

## Moldex3D eDesign – Performance Injection Molding Simulation



**Larry Ren, Regional Manager  
Moldex3D Europe**

# Company Preview

- > Since 1995, CoreTech System developed the Moldex3D full solution and operated a global market of plastic injection molding simulation.
- > Moldex3D is the innovator of TRUE 3D molding CAE.
- > CoreTech constructs the global service network through direct offices or professional resellers around the world.



**Headquarters, HsinChu  
Silicon Valley of Taiwan**

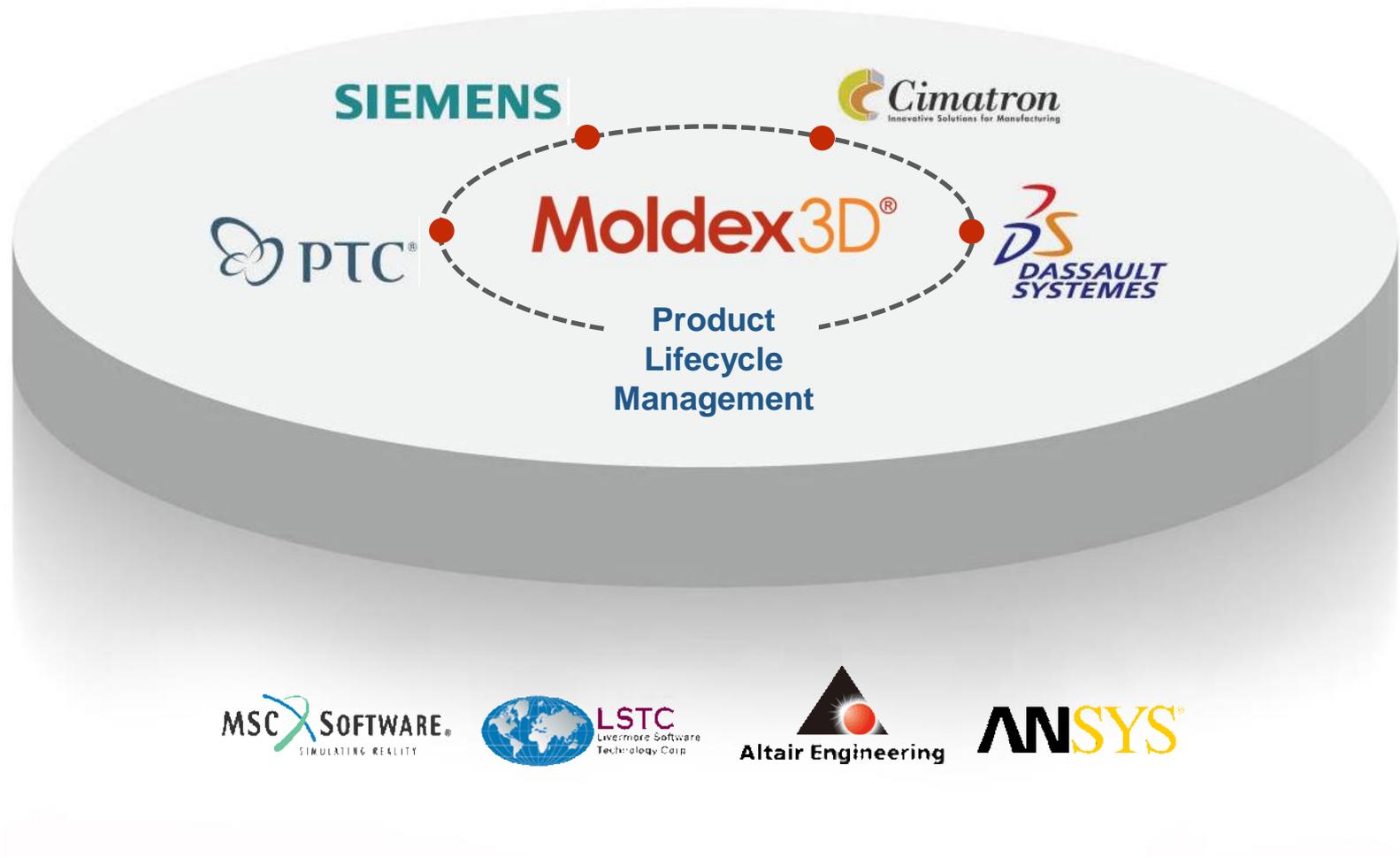


**Over 250 employees**



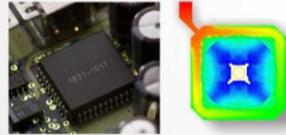
**Global support network**

# Moldex3D Alliances

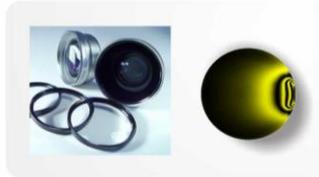


# Moldex3D Application Fields

## Semiconductor Industry



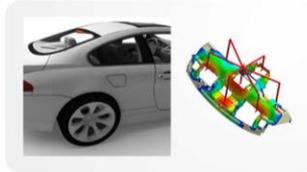
## Photoelectric Products



## Household Electrical Appliances



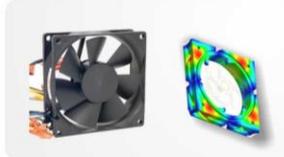
## Automotive Industry



## Communications Products



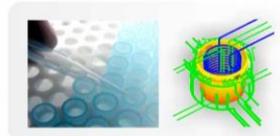
## Computer Component



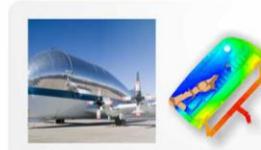
## Key Components



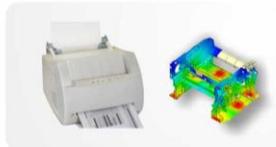
## Biomedical Technology



## Aerospace Industry



## Consumer Electronics

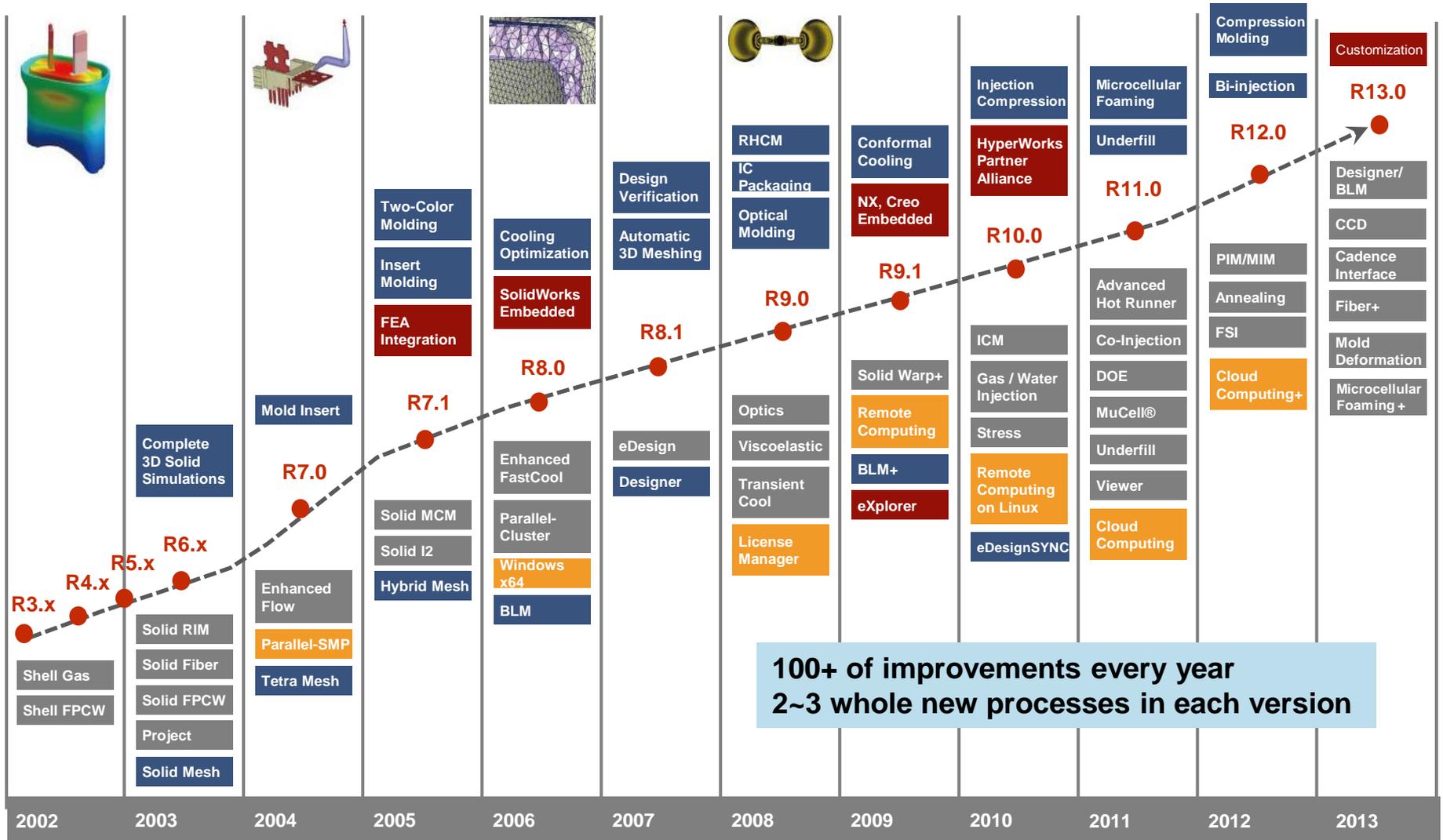


**Big parts**  
**Small parts**  
**Thick parts**  
**Thin parts**

# Moldex3D Reference Customers

Automobile	High Tech/Electronics	Material/Others
 TOYOTA   PSA PEUGEOT CITROËN	    	  The Chemical Company  
   	 	 
   NISSAN VOLVO HONDA	  KONICA MINOLTA OLYMPUS	   
  SEAT MAGNA	  	   
   faurecia Visteon Autoliv	  WIDEX TEXAS INSTRUMENTS	   
     	    	   

# Moldex3D Technology Road Map



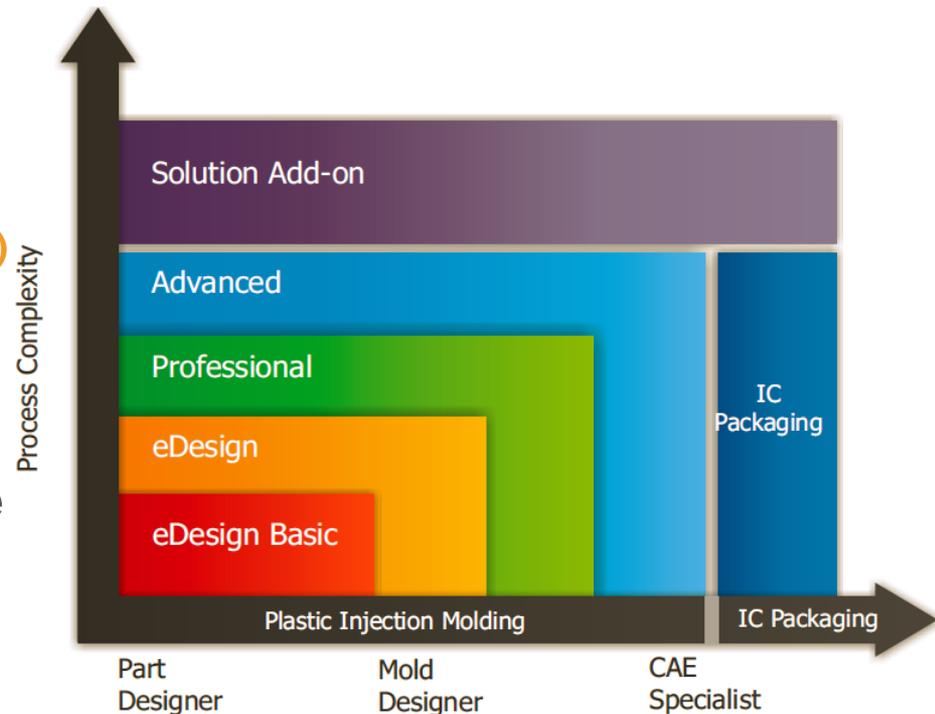
100+ of improvements every year  
2~3 whole new processes in each version

# Moldex3D Product Portfolio

> Moldex3D provides a series of simulation packages to efficiently evaluate molding behaviors and improve product quality:

- eDesign Basic
- eDesign
- Professional (eDesign+Shell)
- Advanced (eDesign+Solid+Shell)
- IC Packaging

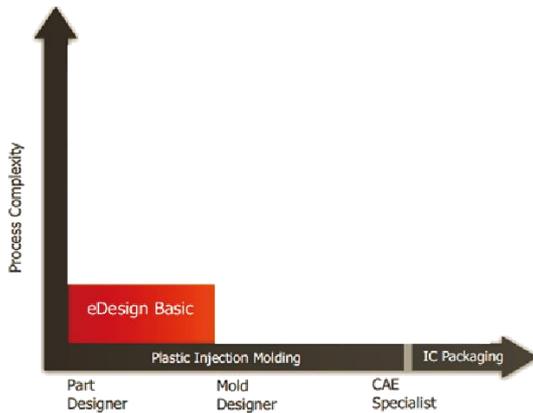
> Solution Add-on modules provide the broadest range of solutions for different industries



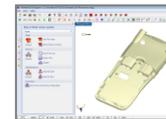
# eDesign Basic Package

## > eDesign Basic

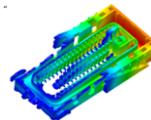
- Provides a full range of **flow simulation capabilities**
- Predict filling performance, decide ultimate gate location, eliminate weld lines and air traps



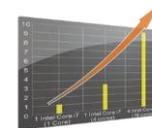
Included modules Plastic



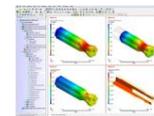
Designer



Flow



Parallel computing

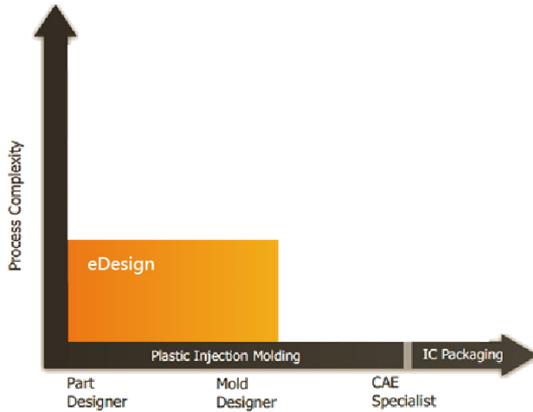


Project

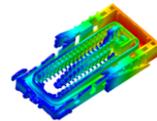
# eDesign Package

## > eDesign

- Equipped with auto-meshing feature and intelligent modeling wizards for streamline CAD-to-CAE simulation process
- Delivers reliable analysis results and quickly verifies part and mold designs
- Easy to use without additional training, efficiently minimize user operation



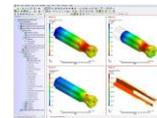
## Included modules



Flow



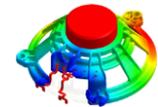
Designer



Project



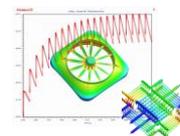
Parallel computing



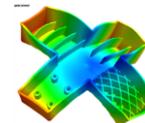
MCM



Pack

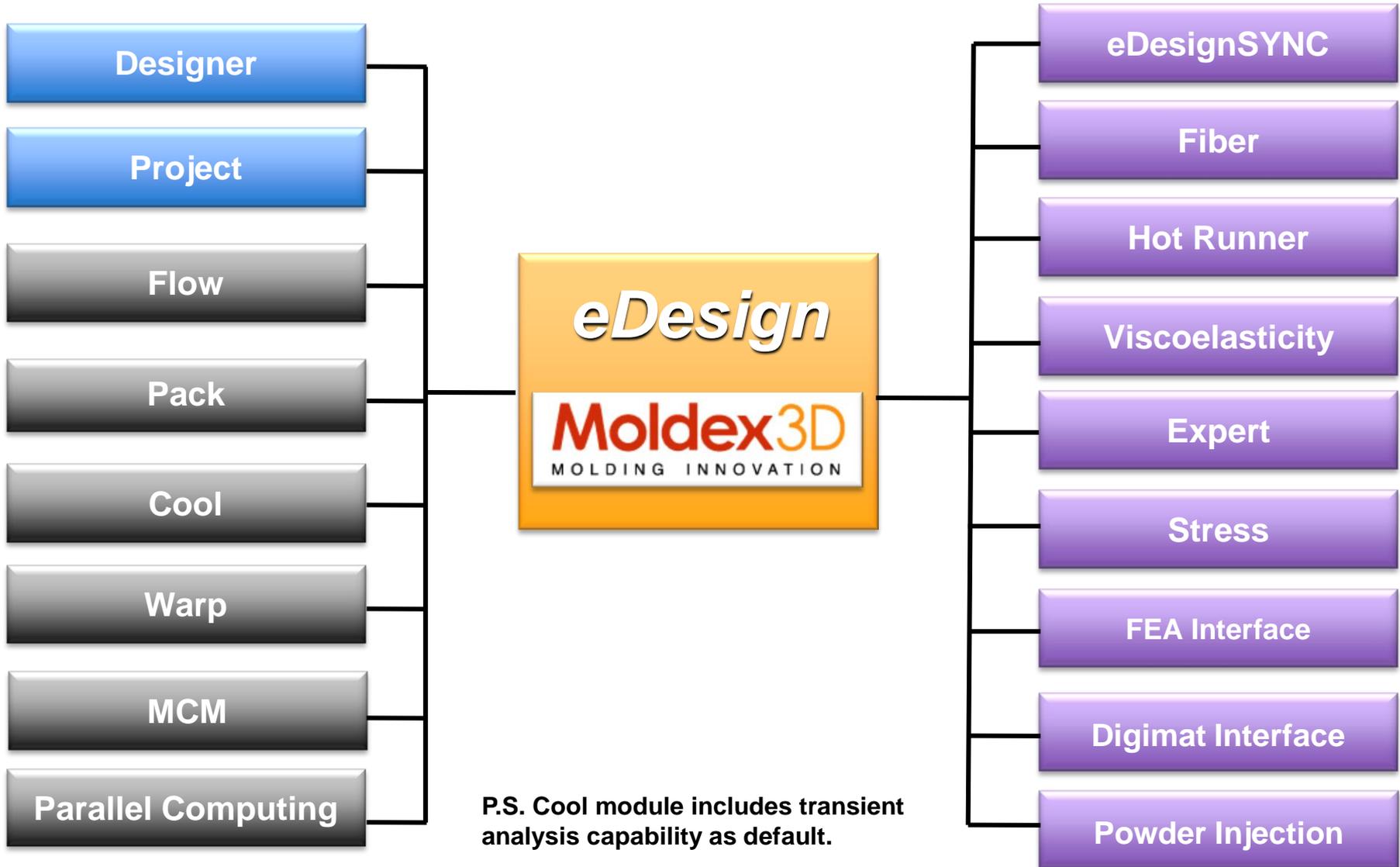


Cool



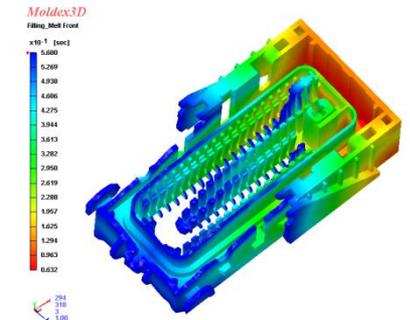
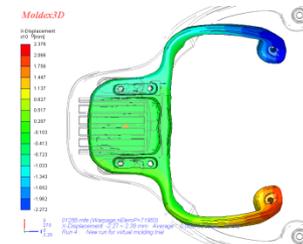
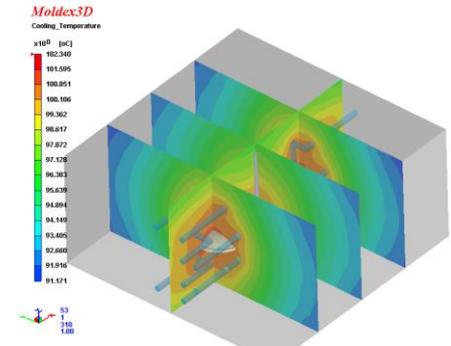
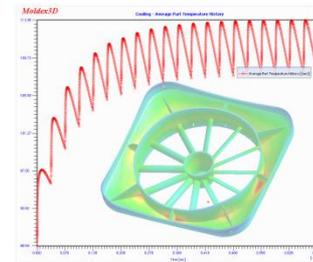
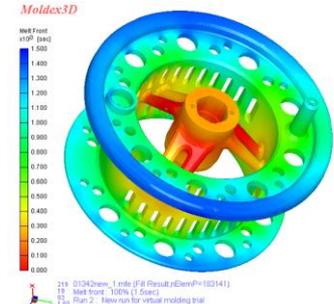
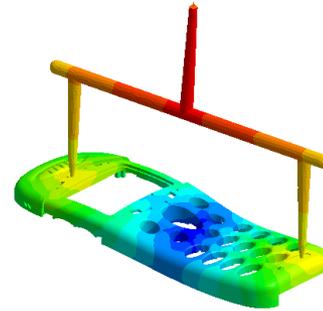
Warp

# eDesign Module Introduction



# What Moldex3D Can Do?

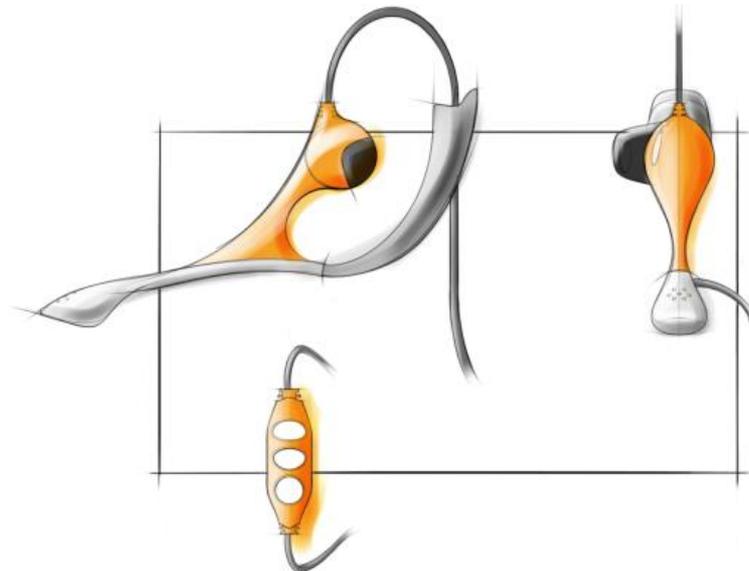
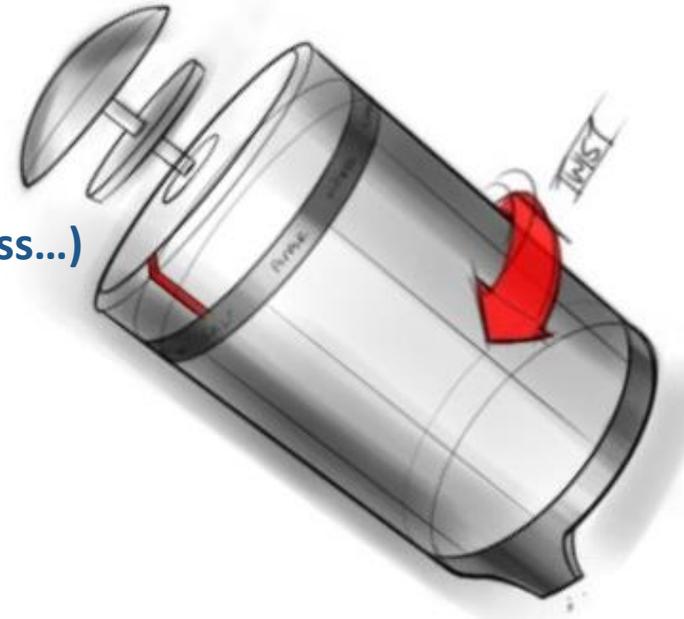
- > Improve the appearance and dimension
  - Weld line, air trap, flow mark, sink mark
  - Flow balance, shrinkage and warpage control
- > Lower down the cost
  - Remove hot and cold spots for cycle time reduction
  - Mold structure optimization
  - Reduce mold trial and tooling costs
- > Optimize the production process
  - Injection condition optimization
  - Clamping force reduction, machine selection



# The main challenges of injection molding

## - Product Design

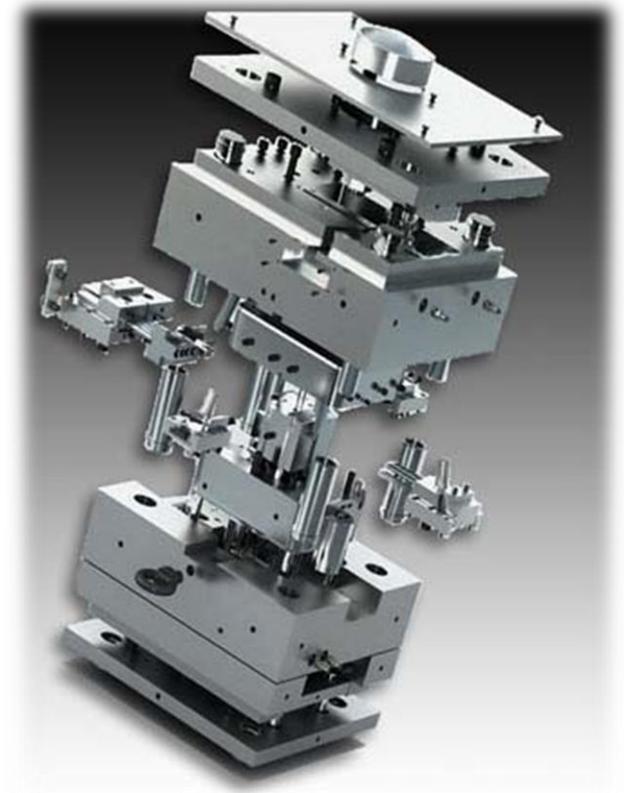
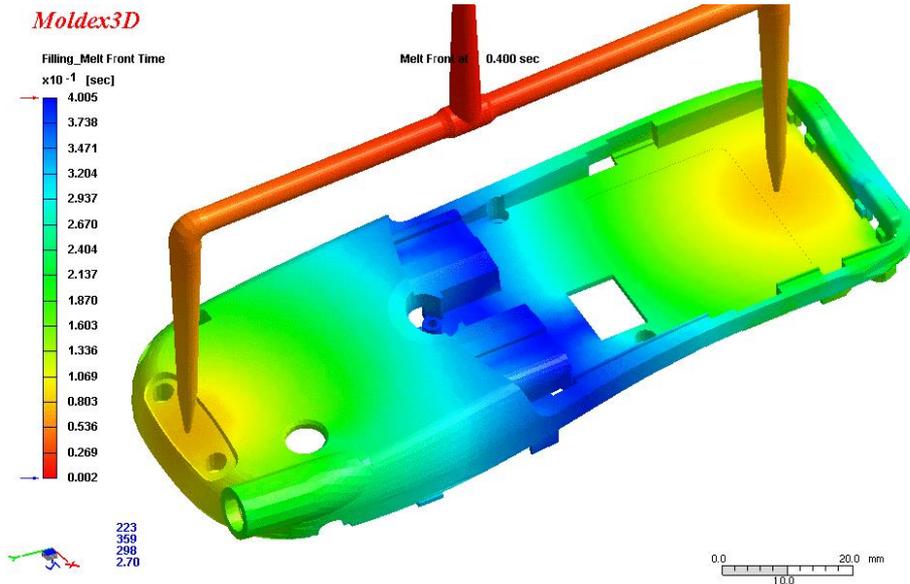
- > **Product Design Challenges**
  - **Design parameters to determine(ex: thickness...)**
  - **Shorten the product development time**
  - **High tooling cost due to complex geometry**
  - **Demanding Tolerance**
  - **Thin-Wall Injection Molding(TWIM)**
  - **Multi-Component Molding(MCM)**



# The main challenges of injection molding

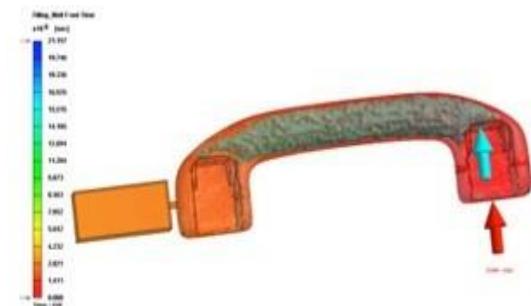
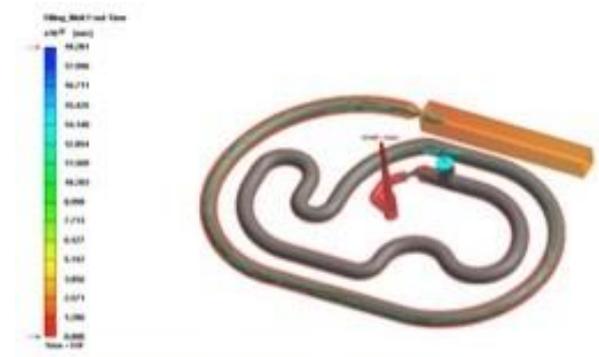
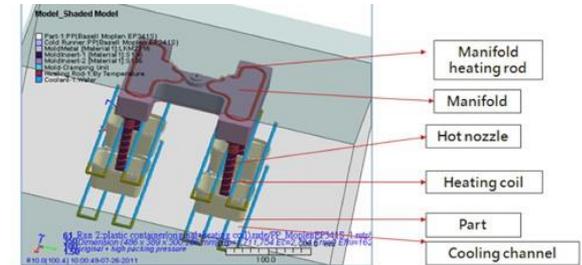
## - Mold Design

- > Mold Design Challenges
  - Gate design - type ? number ? location ? size ?
  - Runner design - type ? cavity design ? size ?
  - Cooling circuit design



# Moldex3D Precise & Realistic Simulation

- > Hot Runner
- > Insert Molding
- > Variotherm
- > Injection Compression Molding
- > Compression Molding
- > Gas assisted Injection Molding
- > Water assisted Injection Molding
- > Reactive Injection Molding
- > Encapsulation
- > Co-injection Molding
- > Bi-injection Molding
- > Fiber-Reinforced Plastic Injection
- > Microcellular Injection Molding
- > Powder Injection Molding



# Moldex3D eDesign

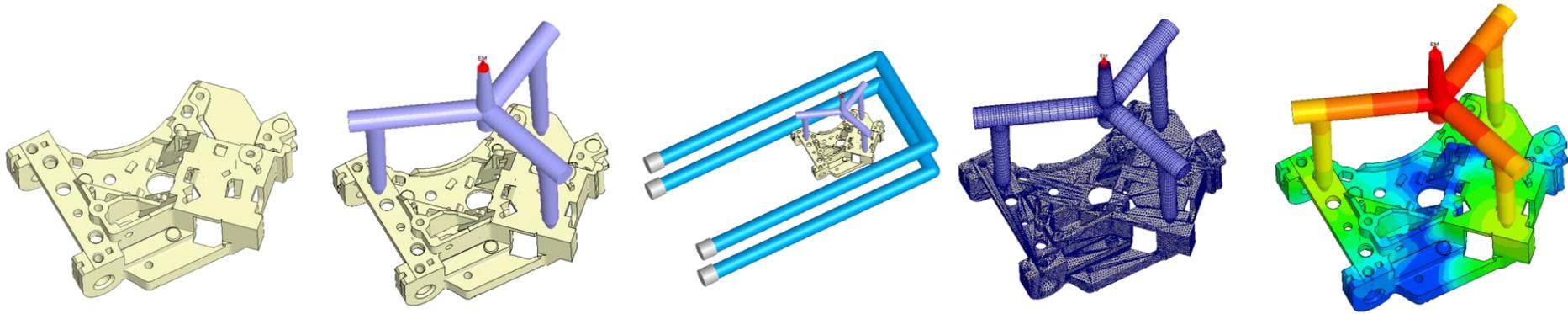
**“Easy and Fast 3D CAE solution based on Solid mesh for injection molded plastics industry”**

# Bottleneck of General CAE Workflow

- > However, the construction of mesh for different product geometry is the major difficulty
  - 80% man-hours are spent in constructing the mesh
  - Construction time and mesh quality are highly dependent on users' experience.



# Rapid True 3D Design Verification Tool



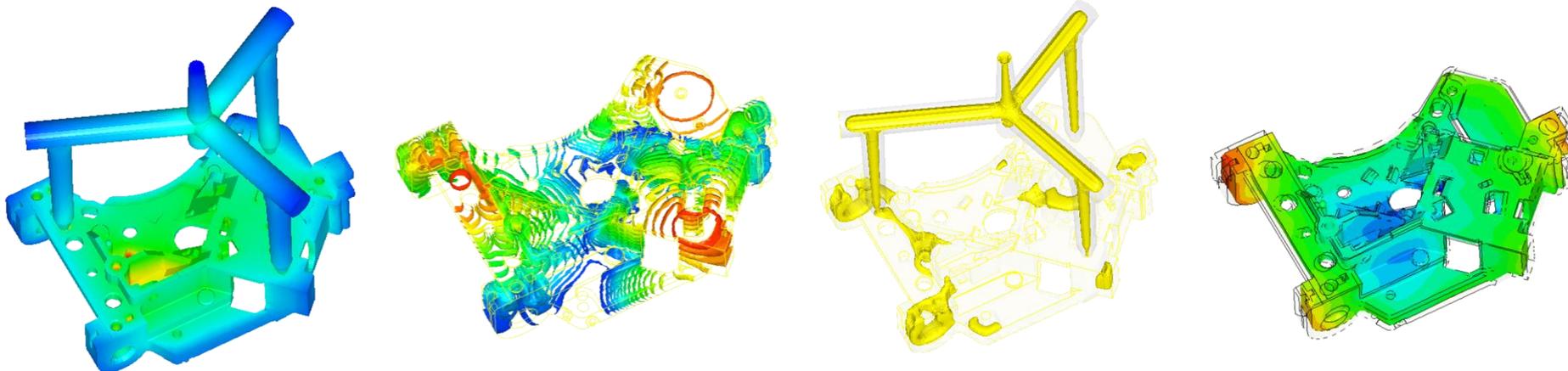
*Import CAD*

*Create Runner System*

*Create Cooling System*

*Meshing*

*Run Simulation*



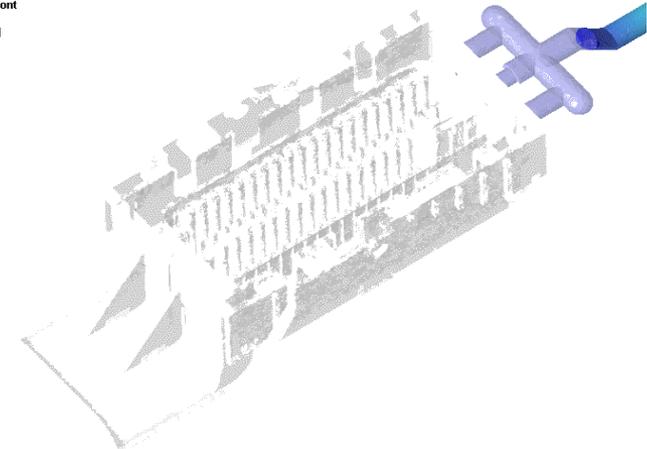
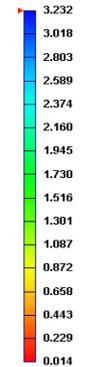
# Moldex3D eDesign – Flow Analysis

eDesign-Flow assists you a deep insight in solid plastic flow behaviors from macro view to micro view. You can know better how the solid melt flow progresses, accurately identify where weld surfaces are, detect the air traps, melt front hesitation or short shot, and estimate the clamping force to choose a suitable machine.

Moldex3D

Filling\_Melt Front

x10<sup>-2</sup> [sec]



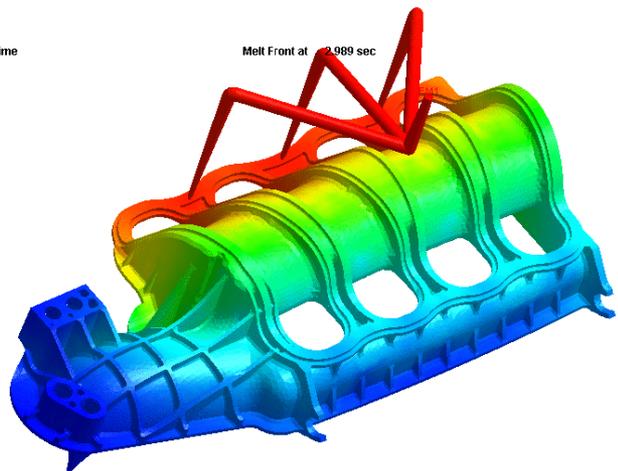
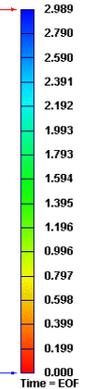
Melt Front at 3.2323e-002 sec



Moldex3D

Filling\_Melt Front Time

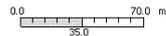
x10<sup>0</sup> [sec]



Melt Front at 2.989 sec

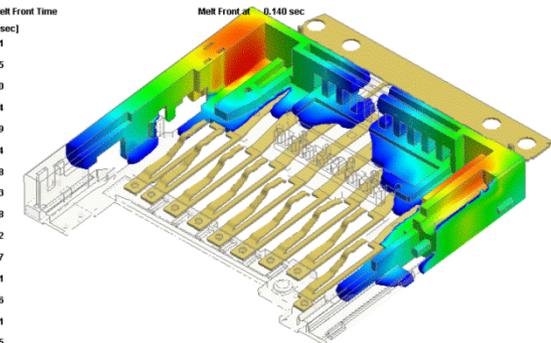
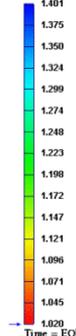
42 Run 1:Model03\_gt4\_gt3.mde/PA6\_UltramidB3EG6\_1.mtr/case03\_4.pro  
 345 At 100% (2.99 sec) (Enhanced Solver+Fiber),Ep=812,011 Ec=0 Em=0 <eDesign3>  
 321 New run for virtual molding trial  
 2.40

R9\_1(9105.3) 14:34:13-12-02-2008



Filling\_Melt Front Time

x10<sup>-1</sup> [sec]



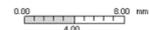
Melt Front at 0.140 sec

Time = EOF

Moldex3D

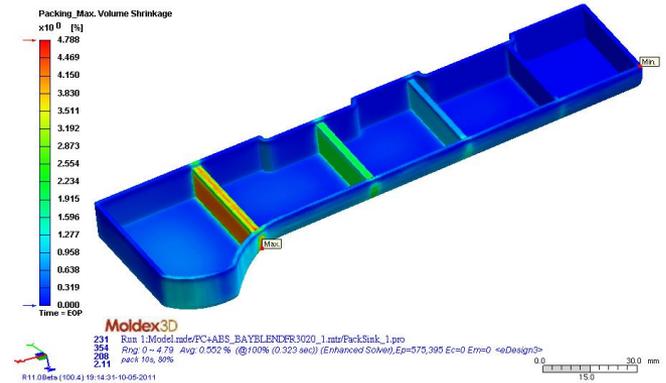
49 Run 1:3:rafo/LCP\_VECTRAE130\_new\_model.mtr/MDXProject20110823\_100\_1.pro  
 0 At 90% (0.14 sec) (Enhanced Solver+Fiber),Ep=842,501 Epin=103,475 Ec=0 Em=0 <Mixed>  
 221 New run for virtual molding trial

R11.08ata (100.4) 19:14:10-10-07-2011



# Moldex3D eDesign – Packing Analysis

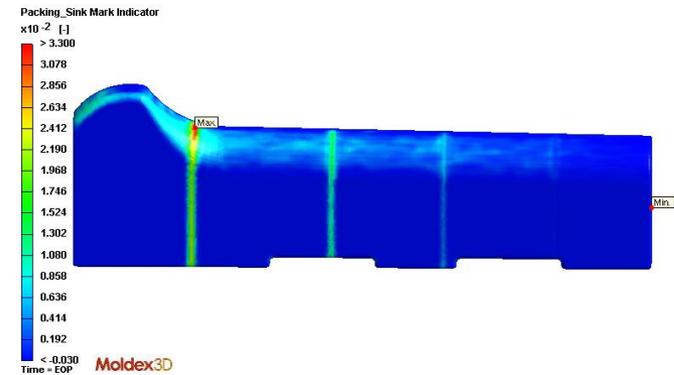
eDesign-Pack follows the material PVT characteristics to predict the shrinkage, sink mark and density variations. It also helps you to precisely determine the gate freeze time, the efficient packing time and the proper packing pressure to minimize the areas of high volumetric shrinkage.



Rib design

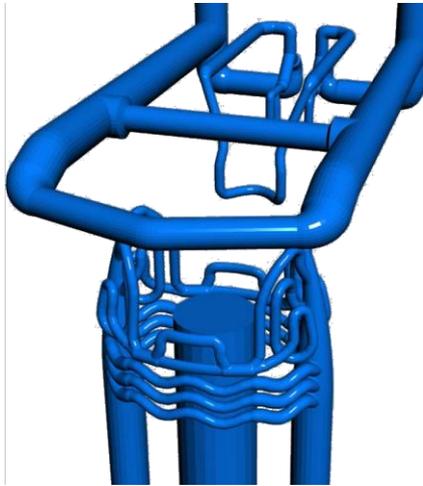


Volumetric shrinkage prediction

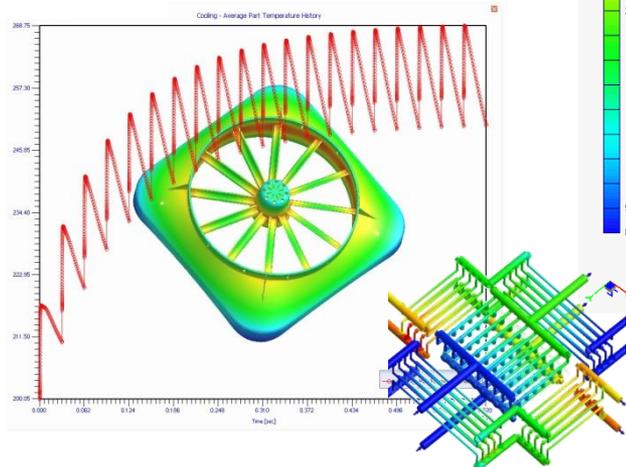


Sink mark prediction

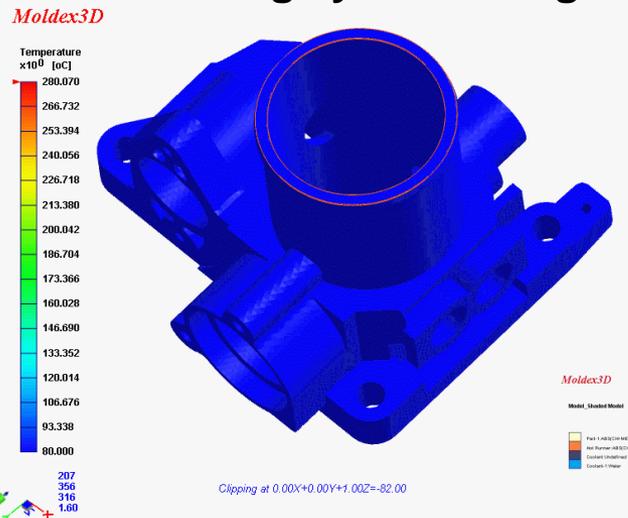
# Moldex3D eDesign – Cooling Analysis



eDesign-Cool accurately analyzes the mold temperature, efficiency of cooling channel layout and required cooling time in the design phase. It is very useful to detect possible mold cooling system defects, such as unbalanced cooling, hot spots, etc. You can accurately evaluate the cooling efficiency to optimize the cooling system design and reduce the cycle time.

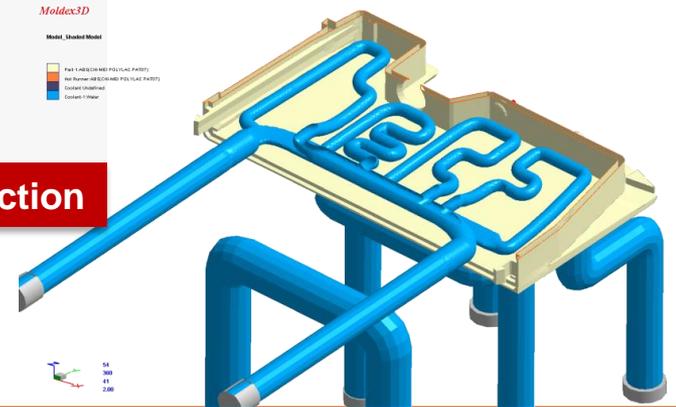


**Transient Cool**



**Part temperature prediction**

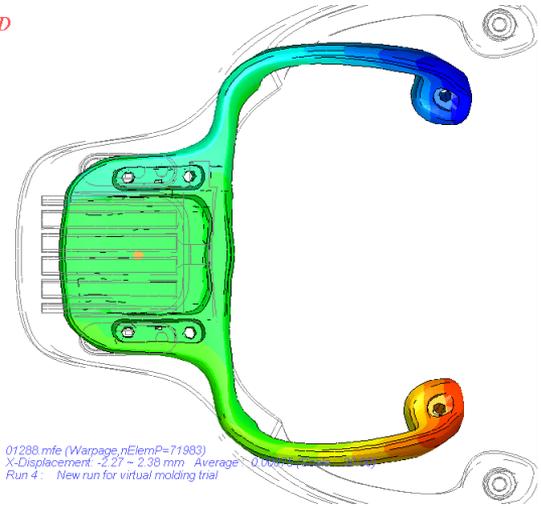
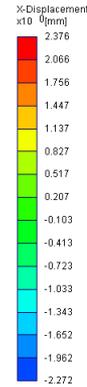
**Conformal cooling capability**



# Moldex3D eDesign – Warpage Analysis

eDesign-Warp predicts the warpage tendency before building the mold. It easily and efficiently improves the part quality and optimizes the design. For fiber-reinforced materials, it follows the fiber composite theories to predict the fiber orientation, anisotropic shrinkage and warpage.

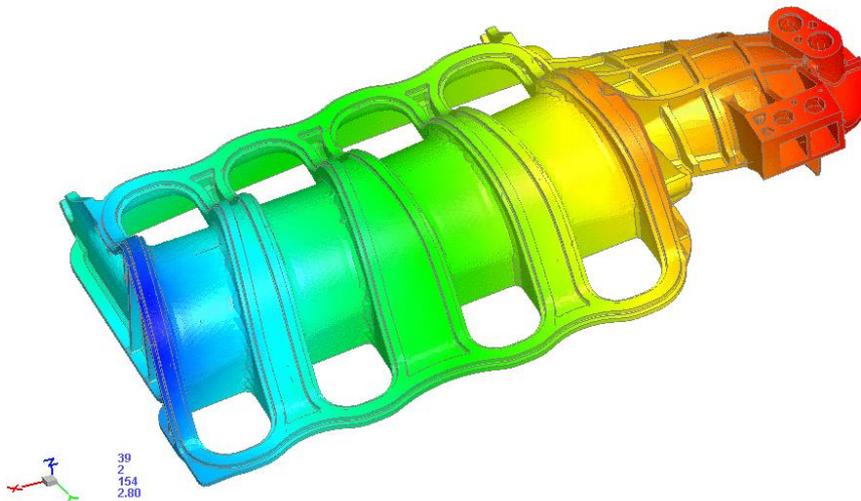
Moldex3D



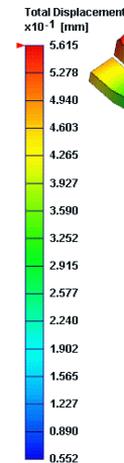
Moldex3D/eDesign

Warpage\_X.Displacement

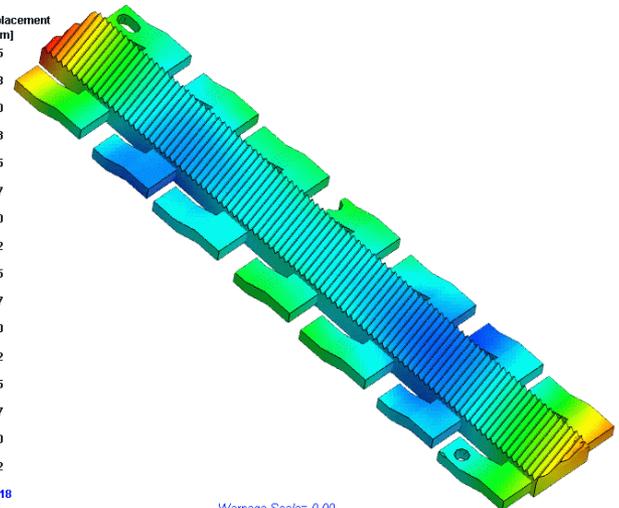
Warpage Scale= 0.000



Moldex3D



Warpage Scale= 0.00

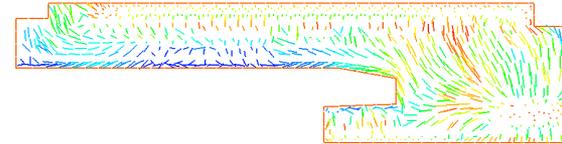


# Moldex3D eDesign – Fiber Analysis

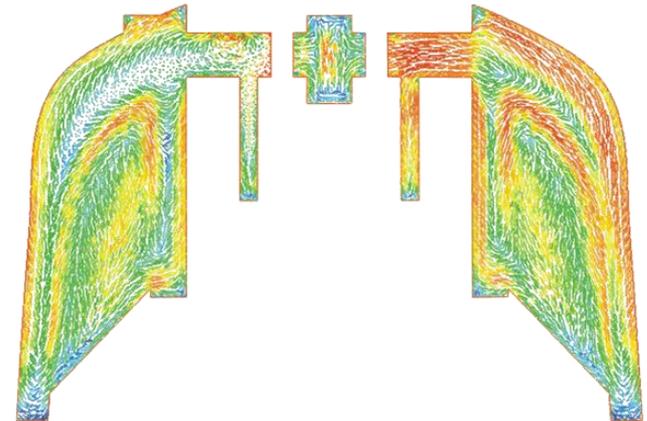
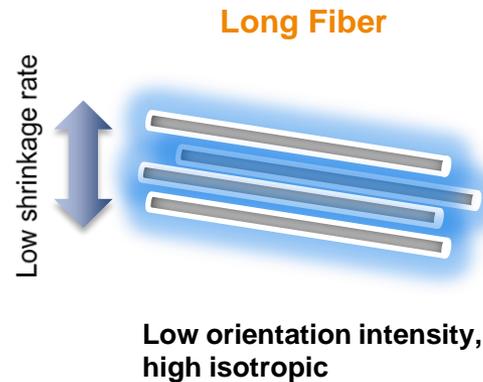
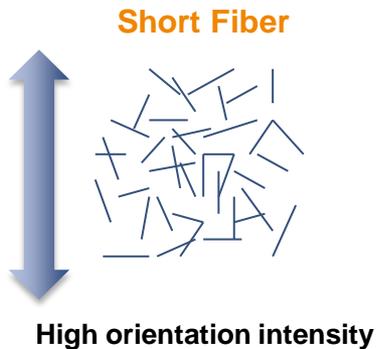
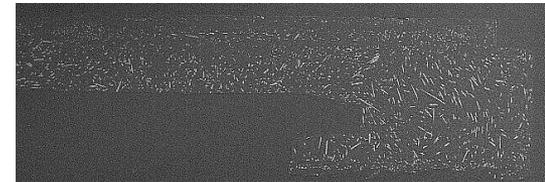
A precise 3D fiber orientation simulation of **both short and long fibers** by considering the fiber length, diameter, concentration, etc.

It predicts process-induced anisotropic thermal calculation of fiber-reinforced plastic parts for improving product dimensional stability and resistance to deformation.

Moldex3D simulation



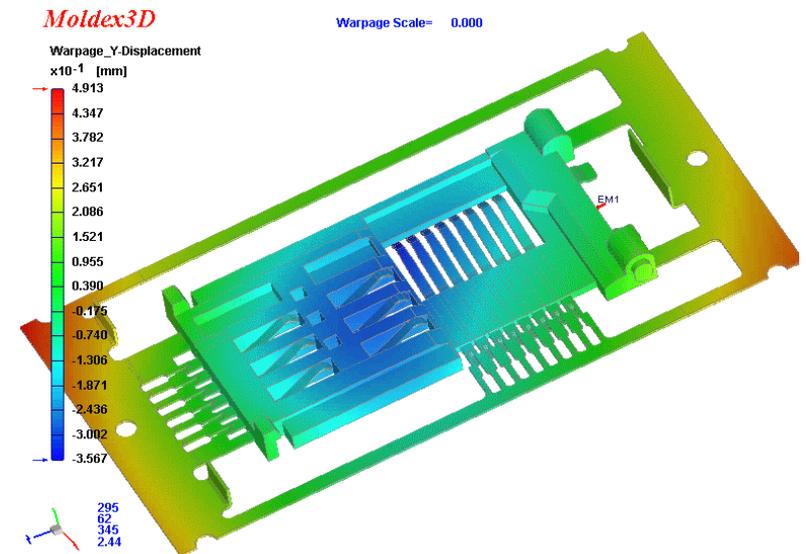
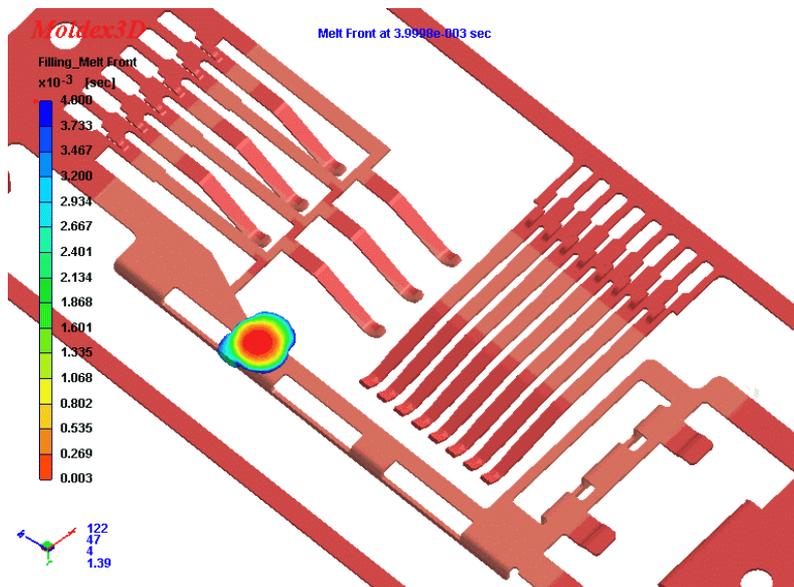
Experiment (SEM)



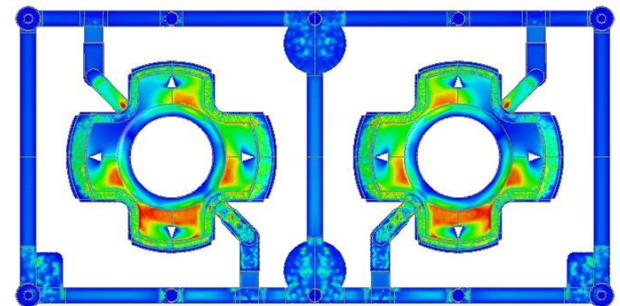
# Moldex3D eDesign

## Multi-Component Molding (MCM) Analysis

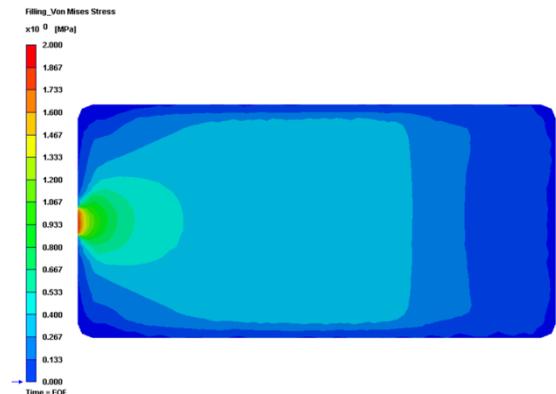
eDesign-MCM simulates the multi-component molding process, including insert molding, overmolding, and multi-shot sequential molding. The accurate interaction behavior and warpage prediction for different components help to further optimize the product design.



# Moldex3D eDesign Viscoelasticity (VE) Analysis

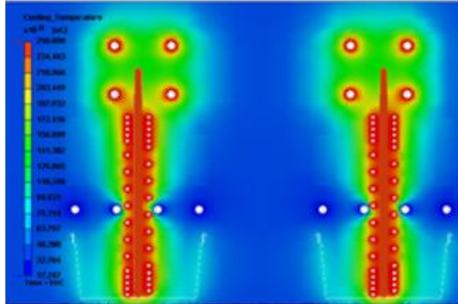


- > A professional calculation of viscous and elastic properties of polymer materials for flow-induced residual stress and warpage.
- > Supports both differential and integral types of viscoelastic constitutive models.

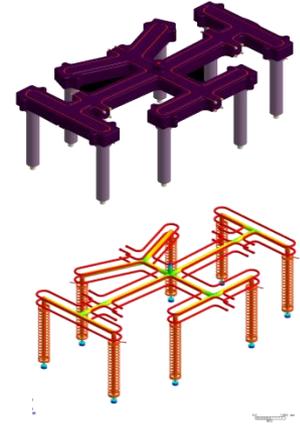


# Moldex3D eDesign

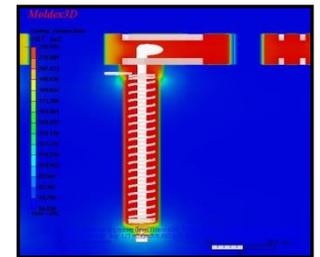
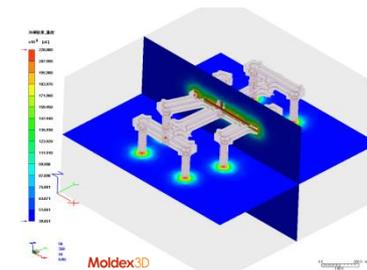
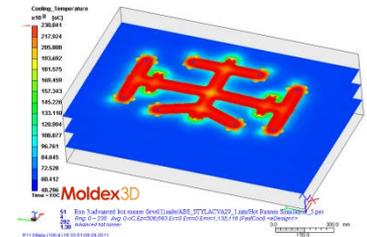
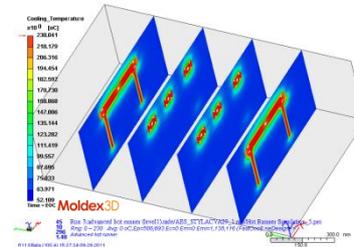
## Advanced Hot Runner Analysis



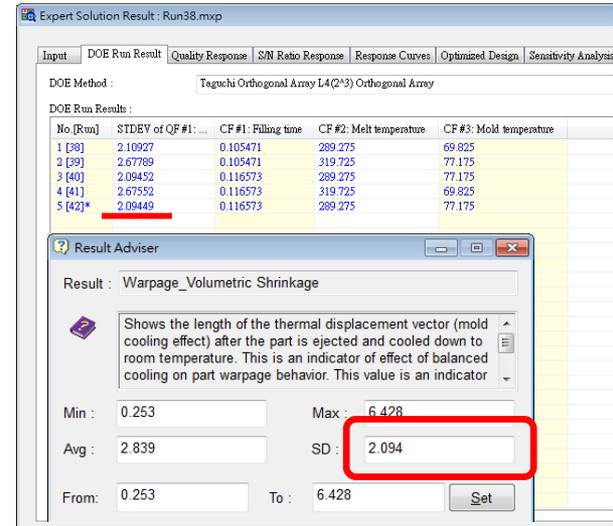
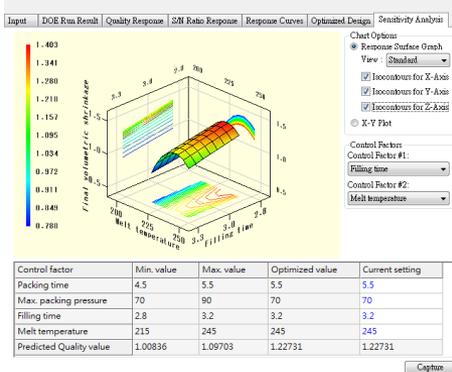
Advanced Hot Runner



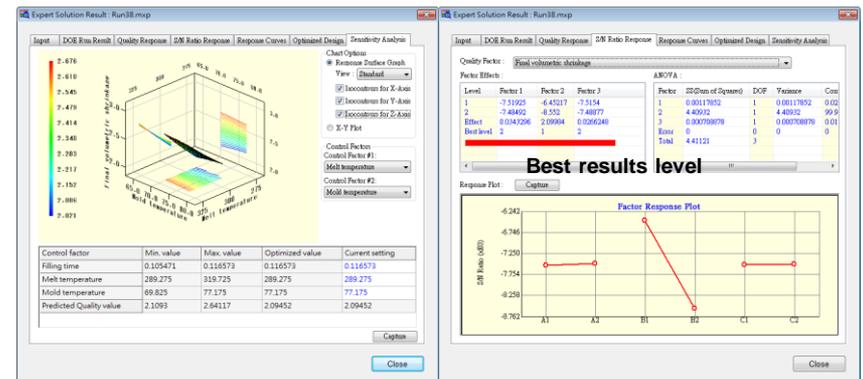
- > A detailed visualization of the distribution of melt temperature and moldbase temperature in a hot runner system.
- > Provides the full interpretation of hot runner components, including heating coils, manifolds, bushing, nozzles, etc.
- > It simulates the heating of sensor-coupled hot runners to improve the thermal uniformity and prevent the degradation of plastic material.



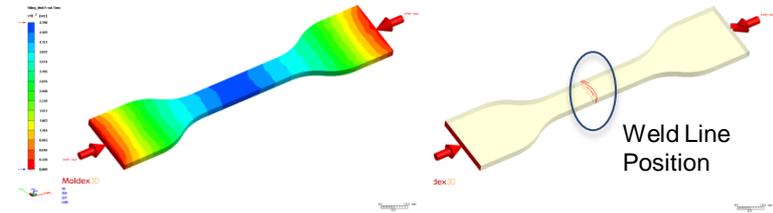
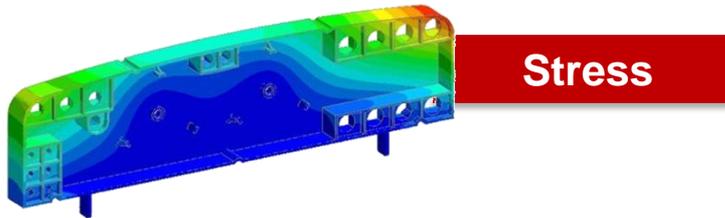
# Moldex3D eDesign Expert Analysis (DOE)



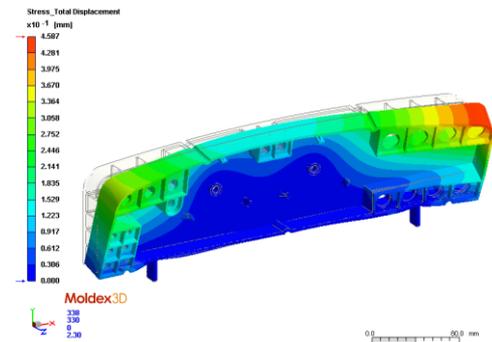
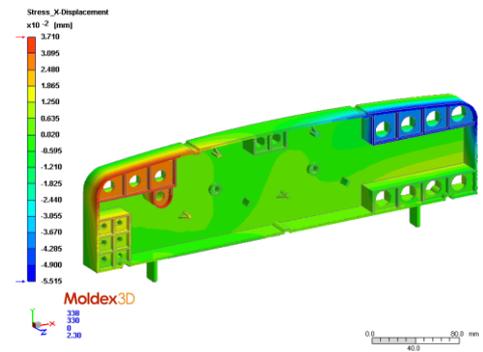
- > A professional tool using **DOE (Design of Experiment)** for efficient optimization of process conditions, such as filling time, packing time, melt and mold temperature, etc.
- > A series of analysis jobs will be launched automatically and collected. Graphical summary for part quality evaluation and optimized design will be proposed automatically.



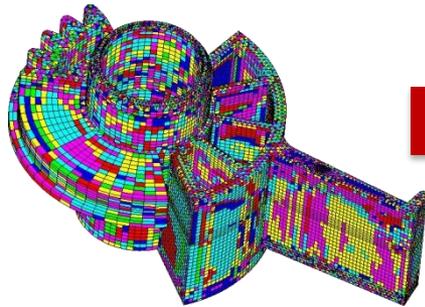
# Moldex3D eDesign Stress Analysis



- > A complete stress analysis for molding products with user-specified boundary conditions. The deformation and stress field could be determined and precisely inspected if the strength meets the design specifications.
- > From R11, gravity and weld line effects are included. Parallel computation is available for enhancing the computation speed.

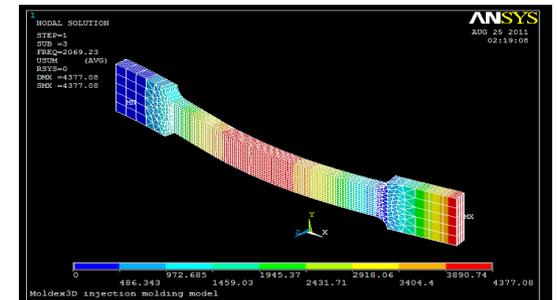
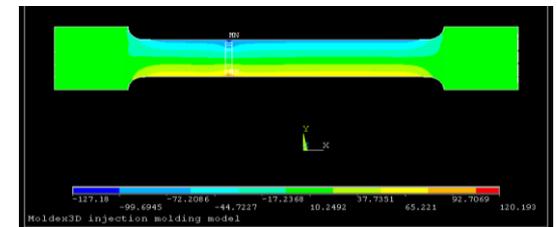
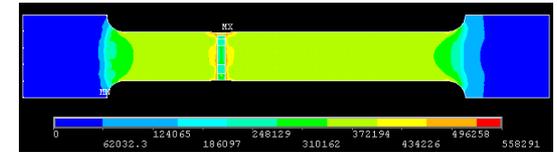
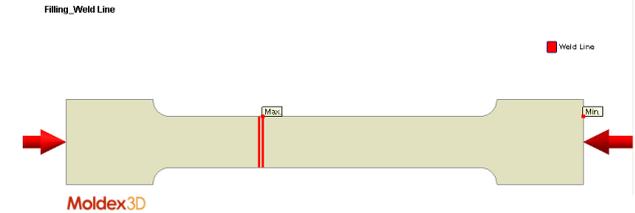


# Moldex3D eDesign FEA Interface & Digimat Interface



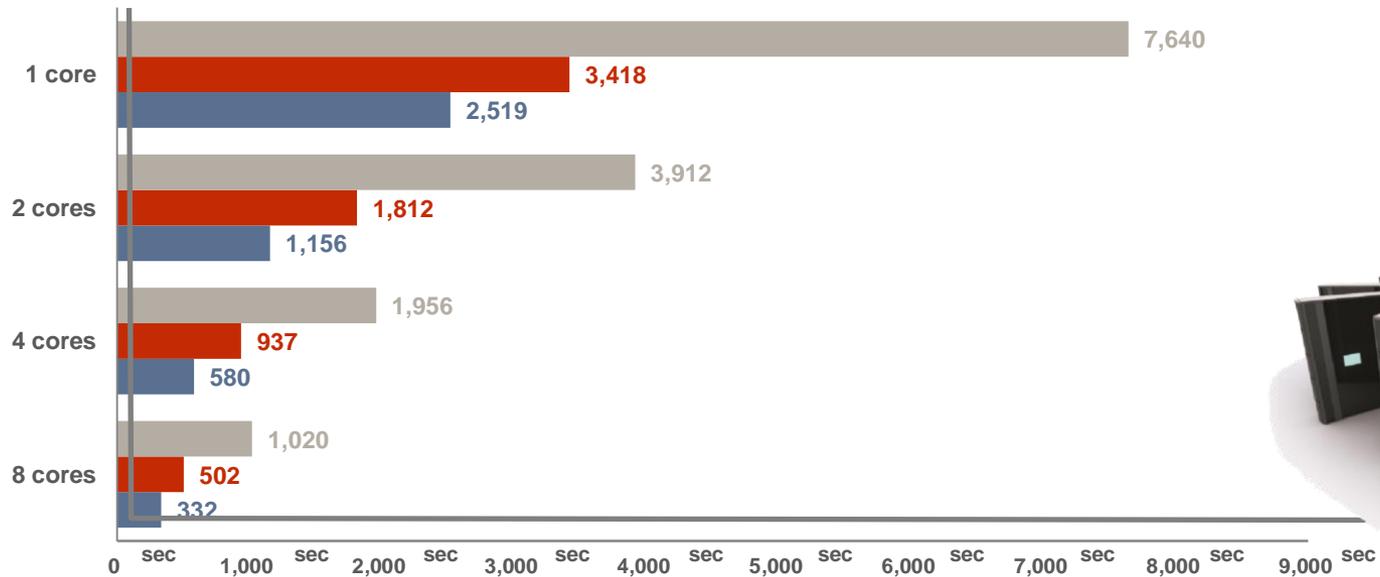
FEA Interface

- > A seamless integration with leading structural analysis software
  - ABAQUS, ANSYS, LS-DYNA, MSC.Marc, MSC.Nastran, NX.Nastran, NE.Nastran, Radioss
- > Results output items include pressure, reduction of weld line strength, residual stress, fiber orientation, temperature distribution, initial strain, density distribution, etc.
- > Digimat interface is also available



# Moldex3D eDesign High Performance Computing (HPC)

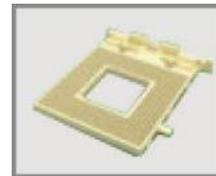
## > Moldex3D 3D-Flow Parallel Computing Performance with Intel Core i7 CPU-Time



Car Fan (elements: 1,422,416 3D-Flow)



Phone Cover (elements: 1,006,448 3D-Flow)



CPU Socket (elements: 713,558 3D-Flow)

### Hardware

- 4-node PC
- Intel Core i7-940 CPU
- 12GB DDR3 RAM
- Gigabit Ethernet

**Computation time can be reduced from hours to minutes!**

# Moldex3D eDesign Comprehensive Material Database

- > Moldex3D material database :
  - Over 7000 plastics
  - Full material models
  - User-defined materials
  - Process condition suggestions

$$\hat{V} = \hat{V}_0 [1 - C \ln(1 + P/B)] + \hat{V}_t$$

$$\hat{V}_0 = \begin{cases} b_{1S} + b_{2S} \bar{T}, & \text{if } T \leq T_t \\ b_{1L} + b_{2L} \bar{T}, & \text{if } T > T_t \end{cases}$$

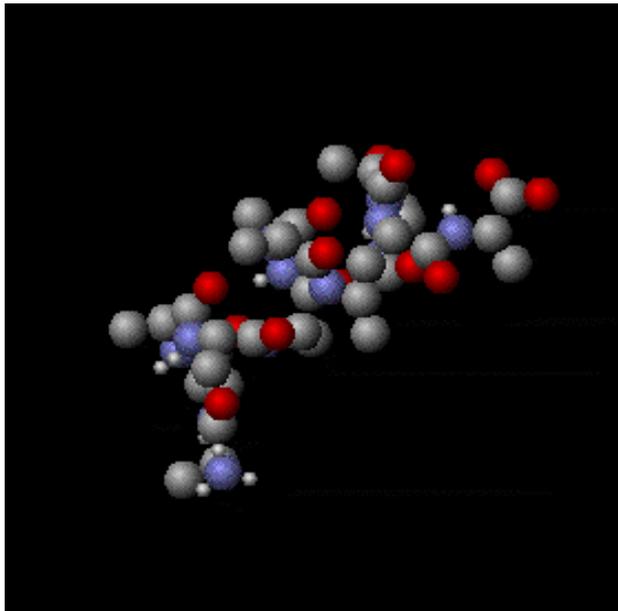
$$B = \begin{cases} b_{3S} \exp(-b_{4S} \bar{T}), & \text{if } T \leq T_t \\ b_{3L} \exp(-b_{4L} \bar{T}), & \text{if } T > T_t \end{cases}$$

$$\hat{V}_t = \begin{cases} b_7 \exp(b_8 \bar{T} - b_9 P), & \text{if } T \leq T_t \\ 0, & \text{if } T > T_t \end{cases}$$

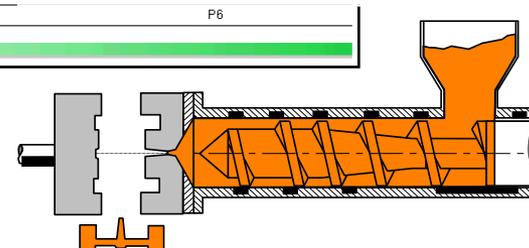
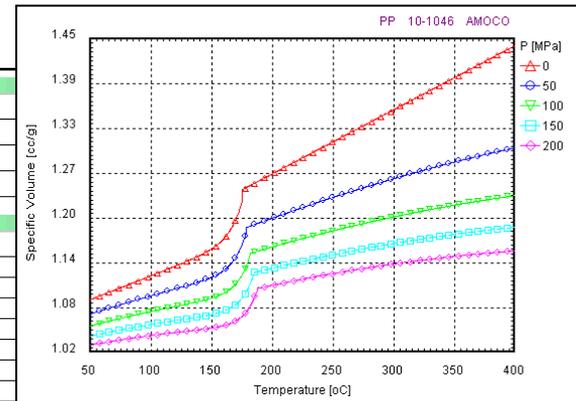
$$\bar{T} = T - b_5 \quad T_t = b_5 + b_6 P$$

$$C = 0.0894$$

- + ABS
- PE
  - + HDPE
  - + LDPE
  - LLDPE
  - + DOW
  - + DSM
- + MDPE
- + PE
- + PP
- + PS
- + PMMA
- + LCP
- + PC
- + PC+ABS
- + NYLON
- + PET
- + PBT
- + PPE+PPO
- + PPS
- + PSU
- + POM
- + SAN



Material
Resin
TradeName
Manufacturer
Comment
Process condition
Melt temperature (minimum)
Melt temperature (normal)
Melt temperature (maximum)
Mold temperature (minimum)
Mold temperature (normal)
Mold temperature (maximum)
Ejection temperature
Freeze temperature
Coolant system
Moldbase material



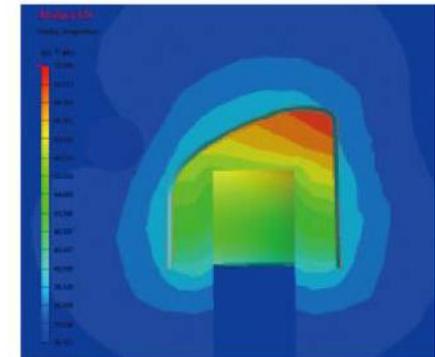
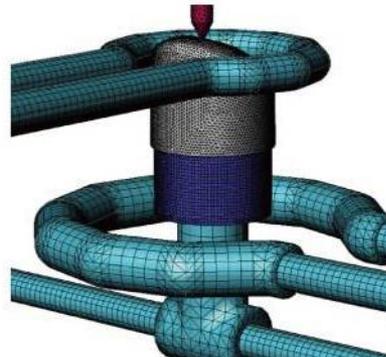
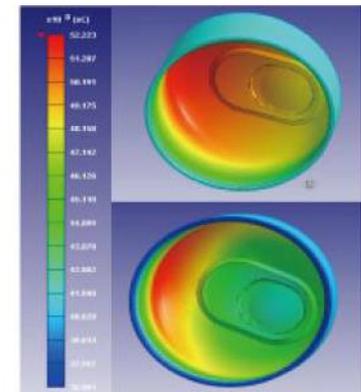
# Moldex3D Successful Stories

## Simulation-Driven Product Development

# Unilever



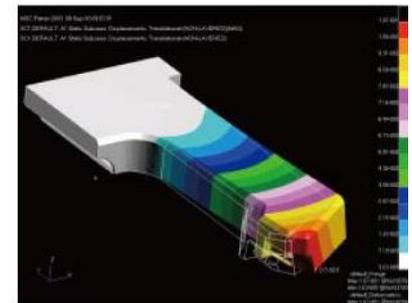
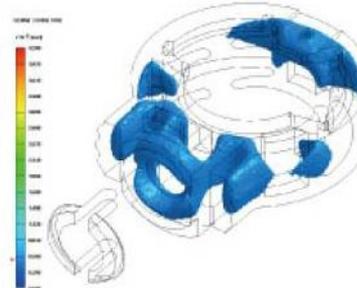
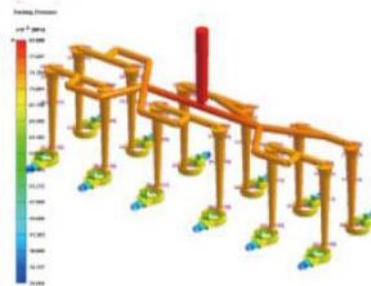
- > Temperature range: 45°C → 15°C
- > Cooling time reduced from 4 to 3 sec
- > More than 4M total saving in hardware investment and production cost



# LEGO



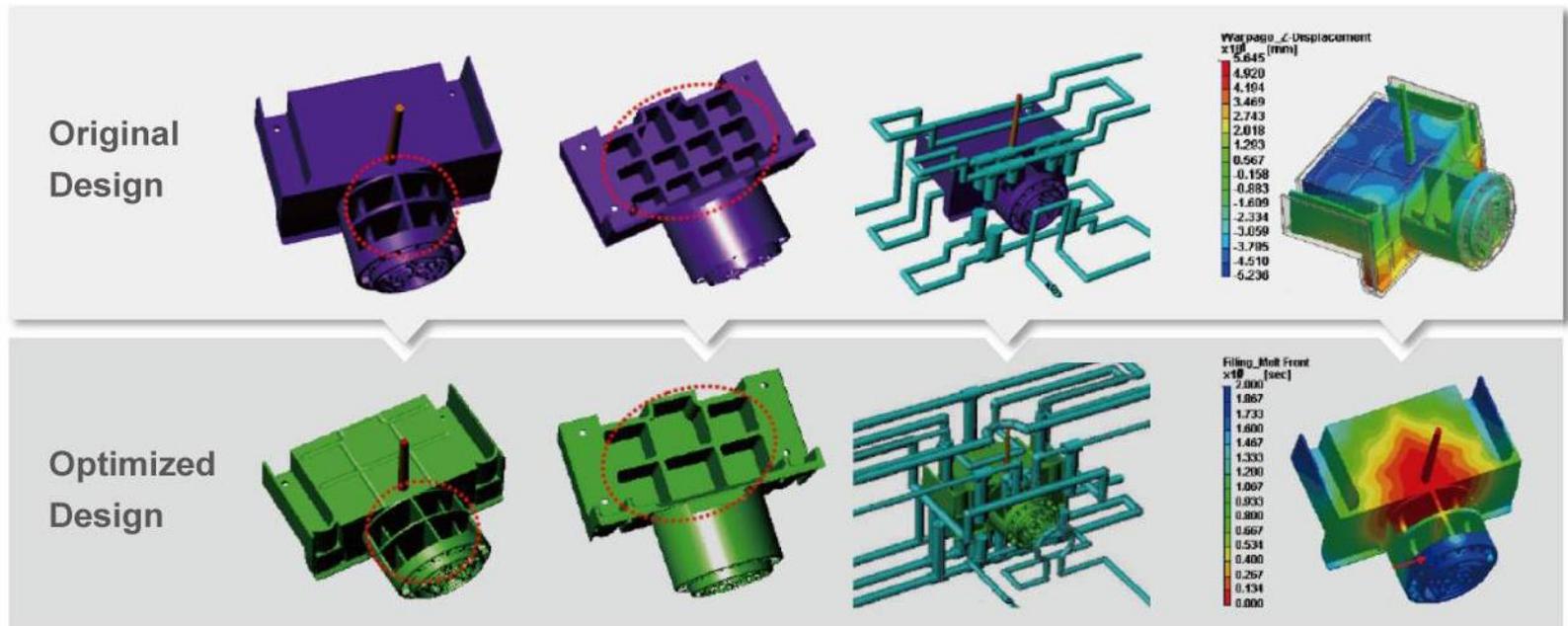
- > Runner balancing
- > Quality control among cavities
- > Cycle time and process optimization
- > Tool design optimization



# SAMSUNG

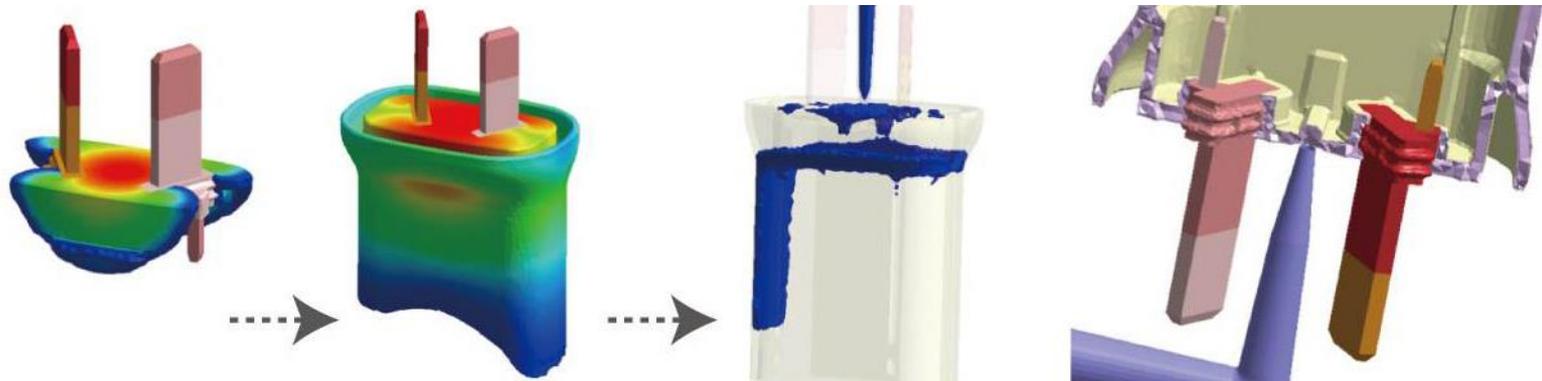


- > Optimization of the part design and cooling system
- > Warpage prediction and control
- > Cycle time reduced by 16 sec; material cost reduced by 9%



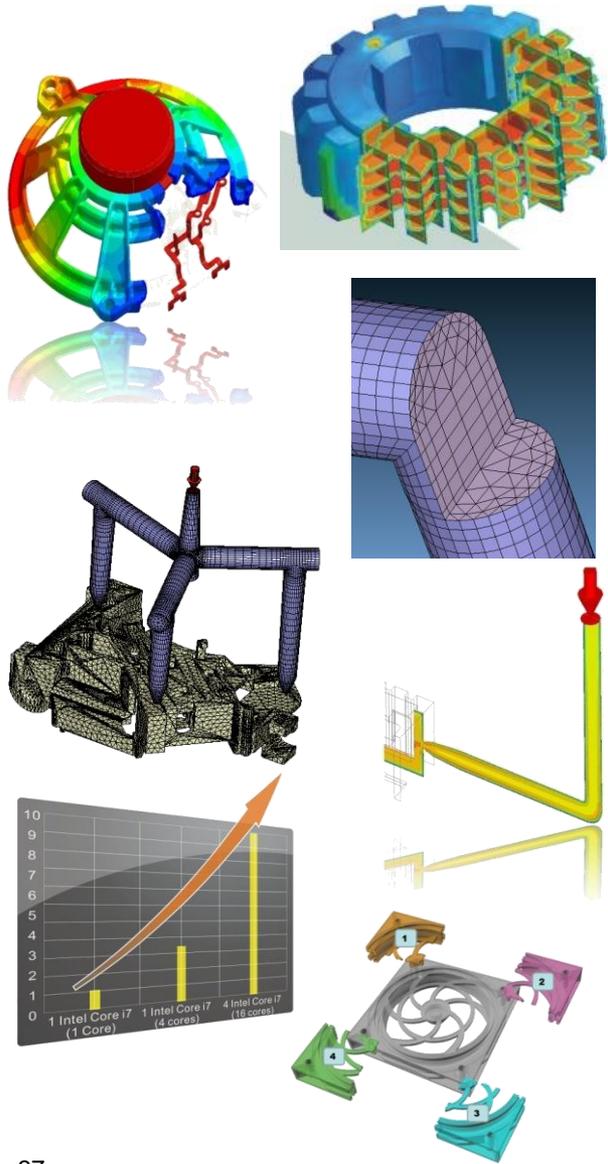
# Salcomp

- Salcomp**
- > Application: insert molding of charger socket
  - > Optimization of the excessive shear heating and material degradation at thin areas
  - > Shrinkage and warpage decreased by 20%
  - > Runner ratio reduced from 31% to 23%
  - > Cooling time for runner ejection reduced by 2 seconds



# Summary

# Exclusive Features of Moldex3D



## Pioneering 3D Kernel

- State-of-the-art FVM method
- Comprehensive 3D throughout runners, cavity to the mold

## Versatile Meshing engine

- Automatic Mesh, man-hours free
- 3D-based Hybrid Mesh
- No limit in element count

## High Performance Computing

- Super fast by using workstations available in the market or cloud computing
- No need to reduce the analysis accuracy due to lacking of computing capability

**Thank you for your attention!**

# Appendix 1

## ROI Example

# Preface

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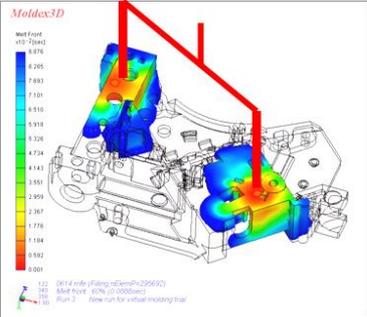
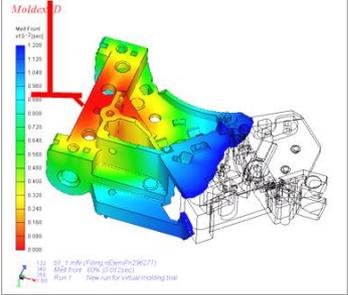
- > **Background of Study**
- > **Case Example**
- > **Design Change Scheme**
- > **Analysis Result**
- > **Overall Cost-Effectiveness**
- > **Practical Benefit**

# Background of Study

- > This customer has the following molding capacity:
    - Building mold for big, medium and small size. Annually 600 molds.
    - Average mold design change cost: 300 € per trial, including equipment, man-hour, plastic material, energy consumption.
    - Simulation helps to save 2 mold trials in average:
      - $2 \times 300 \times 600 = 360.000 \text{ €}$
- **360.000 € saved in average annually.**



# Case Example

	Original Design	Revised Design
<p><b>Design</b></p>		
<p><b>Conditions</b></p>	<ul style="list-style-type: none"> <li>- 1-cavity mold</li> <li>- 3-plate mold</li> <li>- Cycle time: 45 s/product</li> <li>- Product weight: 96.8 g/product</li> <li>- Runner weight: 12.6g/product</li> <li>- Warpage: 0.19~1.64mm</li> <li>- 8 molds in total</li> </ul>	<ul style="list-style-type: none"> <li>- 2-cavity mold</li> <li>- 2-plate mold</li> <li>- Cycle time: 16.25 s/product</li> <li>- Product weight: 76.8 g/product</li> <li>- Runner weight: 3.7 g/product</li> <li>- Warpage: 0.1~0.89mm</li> <li>- 4 molds in total</li> </ul>

# Design Change Scheme

---

## > Target:

- Use Moldex3D to simulate mold tryout
- Find optimization design of lowest production cost.

## > Approach:

- Form 1-cavity mold to 2-cavity mold
- Enhance production efficiency
- Evaluate main thickness to lower cost
- Control Warpage value to ensure yield rate.

# Design Change Scheme cont.

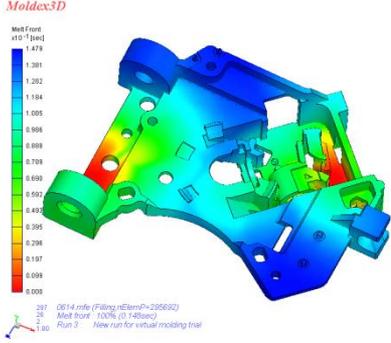
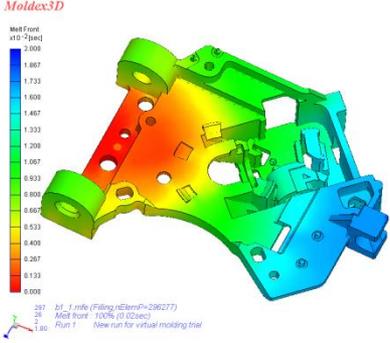
Main Thickness	Molding Pressure	Clamping Force	Result	Suggestion
1.3 mm	X	X	Short shot	Not Adopted
1.4 mm	220 MPa	260 Ton	<ol style="list-style-type: none"> <li>1. High Molding pressure and clamping force</li> <li>2. High warpage value (0.16~1.43)</li> <li>3. Weak product strength with sink mark problem</li> </ol>	Not Adopted
1.5 mm	200 MPa	220 Ton	<ol style="list-style-type: none"> <li>1. High Molding pressure and clamping force</li> <li>2. High warpage value (0.11~0.99)</li> <li>3. Weak product strength with sink mark problem</li> </ol>	Not Adopted
1.6 mm	140 MPa	160 Ton	<ol style="list-style-type: none"> <li>1. Proper injection pressure and clamping force</li> <li>2. High warpage value (0.1~0.89)</li> <li>3. Better product strength</li> </ol>	Adopted

# Analysis Result

	Original Design	Revised Design
<b>Runner Volume</b>	13.60 g	$7.4 \div 2 = 3.7\text{g}$ (small)
<b>Pressure Loss</b>	47 MPa	30 MPa
<b>Product Thickness</b>	1.8 mm (Main thickness)	1.6 mm (Main thickness)
<b>Product Volume</b>	96.80g	76.90 g
<b>Warpage value</b>	0.19 ~ 1.64 mm	0.1 ~ 0.89 mm

Stable  
Deformation  
Tendency

# Analysis Result cont.

	Original Design	Revised Design
<b>Mold Structure</b>	 <p>Moldex3D Mold Front x10^-3(mm) 1.478 1.381 1.282 1.184 1.085 0.986 0.888 0.789 0.690 0.592 0.493 0.395 0.296 0.197 0.098 0.000</p> <p>201 0914.mfx (Filling.nElem=1205662) 20 Mold front - 100% (0.148sec) 2 Plan 3 - New run for virtual molding trial</p>	 <p>Moldex3D Mold Front x10^-3(mm) 1.887 1.733 1.608 1.467 1.333 1.208 1.067 0.933 0.808 0.683 0.558 0.433 0.308 0.183 0.058 0.000</p> <p>201 0914.mfx (Filling.nElem=286277) 20 Mold front - 100% (0.102sec) 2 Plan 1 - New run for virtual molding trial</p>
	3-plate mold 1-cavity mold	2-plate mold 2-cavity mold
<b>Production Cycle</b>	$F+P+C+Mold\ open=Cycle\ time$ $4+3+18+20 = 45\ sec$ $45*1=45\ sec\ (1\ part\ per\ process)$	$F+P+C+Mold\ open =Cycle\ time$ $1.97+4.5+15+11=32.47\ sec$ $32.47/ 2=16.235\ sec\ (2\ parts\ per\ process)$
<b>Remark</b>	In terms of mold structure, 2-plate mold has a shorter mold open time than 3-plate mold. So the revised design can reduce the cycle time effectively.	

# Overall Cost-Effectiveness

	Original Design	Revised Design	Cost Enhancement
<b>Cavity Number</b>	1-cavity mold	2-cavity mold	50%
<b>Mold Type</b>	3-plate mold	2-plate mold	30%
<b>Production cycle</b>	45 sec/pc	16 sec/pc	64%
<b>Production Weight</b>	96.8 g/pc	76.94 g/pc	20%
<b>Runner weight</b>	12.6 g/pc	3.7 g/pc	80%
<b>Warpage Value</b>	0.19~1.64 mm	0.1~0.89 mm	45%
<b>Mold number</b>	8 molds	4 molds	50%

# Mold Cost Evaluation

- > Introducing Moldex3D into mold development of this product can save **16,000 €**, which is a **26% cost-effectiveness enhancement** than before.

	Original Design			Revised Design		
Mold Cost	7.5 K	8 Mold	60 K	11.25 K	4 Mold	45 K
Mold Tryout Expense	0.15 K	6 Times	0.9 K	0.15 K	2 Times	0.3 K
Mold Revision Expense	0.1 K	4 Times	0.4 K	0.1 K	1 Times	0.1 K
€	Total Cost		<b>61.3 K</b>	Total Cost		<b>45.4 K</b>

**Note: This evaluation does not include personnel cost used for running the project**

# Practical Benefit

- > Introduction of Moldex3D into this product can :
  - Enhance 26% cost-effectiveness.
  - Save € 36,000 per month If monthly capacity is 360,000 pcs.

	Original Design ( unit price)	Revised Design ( Unit Price)
Material Expense	0.2	0.15
Molding Expense	0.12	0.08
Processing Expense	0.04	0.04
Logistics Expense	0.04	0.03
Total	<b>€ 0.4</b>	<b>€ 0.3</b>

# Appendix 2

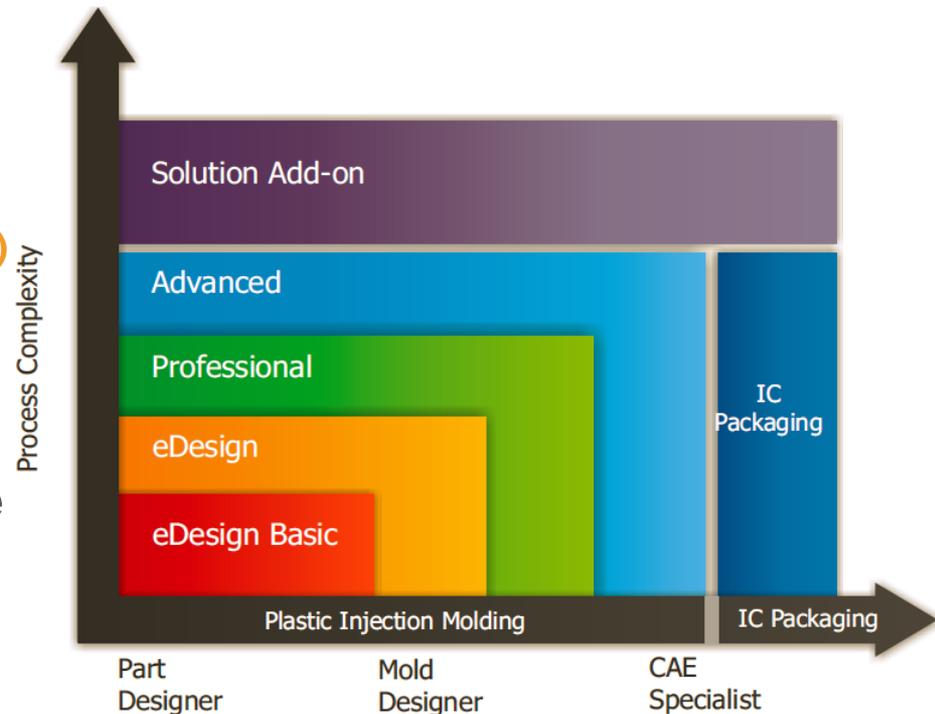
## Moldex3D Product Structure

# Moldex3D Product Portfolio

> Moldex3D provides a series of simulation packages to efficiently evaluate molding behaviors and improve product quality:

- eDesign Basic
- eDesign
- Professional (eDesign+Shell)
- Advanced (eDesign+Solid+Shell)
- IC Packaging

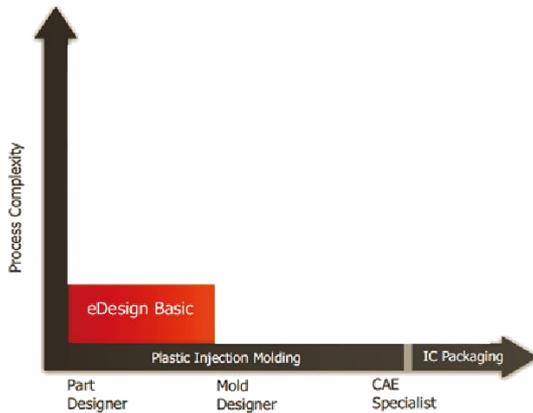
> Solution Add-on modules provide the broadest range of solutions for different industries



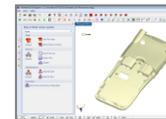
# eDesign Basic Package

## > eDesign Basic

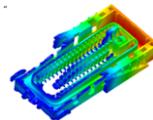
- Provides a full range of **flow simulation capabilities**
- Predict filling performance, decide ultimate gate location, eliminate weld lines and air traps



Included modules Plastic



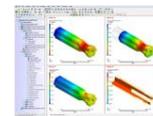
Designer



Flow



Parallel computing

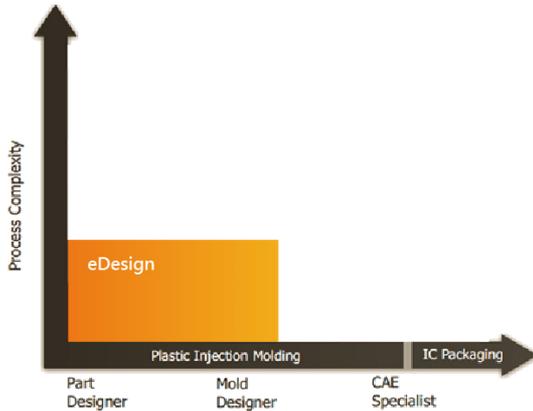


Project

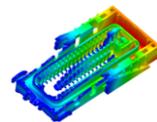
# eDesign Package

## > eDesign

- Equipped with auto-meshing feature and intelligent modeling wizards for streamline CAD-to-CAE simulation process
- Delivers reliable analysis results and quickly verifies part and mold designs
- Easy to use without additional training, efficiently minimize user operation



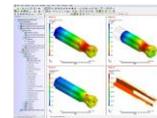
## Included modules



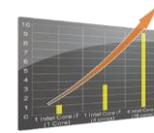
Flow



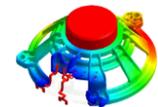
Designer



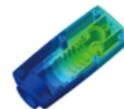
Project



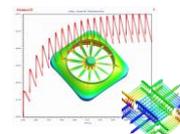
Parallel computing



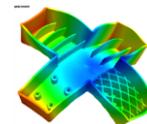
MCM



Pack



Cool

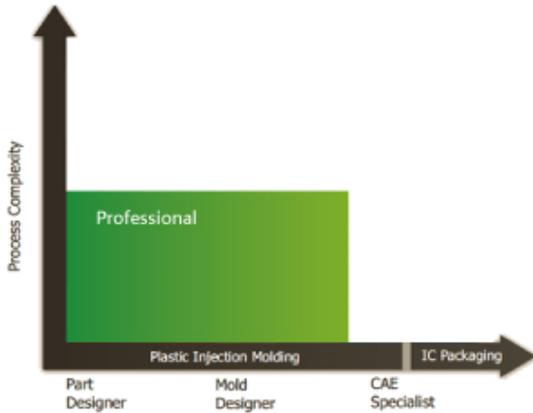


Warp

# Professional Package

## > Professional

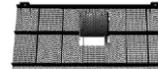
- Include **eDesign** and **Shell** technologies
- Include eDesign auto-features and enhance simulation efficiency for **complex geometry** and **conventional large and thin shell-like parts**



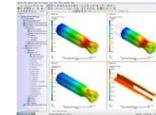
## Included modules



Designer



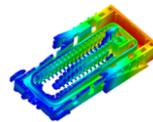
Shell Mesh



Project



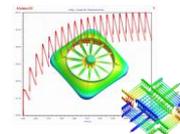
Parallel computing



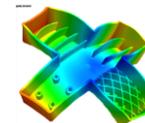
Flow



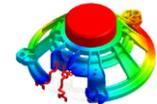
Pack



Cool



Warp

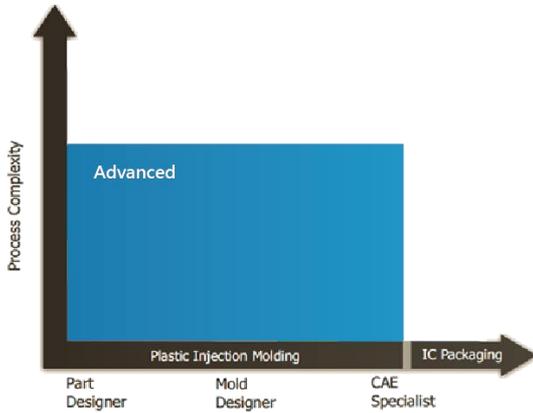


MCM

# Advanced Package

## > Advanced

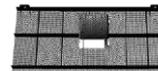
- Include **eDesign**, **Solid** and **Shell** technologies for the highest complexity process simulation
- Combine the three core features and extend exclusive **Boundary Layer Mesh technology**
- Deliver more comprehensive capabilities for advanced analysis



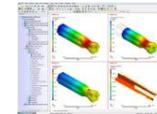
## Included modules



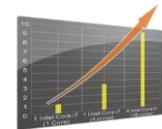
BLM Mesh  
(Solid)



Shell Mesh



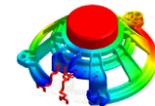
Project



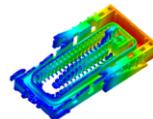
Parallel  
computing



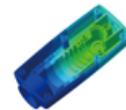
Designer



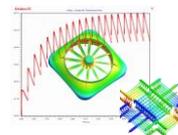
MCM



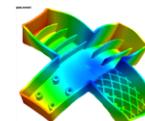
Flow



Pack



Cool



Warp

# Solution Add-on

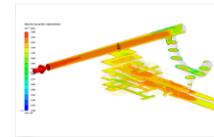
- > **Solution Add-on - more choices for industries**
  - Provide more advanced modules with flexible functionality extensions
  - Bring a broad range of professional solutions for special injection molding processes



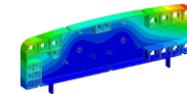
## Included modules



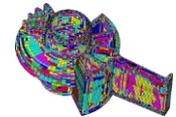
eDesignSYNC



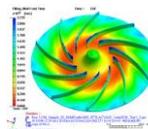
Fiber



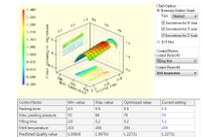
Stress



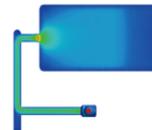
FEA/Digmat Interface



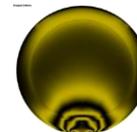
Compression Molding



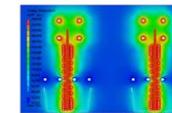
Expert



Viscoelasticity



Optics



Advanced Hot Runner

# Solution Add-on

- > **Solution Add-on - more choices for industries**
  - Evaluate and optimize product performance
  - Help designers to innovate and develop new concept with insightful information



## Included modules

