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Digital Prototyping: Autodesk Manufacturing Versus Dassault SolidWorks

The Autodesk® Digital Prototyping Solution brings together design data from all phases of the product development process to create a single digital model. This single digital model simulates the complete product and gives engineers the ability to better visualize, optimize, and manage their design before producing a physical prototype.

Although the market has been talking about the benefits of Digital Prototyping for many years, the ability to build and test a true digital prototype has, until recently, been beyond the budgets of most manufacturing companies.

Autodesk Manufacturing is uniquely positioned to bring Digital Prototyping to a broader market, making it easy, accessible, and affordable for design and manufacturing workgroups — not just large enterprises. By putting powerful desktop technology within the reach of mainstream manufacturers, the Autodesk Digital Prototyping Solution is changing the way they think about their design processes and is helping them to create complete workflows based around a single digital model.

HTC Sweden is a rapidly growing company that was founded in 1987 and is now the market leader in diamond-based concrete grinding equipment. Through the use of the Autodesk Digital Prototyping Solution, HTC has been able to reduce its reliance on physical prototypes and bring products to market ahead of its competition.

Conceptual Design

Autodesk® AliasStudio™ software armed HTC designers with best-in-class conceptual design tools for creating sketches and 3D concept models digitally in an environment that's comfortable for them and in a format that can easily be incorporated into the digital prototype.



Task	Description	Autodesk Manufacturing	SolidWorks Corporation
Concept Sketching	Create freehand concept sketches and sketch over 3D data using digital pencils, markers, and brushes.	●	◐ · Must use external imaging software
Concept Illustration	Create illustrative shapes (outline strokes, fills, and gradients) as well as paint masks using an integrated toolset.	●	◐ · Must use external illustration software
Rapid 2D to 3D Exploration	Quickly apply 2D graphics and sketches to 3D data. Gives designers the flexibility to sketch what's hard to model, and model what's hard to sketch.	●	○
Flexible Modeling	Take advantage of different modeling techniques to describe any form. Flexible modeling tools combine the repeatability and speed of curve-based modeling tools with the ability to directly "sculpt" the 3D model.	●	○
Reverse Engineering and Hybrid Modeling	Use a complete set of tools for importing and configuring data from 3D scanners for visualization and reverse engineering. Apply shape modification to scan meshes. AliasStudio supports a unique modeling workflow that allows NURBS (nonuniform rational B-spline) components to be integrated into scan data.	●	◐ · Must use external surface modeling tool
Explicit Surface Control	Maintain control over surfaces, creating the lightest, highest-quality geometry. Choose between Bézier and NURBS geometry depending on the complexity of the shape to be modeled.	●	◐ · Requires external surface modeler

● = Functionality available

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Engineering

The Autodesk Digital Prototyping Solution gave HTC the smoothest bidirectional interoperability between 2D and 3D mechanical and electrical design applications on the market. Autodesk Mechanical and Electrical applications speak to each other, exchange data seamlessly, and help HTC's mechanical and electrical teams work together more effectively to create complete digital prototypes. Using Autodesk® Inventor™ software, the foundation for Digital Prototyping, HTC could create accurate 3D digital prototypes that enable users to validate design and engineering data as they work, minimize the need for physical prototypes, and reduce costly engineering changes discovered after the design is sent to manufacturing.







Task	Description	Autodesk Manufacturing	SolidWorks Corporation
Wires, Cables, and Ribbon Cable Routing	Automatically route wires and cables as well as create ribbon cables using tools to validate and check for errors. Easily create nailboard drawings with necessary information such as wire lengths, wire gauge, wire ID, and more.	●	○ · Manual process · Limited checking tools
Pipe and Hose Routing	Easily validate and create pipe and hose routes based on rules to have proper pipe lengths, cutoff length, and bend radius.	●	○ · Manual process · No error checking · No route validation tools · Not rules-based
Frame Design	Create complete frame structures, including welds and weld analysis, and complete set of cleanup tools.	●	○ · No weld support · Limited cleanup tools
Simulation	Simulate the dynamic behavior of a design throughout its full operating cycle and accurately predict operating loads and accelerations.	●	●

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Engineering (continued)

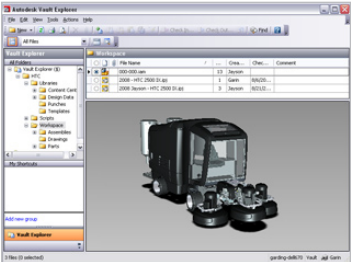
Task	Description	Autodesk Manufacturing	SolidWorks Corporation
Sheet Metal Design	Easily build sheet metal parts through the use of disjointed faces. Place mounting features and fill in the rest later for conceptual design.	●	○
Design Calculators	Use a comprehensive set of tools to create and validate common systems such as meshing gears, shafts, belts, cams, and more.	●	 <ul style="list-style-type: none"> · No support for gears, shafts, or cams
Design Sensors	Monitor crucial design parameters, including length, distance, angle, diameter, loop length, area, volume, and mass, and notify user when in violation.	●	○
Drawings	Complete set of drawing tools to create and detail drawing views, add descriptions and blocks, and share DWG™ files with AutoCAD software users with full visual fidelity and associativity to the 3D model without translators.	●	 <ul style="list-style-type: none"> · Doesn't support a style library repository · No DWG™ TrueConnect capability
Mechatronics	Controls diagrams and point-to-point schematics.	●	 <ul style="list-style-type: none"> · Limited integration provided by partner product
Mechatronics	Bidirectionally exchange 2D schematic wire and component data with 3D wire harness assembly.	●	○
Design Reviews	Electronically capture comments during design reviews and import them into Inventor and AutoCAD products.	●	○
Stress Analysis	Analyze designs and avoid costly stress-related field failures.	●	●
Standard Content	Locate and insert standard parts and features based on standards.	●	 <ul style="list-style-type: none"> · Limited content
Engineer Handbook	A comprehensive collection of knowledge and calculation formulas to aid in mechanical engineering.	●	○

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Data Management

HTC used scalable data management tools from Autodesk to manage and track all the design components for its digital prototype. The Autodesk® Productstream® family of product data management applications provides the path through which the digital prototype moves, seamlessly connecting all design and manufacturing workgroups.

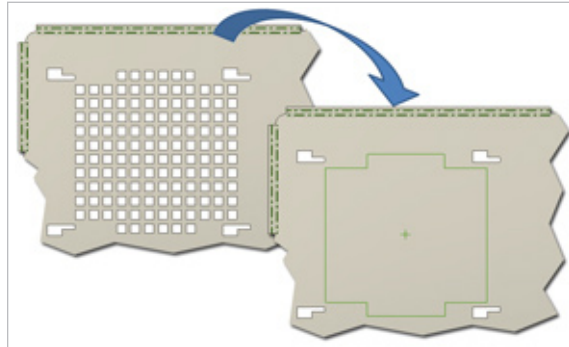



Task	Description	Autodesk Manufacturing	SolidWorks Corporation
Scalability	Painless transition from basic file data management to release and bill of materials (BOM) management.	●	○
BOM Management	Create and maintain accurate engineering BOMs with non-CAD items. Bulk data items control the release and effectiveness of BOM and item revisions.	●	○ · Based purely on file references
Change Management	Control the change and release of engineering data with engineering change orders (ECOs).	●	○
Enforced Compliance with Design Processes	Enforce compliance of property data prior to release of data from engineering.	●	○
Watermarking	Clearly communicate lifecycle state of engineering data through watermarks on drawings.	●	○

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Manufacturing

The Autodesk Digital Prototyping Solution allowed HTC's various teams to benefit from accessing the most current and accurate data (release drawings, models, and BOMs)—avoiding costly mistakes caused by using outdated documents. Easy, early access to critical design data reduced the manufacturing team's need to create as many physical prototypes.



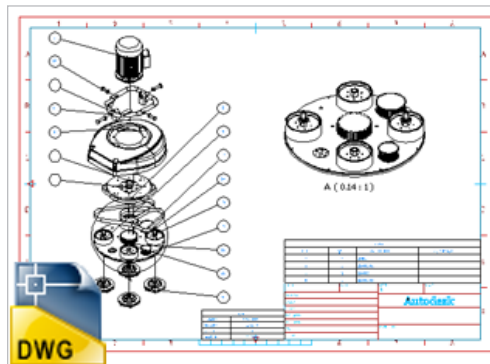
Task	Description	Autodesk Manufacturing	SolidWorks Corporation
Communicate with Manufacturing	Save faces from 3D models directly to DWG or DXF™ format.	●	○
Optimize Manufacturing	Optimize DWG and DXF for manufacturing sheet metal components (simplify splines to lines).	●	○
DWG/DXF	Natively create all 2D documentation in DWG format to easily communicate with manufacturing (DWG TrueConnect).	●	○
Manufacturing Flat Pattern	Document sheet metal flat patterns with alternate punch design to display punches as 3D cuts or 2D representations.	●	 · No alternate punch support

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Supply Chain

HTC is able to easily and securely communicate with its supply chain using the Autodesk Digital Prototyping Solution. Autodesk Streamline® software products and Autodesk Design Review allowed HTC to connect, share, and collaborate with external team members, without the complexity and cost associated with collaboration applications. The DWG TrueConnect technology found in Autodesk Inventor allowed HTC engineers to read and write DWG files without the need for translators while maintaining full associativity to the 3D model – simplifying the sharing of manufacturing information with AutoCAD® software users.



Task	Description	Autodesk Manufacturing	SolidWorks Corporation
Visualize Design	Communicate with supply chain using lightweight, viewable file that includes assembly animation and BOM data.	●	◐ · No assembly animations
DWG Interoperability	Communicate with supply chain using native DWG files from 3D engineering application without the need to export.	●	○
Communicate	Use a tool that allows supply chain to make (open/edit/import/export) standard parts without having to purchase a full license.	●	○
Secure Collaboration	Use tools to easily communicate with extended teams that aren't behind the firewall.	●	○
Communicate with DWG	Directly open 2D DWG files that were created from the 3D model without the need to convert.	●	○

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Sales Materials Management

The Autodesk Digital Prototyping Solution enabled HTC to deliver a comprehensive simulation of the complete product that was being developed so they and their customers could experience exactly how it would look and function before it was built. The visualization capabilities of Autodesk Inventor, Autodesk® AliasStudio™ and Autodesk® Showcase™ software allows HTC to turn their 3D design data into high quality imagery for clear, efficient, and persuasive visual communication of their digital prototype. Using Autodesk® 3ds Max® and Autodesk® Maya®, customers can create advanced renderings and animated visualizations of digital prototypes for design reviews, client presentations, and sales and marketing without needing to build physical prototypes.



Task	Description	Autodesk Manufacturing	SolidWorks Corporation
Illustrated Rendering	Easily create illustrated renderings with simplified shading for printed brochures and sales materials.	●	○
Paint Tools	Use a full set of tools for sketching, illustration, and image editing such as pencils, paintbrushes, airbrushes, markers, erasers, and special texture and effects brushes.	●	○
Realistic Imagery	Create accurate, realistic imagery from 3D digital design data to not only convey form, but also incorporate environmental context to communicate brand character.	●	○
Realistic Interactive Visualization	Interactively present and review designs, enabling a streamlined design review process where important decisions can be made efficiently and economically through realistic real-time changes.	●	○
Interactive Rendering	Directly output QuickTime® VR files with realistic, interactive shading (on screen, not software-rendered).	●	○

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Sales Materials Management (continued)

Task	Description	Autodesk Manufacturing	SolidWorks Corporation
Interactive Shading	Increase the quality of shading to achieve high levels of realism, reducing the need to make many time-consuming rendered images. Add realism to models through user-defined antialiasing, glow, incandescence, and environment backgrounds.	●	◐ · Requires external dedicated real-time visualization package
Unique Tools	Tools like nCloth, Fluid Effects and Paint Effects, and rigid and soft body dynamics allow designers to create the most sophisticated visualizations and visual simulations.	●	◐
Full Visualization Suite	Full suite of animation, dynamics, and character animation tools to create advanced animated visualizations.	●	◐
Review Rendering	Produce stunning, photo-real imagery faster with iterative rendering workflows by delivering interactive previews of shadows, sun/sky environment, and mental® ray design material settings. Get the instant visual feedback you need to iterate rapidly.	●	◐

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Learn More or Purchase

Learn more about the Autodesk Digital Prototyping Solution at www.autodesk.com/digitalprototyping.

For more information on extending the power of your design technology, visit www.autodesk.com/subscription.

For more information on making the most of your software investment, visit www.autodesk.com/consulting.

Purchase Autodesk Manufacturing software through your Autodesk Authorized Reseller. To locate the reseller nearest you, visit www.autodesk.com/reseller.



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