible capacities
- fixed rates
- avoid waste of expensive expert resources

Our Modelling and Meshing Tools:

- ANSA
- CATIA
- IDEAS / UG / NX
- ICEM
- HYPERMESH

Generation of High Quality Finite Element Models
Full Analysis Service
Analyses and Optimization of Injection Molded Plastic Components

Structural Analyses:
- thermal expansion analyses
- linear/nonlinear statics and dynamics with contact
- structural optimization
- modal- and frequency response analyses
- buckling analyses

Moldflow Analyses:
- MPI, Midplane, Fusion, 3D
- Fibre, Warp, Cool, Gas, Sequential Filling, Overmolding, Dynamic Feed, Co-Injection, MuCell, Injection Compression, Reactive Molding

The Plastics Engineering Group:
- experienced Moldflow users since 1989
- proven record of more than 6000 projects
- individual and multilingual reporting
- up to date software applications
- multifaceted CAD data import

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MOLDFLOW analyses
Mold design and process optimization

Moldflow applications:
- Autodesk® Moldflow® Insight (AMI) used
- Midplane, Fusion and 3D meshing technology
- Filling simulation
- Runner design and runner balancing
  - Sequential gating
  - Dynamic Feed®
- Cooling channel design and optimization
- Shrinkage and warpage prediction
  - Including fiber orientation effects
- Special processes
  - In-mold decoration (film, wood, metal)
  - Overmolding of part inserts (hybrid)
  - 2K injection molding
  - Gas injection molding
  - Injection compression molding (ICM)
  - Reactive injection molding (RIM)
  - Co-Injection
  - Mucell® process (microcellular foam)

Moldflow analyses offer you:
- Increased part and mold quality
- Shorter cycle times
- Reduced efforts during molding trials
- Stable molding processes
- Better understanding of the complex rheological and thermal phenomena during molding

Our offer contains:
- Short response times
- Timely delivery of our services
- Analysis fee communicated in advance
**Analysis goals & problem definitions**

**Part / cavity:**
- Gate placement, general ability to fill the part, position of weld lines and air traps, pressure and clamp force requirements, shrinkage holes, thermal and mechanical loading on the melt, cooling time, part deflection (shrinkage and warpage)
- Process window and process capabilities
- Part deflection: Tolerance compliance, part flatness, part roundness, position of holes, screw bosses and other functional features
- Part inserts taken into account
- Core deflection
- Identification of jetting phenomena

**Hot and cold runner systems:**
- Number and positions of the injection points
- Runner balancing, minimizing the clamp force requirement, avoiding flash
- Dimensioning of the gates for most effective packing
- Hot runner layout and valve gate timing for sequential gating
- Hot runner layout and pressure profiles (Dynamic Feed®) for single cavity, multi cavity, family and stack molds...

**Cooling channel layout:**
- Determination and optimization of the cycle time
- Detecting thermal vulnerabilities like hot spots and other non-uniform cooling issues
- Cooling channel layout, channel dimensioning and process settings like flow rates and temperatures
- Optimizing the cooling system with mold inserts (Ampcoloy, copper, BeCu, heatpipes, ...)
- Part deflection due to thermal influences

**Special processes:**
- In-mold decoration (IMD): Assessment of thermal and mechanical loading on the film
- Part inserts: Thermal and mechanical effects
- Overmolding: Thermal effects of A-component on B-component, vice versa shrinkage and warpage analysis of A- and B-component coupled
- Gas injection molding: Placement of gas needles and overflow cavities, gas channel penetration, final polymer wall thickness, fingerling processing parameters like gas delay time, gas pressure profile, ...
- ICM: Clarify advantages of ICM over conventional molding, compression forces, thermal and mechanical loading of the melt, processing: Volume to be filled, press-open distance, closing profile, ...
- Co-injection: Determining (thickness) distribution of skin and core components penetration of core component
- Mucell®: Weight savings, sink marks, bubble distribution
  Processing: Initial volume to be filled, gas concentration, ...
MOLDFLOW analyses
Low Pressure Molding

Hotmelt technology:
- Ability to fill the part
- Filling animations
- Position of weld lines
- Position of air traps
- Venting
- Pressure and clamp force
- Overmolding and bonding
- Runner and gate dimensioning
- Freeze time
- Shear rates and shear stresses
- Shrinkage & warpage
- Process optimization
- Gravity, inertia & jetting

Reactive technology:
- Reactive molding
  - Epoxy, EMC, LSR, rubber, ...
  - Conversion
  - Curing kinetics
  - Venting and air pressure
- Microchip encapsulation
  - Paddle shift
  - Wire sweep

Your advantages:
- Less development time
- Higher quality standard
- Optimized production processes
- Cost savings
- Less claims and complaints
= CUSTOMER SATISFACTION
Benefits:
- Prediction and evaluation of stresses, strains and deformations
- Evaluation of strength- and deformation requirements
- Prediction of functionality, reliability and safety reserves
- Reduced test effort
- Close-to-production prototype
- Better understanding of the general mechanical behavior

Application:
- Thermal expansion analyses
- Strength analyses, linear, nonlinear, static, dynamic by considering contact definitions
- Part optimization and investigation of variants
- Investigation of parameter sensitivity
- Eigenvalue, frequency- and harmonic response analyses
- Creasing- and buckling analyses

Our offer contains:
- Short response times
- Timely delivery of our services
- Analysis fee communicated in advance
**filling simulation coupled with structural mechanics**

**Application:**
- Specific part design
- Weight optimization
- Analysis of weld line quality

**Benefits:**
- More accurate and realistic results
- Consideration of fiber orientation
- Taking the microstructure into account

**Technology:**
- Non-linear non-isotropic approach
- “MAPPING”: ideal numerical models for process simulation and structural analyses
- Virtual material laboratory
- Definition of any material model with different base polymers and fillers

**Consulting Services:**
- Material testing & validation
- Moldflow fiber solver adjustment
- Analyses & optimisation
- Evaluation projects

**Our offer:**
- Coordination of medium-term development projects
- Possible cooperation with leading „Plastics Institutes“ in Darmstadt, Germany
- First certified German Digimat service provider

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Plastics Engineering Group
Leading by Simulation

Record of projects / Experience 2/2

automotive power train
- radial fan with metal retainer
- radiator
- radiator housing
- radiator shroud double
- radiator shroud single
- resonator
- retainer
- sealing cover
- sealing frame mold
- sealing plate
- shift fork
- shift-fork housing
- single radiator frame
- snorkel
- spring
- spring bracket
- spring panel
- spring support
- steam partition
- tank flange
- tank hub
- tank inlet neck
- tapped rod
- tooth wheel
- transducer cylinder
- trim engine hood
- trolley body flange
- truck cylinder head cover
- truck valve cover
- U-Box
- valve
- valve cover 3 Zyl
- valve cover 4 Zyl
- valve cover 6 Zyl
- valve roll
- ventilator
- water box
- water tank

consumer + packaging
- 5 cavity preform mold
- 8 cavity preform mold
- 10 cavity preform mold
- 24 cavity preform mold
- 32 cavity preform mold
- 48 cavity preform mold
- 64 cavity preform mold
- 72 cavity preform mold
- 24 X-injected handle for screwdriver
- Beauty cover
- bill box tool
- bottle
- bottle bottom
- bottle box
- box
- brush head
- bucket
- cap nut
- cartridge
- condensing dryer drum
- condensing dryer rear panel
- cooker hood
- cooker hood, gas-assisted
- creme jar
- diaphragm dryer
- dryer
- dryer air vent
- dryer door
- dryer door inner plate
- dryer front panel
- dryer housing
- dust pan
- electric toothbrush housing
- garbage can 120 l
- garbage can 140 l
- garbage can 210 l
- garbage can lid
- ice box
- margarine tub
- napkin box
- plastic broom
- preform
- rubber broom
- sleeve
- spray cap
- stack box
- suzie bowl (washing machine)
- suitcase
- tool box
- tooth brush
- transport box 40 l

medical technology
- cap for insulin injector
- chair
- chair wheel components
- chair wheel foot lock
- dental housing front part
- dental housing back part
- diagnosis system
- diagnostic plate
- disk
- dispenser housing
- e-pack
- filter
- inhaler housing
- injector
- lower test plate
- medical tacker
- miks test plate
- pipette
- pipe
- pack 24
- pack 96
- shower cushion
- syringe
- test stuff housing
- tray 12
- tray 24
- upper test plate

miscellaneous products
- 2K fitting
- 2K palette
- backrest
- box
- bucket
- bucket handle
- bullet jacket
- brush
- castor
- cement mixer barrel
- chain link
- chair
- chair with gas injection
- technology
- charger
- coin dispenser
- container corner
- creme jar
- curgugated tube
- cushion
- deck chair
- dispenser box
- door plate
- drain pipe
- face guard for welding
- filter frame with interface
- fitting
- fitting with inserts
- foam plate
- folding seat
- glass smoothing blade
- gutter
- hemlet
- hinge
- ice box 5 l
- ice scraper
- LCO stand
- lid
- monitor rotary arm
- napkin dispenser
- palette
- pen cap
- pen housing
- pipe
- pipe fitting
- pivot arm
- roll chain
- rubber gaiter
- shovel
- shower basin
- shower cabinet
- stop bar
- steel
- sunbed
- tie wrap
- TV stand
- tweeter
- visor
- wall holder
- wedge