Beyond Autodesk® Simulation Moldflow® Insight
Products to help productivity and workflow

Jeff Higgins
Technical Specialist
How many product interoperate with Moldflow?

That I can think of!!!
Autodesk Products

What products interoperate with Moldflow and How?

1. Autodesk Alias
2. Autodesk Inventor
3. Autodesk Simulation DFM
4. Autodesk Vault
5. Autodesk Inventor Fusion
6. Autodesk Simulation Mechanical/Multiphysics
7. Autodesk Simulation CFD
8. Simulus
9. Autodesk Showcase
10. Autodesk Publisher
11. Autodesk Simulation 360 (The Cloud)
12. Autodesk PLM360
Autodesk’s vision is to help people imagine, design, and create a better world.

Image courtesy of ASTRO Studios, Inc.
Digital Prototyping enables users to design, visualize and simulate their products and processes digitally.
Capabilities

- Industrial Design
- Visualization
- Engineering
- Simulation
- Manufacturing
Let’s get the easy ones done first!!!
Autodesk Moldflow Design Link
Re-package and Expanded for 2013

Autodesk Simulation Moldflow Design Link allows for direct access of native CAD models from a variety of format to be integrated into the models.
1. Autodesk Alias
Autodesk Alias 2013 Family of Products

- **Autodesk® Alias® Design**: Industrial and product design solution for the creative design process.
- **Autodesk® Alias® Surface**: Advanced technical surfacing for production and Class-A modelers.
- **Autodesk® Alias® Automotive**: Complete automotive styling solution from first creative sketch to technical surfacing and visualization.
Autodesk Alias

- World leading industrial design tool
- Sketching and conceptualization
- Surfaces – Start of 3D Geometry
- Integrate 3D CAD geometry
  - Design with engineering in mind
It’s never too early to simulate

- Part optimization can be started with the initial surfaces from Autodesk Alias
  - Remember without all the features a true simulation does not exist
  - This is an initial check of manufacturability of the part shape
2. Autodesk Inventor
Autodesk® Inventor®

Takes You From 2D to 3D Digital Prototyping

The Inventor model is an accurate digital prototype that enables you to:

- **Design** – Integrate all design data into a single digital model

- **Visualize** – Create a virtual representation of the final product

- **Simulate** – Digitally validate the real-world performance of your product

Image courtesy of Brimrock Group Inc. and Mechanix Design Solutions Inc.
A Complete Set of Design Tools

Engineering Design Productivity
Design Automation
Industry-Leading Visualization
Efficient Design Asset Reuse
Drawings and Documentation
Easy-to-Use Simulation
Building More Sustainable Products
Complete Design
Autodesk® 360
Integrated Data Management
## Inventor Feature Comparison

*Autodesk® Inventor® LT 2013 software offers limited functionality for sheet metal design*

<table>
<thead>
<tr>
<th>Feature</th>
<th>Autodesk® Inventor LT™ 2013</th>
<th>Autodesk® Inventor® 2013</th>
<th>Autodesk® Inventor® Professional 2013</th>
</tr>
</thead>
<tbody>
<tr>
<td>Native DWG™ Compatibility</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
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<tr>
<td>BIM Interoperability</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
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<tr>
<td>Includes Inventor Fusion</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
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<tr>
<td>In-Product Data Management</td>
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<tr>
<td>Digital Prototyping</td>
<td>✔</td>
<td>✔</td>
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<tr>
<td>3D Mechanical Design</td>
<td>✔</td>
<td>✔</td>
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<tr>
<td>Direct Manipulation</td>
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<tr>
<td>State-of-the-Art Visualization</td>
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<td>Large Assembly Design</td>
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<tr>
<td>Automatic Bill of Materials</td>
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<tr>
<td>Over 1 Million Standard Parts</td>
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<tr>
<td>3D Design Automation Tools</td>
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<tr>
<td>Rules-based Design</td>
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<tr>
<td>Sheet Metal Design</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
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<tr>
<td>Plastic Part Design</td>
<td></td>
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<tr>
<td>Complete Plastic Mold Design</td>
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<tr>
<td>Tube &amp; Pipe Design</td>
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<tr>
<td>Cable &amp; Harness Design</td>
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<tr>
<td>Dynamic Simulation</td>
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<tr>
<td>Finite Element Analysis</td>
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</tbody>
</table>
Autodesk Inventor Professional

- Build in Tooling Abilities
  - 2-Plate Tools
  - 3-Plate Tools
  - Multiple Cavities
  - Automatic DWG Creation
  - Automatic BOM Creation
  - Mold Component Catalog
- Built-In Moldflow Abilities
  - Gate Location
  - Shrinkage
  - Basic Adviser Simulation
3. Autodesk Simulation DFM
The Right Tool at the Right time

Different users

Designer
Creative
100% CAD
Autodesk Simulation
DFM

Manufacturing Engineer
Generalist
CAD and Engineering tools
Autodesk Simulation
Moldflow Adviser

Analyst
Expert
100% Moldflow Insight
Autodesk Simulation
Moldflow Insight
Autodesk Simulation DFM
Simple Indicators embedded in the CAD environment
Autodesk Simulation DFM

- IS NOT MOLDFLOW!!!!
  - DFM is Powered by Moldflow
  - Designer based application for plastic part design
  - Allows designers to check plastic design principles
  - Shows areas that do not meet plastic standards
  - Customizable definitions of acceptable
Direct Link to Moldflow for more detail

- From inside DFM send your model to Moldflow
  - More detailed simulation
  - Need more information
  - Want specific material to be simulated
  - More process controls
4. Autodesk Vault
Manage Your Entire Design

Autodesk® Vault product data management software helps engineering workgroups manage Digital Prototyping processes.

- Save time organizing files and reusing data
- Manage change processes to avoid costly mistakes
- Efficiently release and revise designs to get to market faster
# Vault Feature Comparison

<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>Autodesk CAD Integration</td>
<td>✔</td>
<td>✗</td>
<td>✗</td>
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<tr>
<td>File Management Tools</td>
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<td>✗</td>
<td>✗</td>
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<td>Single Workgroup</td>
<td>✔</td>
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<td>Fast Searching</td>
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<td>✗</td>
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<td>Data Reuse Tools</td>
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<td>File Revision Control and Lifecycles</td>
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<tr>
<td>Automatic File Naming</td>
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<tr>
<td>Access for Non-CAD Users</td>
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<td>✗</td>
<td>✗</td>
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<tr>
<td>File and Folder Security</td>
<td>✔</td>
<td>✗</td>
<td>✗</td>
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<tr>
<td>Reporting</td>
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<tr>
<td>Server Based DWF Publishing</td>
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<td>Multi-Site Replication</td>
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<td>✗</td>
<td>✗</td>
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<tr>
<td>‘Query, View, and Print’ Web Client</td>
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<td>✗</td>
<td>✗</td>
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<tr>
<td>Custom Objects</td>
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<tr>
<td>Bill of Material Management</td>
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<tr>
<td>Engineering Change Management</td>
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<td>✗</td>
<td>✗</td>
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<tr>
<td>PLM 360 Integration</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
</tr>
<tr>
<td>Coexist with Enterprise Business Systems</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
</tr>
</tbody>
</table>
Moldflow Links to Autodesk Vault
Free Data Management System
5. Autodesk Inventor Fusion
aka: Fusion
Inventor Fusion

Autodesk Inventor Fusion expands the 3D conceptual design capabilities of Inventor and sets a new standard for 3D modeling ease of use.

- Unites Direct and Moldflow
- 3D modeling Ease of Use
- Rapid Design Changes without Limitations
- Aids in Design exploration
Model Translation and Clean-Up

- Import models directly from CAD
- Make modifications without worrying about the history tree
- Save multiple native CAD formats
- Prepare Models for Simulation
3D Dimensional Feature Creation

- Add features to the part
- Add tooling features using 3D Solids
  - Make shapes only done with Real 3D solid capabilities
- Provides cleaner meshing
- Create Conformal Cooling System
- Add tooling detail not previously available
  - Tool Base
  - Inserts
  - Material variations in mold material
Round Trip Geometry Modification

- Use Fusion to edit models from inside of Moldflow
  - Keep your boundary conditions
  - Keep your gate locations
  - Keep your processing conditions
- Save CAD format that can easily be shared
6. Autodesk Simulation
Mechanical/Multiphysics
Autodesk Simulation Mechanical

- Static stress with linear material models
- Fatigue
- Linear dynamics
- Critical buckling
- Steady-state and transient heat transfer
- Large-scale motion and stress
- Nonlinear material models
- Impact, buckling, and permanent deformation
Autodesk Simulation Multiphysics

Everything in Mechanical plus:
- Steady and unsteady fluid flow
- Open channel flow
- Flow through porous media
- Mass transfer
- Electrostatic analysis
- DDAM (Dynamic Design Analysis Method)
Interoperability

Simulate Plastic Parts Using Autodesk Moldflow Material Properties

Accurately simulate plastic parts by using as-manufactured material properties

What’s New

- Export models directly to Autodesk Moldflow software
- Import material properties that account for fiber orientation calculations
- Database of over 8,000 plastic materials

Max Stress 3704 lbf/(in^2)
7. Autodesk Simulation CFD
# Autodesk Simulation CFD Feature Comparison

## Feature Supported

<table>
<thead>
<tr>
<th>Feature</th>
<th>Autodesk Simulation CFD</th>
<th>Autodesk Simulation CFD Advanced</th>
<th>Autodesk Simulation CFD Motion</th>
</tr>
</thead>
</table>

## Fluid Flow
- Laminar Flow
- Turbulent Flow
- Inviscid Flow
- Supersonic Flow
- Steady State (Time-Independent)
- 3D and 3D Cartesian
- 2D Asymmetric
- Velocity and Pressure Boundary Conditions
- Volume Flow Rate and Mass Flow Rate Boundary Conditions
- External Fan Curves with Rotational Speed and Slip Factor
- Slip Symmetry and Unknown (Natural)
- Spatially Periodic Boundary Conditions
- Velocity and Pressure Initial Conditions
- Compressible Flow
- Transient (Time-Varying)
- Two-Phase Flows (Hysteresis and Steam)
- Height of Fluid
- Two-Fluid Scalar Mixing
- Compressible Liquid (Water-Hammer)
- Cavitation

## Heat Transfer
- Conduction
- Convection with Automatic Film Coefficient Calculation
- Forced Convection with Automatic Transition from Flow to Thermal
- Natural Convection (Buoyancy-Driven with Gravity Vector)
- Thermal Comfort Calculation
- Conjugate Heat Transfer (Simultaneous Conduction and Convection)
- Temperature, Film Coefficient, and Radiation Boundary Conditions
- Area-Based and Total Heat Flux Boundary Conditions
- Temperature-Dependent Heat Source Boundary Conditions
- Temperature-Dependent Heat Source Boundary Conditions with User-Defined Sensing Location
- Temperature Initial Conditions
- Internal Radiation Heat Transfer
- Radiation through Transparent Media
- Solar Heating
- Temperature-Dependent Emissivity
- Joule Heating with Temperature-Dependent Resistivity

## Turbulence Models
- k-ε
- Low Reynolds Number K-ε
- RNG
- RSM
- Merging Length
- Automatic Turbulent Startup

## Motion
- Linear
- Angular
- Rotating/Turbomachinery
- Combined Linear and Angular
- Combined Orbital and Angular
- Translation
- Sliding Vane

## Design Study Environment
- Direct Modeling with Autodesk Inventor Professional
- Designing with Inventor Fusion
- Multi CAM Data Exchange
- Design Study Automation
- Critical Value Decision Center
- Multi Scenario Design Review Center
- Model-Specific Interface
- Customizable Material Databases
- Autodesk 3ds Max Interoperability

## Intelligent Meshing
- Adaptive Meshing
- Local Size Adjustment
- Geometry Mesh Diagnostics
- Boundary Layer Mesh Enhancement
- Interactive Mesh Refinement Regions
- Extraction
- Volume Mesh Growth Rate Specification
- Surface-based Mesh Distribution and Refinement
- Gap and Tab Solid Refinement
- Mesh Generation Flexibility

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Conformal Cooling

- At AU 2011 we saw how Simulation CFD could be used for conformal Cooling
  - This functionality has been added to Autodesk Simulation Moldflow Insight – Scandium Technology Preview (available at http://labs.autodesk.com)
Design and Manufacture with CFD in mind

- Remember that there are reasons to design for flow
  - Cooling
  - Heating
  - Energy
- Design is always the first concern
  - How can the design be changed to optimize flow
- Manufacturing can also influence flow
  - Any time plastics cool or shrink those changes can create variations in flow that were not expected
8. Simulus
Project Simulus TP1
Redefining the Simulation Experience

Geometry modification
Visualization Simulation

FREE!
Project Simulus TP1
Redefining the Simulation Experience

- From within one interface:
  - Import models
  - Simplify models
  - Modify models
  - Setup simulations
  - Review Results
Welcome to Project Simulus Technology Preview. In this video, let’s explore tools for viewing the simulation results.
9. Autodesk Showcase
Showcase 2013 product line

<table>
<thead>
<tr>
<th>Product</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>Autodesk® Showcase® Viewer</td>
<td>Exploration/Viewer (~100MB)</td>
</tr>
<tr>
<td>Autodesk® Showcase®</td>
<td>Stand-alone and Suites</td>
</tr>
<tr>
<td>Autodesk® Showcase® Professional</td>
<td>Advanced Solutions</td>
</tr>
</tbody>
</table>

Note that Autodesk® Showcase® Presenter is no longer be available for purchase. It is being replaced by Autodesk Showcase 2012. Existing Autodesk Showcase Presenter Subscription customers will have their entitlement migrated to Autodesk Showcase 2012. Full details are available in the Autodesk Presenter EOL FAQ, in the Partner Portal.

*Free products are subject to the terms and conditions of the license and services agreement that accompanies the software.*
Defect Visualization

See part defects and then correct by modifying the design, changing the manufacturing process, or applying surface finishes to the part.

Features
- Photorealistic visualization of defects powered by Autodesk Showcase
- Sink marks and Warpage
Illustrate what production will be

- Make realistic renders of manufactured parts
- Create detailed alternatives
  - Production Changes
  - Design Changes
  - Texturing

With Showcase, show exactly what your part will look like when manufactured!
10. Autodesk Publisher
Documentation with Autodesk® Inventor® Publisher Software

1. Directly created using CAD data
2. Updated mechanism
3. Single document publishing in different formats

Print Formats

Video Formats

Interactive Formats
Deliver High-Impact Documentation

Publish compelling and engaging documentation for downstream consumers in the formats they need.

Documents
- Microsoft® Office Word
- Microsoft® Office PowerPoint®
- Adobe® PDF (2D)

Images
- Rasters (various)
- Vector (SVG)

Animations
- Adobe® Flash®
- AVI Video
- MP4
- WMV
- Publish to YouTube and Facebook

Interactive 3D
- Mobile
- Adobe PDF (3D)
- DWF
11. Autodesk Simulation 360
Technology Shift
Cloud Computing and Mobile Devices Will Change Everything
Autodesk Simulation Cloud Applications
Infinite Compute Power via the Cloud

Autodesk Inventor Optimization

Autodesk Green Building Studio
Autodesk Simulation 360
Moldflow, Mechanical and CFD in the Cloud
12. Autodesk PLM360
The next generation alternative...

Cloud-based, zero deployment

Accessible on any device

Up and running in minutes, not months
What makes Autodesk PLM 360 different?

- Instant On!
- Highly Current User Experience.
- Ubiquitous Access.
- Pre-Installed Apps.
- Insanely Configurable.
- Integrated.
- Subscription based.
Where’s your bottleneck?

Ideas & requirements
- Concept
- Creativity
- Innovation
- Possibility
- Expression

Design & Engineering
- Specifics
- Cost
- Performance
- Quality
- Validation

Manufacture & Production
- Processes
- Efficiency
- Productivity
- Optimization
- Control

Marketing
- Market Share
- Differentiation
- Brand
- Awareness

Sales
- Value
- Revenue
- Proposition
- Execution
- Delivery

Delivery & Implementation
- Integration
- Service
- Support
- Mitigation
- Risk

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