



Coffee Bean Roaster image courtesy of Richard Walers, Brooks Steven Design Associates. Drill and iron images courtesy of Alias|Wavefront a division of Silicon Graphics Limited.

Design|Studio®

Software for Product Designers

DesignStudio™ is our entry-level industrial design system for developing and visualizing conceptual designs. Design Studio is a complete design package that provides designers with tools for the entire design process, from concept sketching, modeling, evaluation and presentation to data integration with CAD for engineering.

Integrated sketch and paint tools enable designers to use imported 3D engineering/ergonomic data as a reference while developing concepts. Sketch tools can be used throughout the design process for exploration and annotation of 3D models.

DesignStudio delivers our industry-leading 3D modeling and visualization tools, providing designers with the freedom and flexibility to experiment with shape and form.

Rendering and animation are powerful tools to create virtual prototypes for exploring and communicating design concepts while saving time and money required to build physical prototypes.

Data integration with other tools such as CAD software preserves the design intent of models developed in DesignStudio.

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Technical Features

DesignStudio – Version 10

Usability

- **Efficient UI** – The intuitive user interface shortens learning time for new users and features like context-sensitive gestural marking menus allow experienced users to work quickly.
- **Customizable UI** – Hot keys, marking menus and tools shelves can be customized to suit your workflow.
- **Menu Presets** – Streamline the interface for design tasks like sketching, modeling or rendering by displaying only the tools required for the job.
- **Modeling Panel** – Quick access to often-used tools for modeling and evaluation as well as a customizable tool area.

Sketching*

A complete set of tools for 2D design work tightly integrated in a 3D modeling environment.

- **Integrated Paint** – Create concept sketches and annotate models with integrated pencils, markers and brushes. Sketch directly over imported CAD reference data.
- **Brushes** – Paint Brushes, Airbrushes, Smear, Clone, Blur, Sharpen, Flood Fill, Hide and show. Highest interactive performance and quality.
- **Shapes** – Quickly create illustration-like drawings by assigning line and fill attributes to curves. Editing the curve automatically updates the shape for rapid iterations.
- **Multiple Layers** – Sketch in front or behind geometry.
- **Masks** – Protect parts of an image while painting.
- **Snap to Geometry** – Use curves or other reference geometry as sketching guides.

Modeling

Industry-leading, NURBS-based surface modeler with Construction History.

- **Construction History** – Most tools retain the history of how objects were constructed so that they can be automatically rebuilt if the curves or surfaces they were constructed from are modified.
- **History View** – A graphical interface that allows you to view and edit construction history.
- **Curve Tools** – Create and edit lines, arcs, circles and high quality freeform NURBS curves.
- **Blend Curves** – Curves automatically update to maintain constraints set by the user. Constraints may be position, direction, or continuity with other geometry (degree 1,2,3).
- **Sweep Curves** – Set of industry standard sweep (French) curves for sketching or modeling. Create and save custom curves.

- **Curve Planarize** – Make a curve, or the boundary of a surface, planar along a specified or best-fit plane.
- **Curve Section** – Trim, detach, edit, and create curves using surfaces, point, planes or curves.
- **Basic Modeling** – Create surfaces by revolving, extruding, skinning, boundary curves, bounded planes and filleting.
- **Rotational Scaling** – Scale a set of curves or surfaces around a common pivot point.
- **Round** – Create variable or constant radius fillets between multiple surfaces.
- **Trimmed Surfaces** – Interactively trim away regions of a surface.
- **Tubular Offset** – Automatically trim out regions for cut lines, grooves and ridges.
- **Stitching** – Form shells by stitching together adjacent NURBS surfaces.
- **Boolean Operations** – Produce new shells formed by the union, intersection or difference of two shells.
- **Align** – Creates high quality surfaces by modifying existing curves or surfaces to achieve G0, G1 or G2 continuity between them.
- **Smooth** – Interactively modify curves or surfaces to improve curvature distribution.
- **Rebuild Surface** – Interactive tool for surface fitting through data reduction, degree elevation or reduction, surface smoothing and control of parameterization.
- **Layers** – Organize related parts of a model into groups that can be picked, displayed, and edited individually or together.
- **Proportional Modification** – Interactively move groups of control points proportionally relative to a master control point (CV).
- **Symmetry Plane Align** – Automatically aligns an object tangent to a defined axis.
- **Construction Planes** – Free Planes, Surface Planes and Three Point Planes.
- **Viewing Panel** – Control orthographic and perspective views from one main window. Point of interest, book marking and station views can be manipulated from this interactive panel.

Advanced Surfacing Tools

Surface creation tools that maintain positional or tangent continuity between surfaces with Construction History.

- **Rail** – Create surfaces by sweeping one or more curves along path curves.
- **Square** – Create surfaces by blending four bounding curves.
- **N-sided** – Create surfaces by blending up to eight bounding curves.

- **Draft/Flange** – Create surfaces with draft angles or flange surfaces. Create more complex surfaces by setting multiple pull depths and angles using interactive manipulators.
- **Multi-Surface Filleting** – Create circular, circular with lead radius or freeform fillets across multiple surfaces with constant, variable radius or user-defined chordal distance blending options.

Evaluation Tools

Tools to analyze and evaluate the styling and physical properties of curves and surfaces interactively, while creating and editing geometry.

- **Curve Curvature Display** – Interactively plot curvature information by displaying vectors normal to the curve.
- **Min/Max Distance** – Measure the minimum and maximum distance between points, curves and surfaces.
- **Mass Properties** – Examine mass properties such as volume and surface area.
- **Diagnostic Shading** – Interactive shaded display of surfaces for surface quality evaluation using colors, zebra stripes and horizon reflections.
- **Fast Shaded Mode Display** – Realistic, real-time, interactive shaded display of 3D models that supports textures and transparency.
- **Check Model** – Check geometry for potential data transfer problems to CAD.
- **3D Stereo Viewing** – 3D stereo viewing mode using liquid-crystal shutter glasses enhances your ability to interactively view and evaluate 3D models.

Animation

Animations can be used for high-quality design presentations, design analysis of mechanisms, motion and ergonomic studies, manufacturing or assembly simulation.

- **Design Animation** – Present your design with turntable animation. Define parameter-based animations using key frames and motion paths.

Rendering

Tools to create photorealistic images using textures, colors, highlights, shadows, reflections and backgrounds.

- **Project Sketch** – Project a 2D sketch as a texture onto the surfaces of a 3D model. This allows designers to efficiently explore ideas by quickly sketching details and projecting them onto a model before taking the time to model them.
- **RayTracing** – Achieve realistic effects for glass, water or shadows.
- **Rendering Effects** – Apply realistic effects such as motion blur to individual objects or an entire scene. Create camera and lighting effects including lens flare, fog, light beams, object and light glows, projector glows.

Alias Open Digital Studio™ and Data Integration

Support for industry-standard data formats and a wide range of peripheral devices.

- **OpenAlias™** – Develop your own programs as plug-ins that can be integrated with DesignStudio's user interface.
- **Alias OpenModel™** – Write your own programs to manipulate DesignStudio models and animations.
- **CAD/CAM Data Input/Output** – STEP (AP203/214), IGES, ACIS SAT, VDA/FS, VDA/IS, DES, DXF, JAMA-IS, Pro/RENDER input, UG® FAC input.
- **Granite™ Data Import/Export** – Import Pro/ENGINEER® part files. Import/Export data between DesignStudio and CAD packages that support PTC® Granite file format such as Pro/ENGINEER and Pro/DESKTOP®.
- **Vendor-Specific IGES Interfaces** – CATIA®, Pro/ENGINEER, I-DEAS®, UNIGRAPHICS®, COMPUTERVERSION®, EUCLID®.
- **Rapid Prototype** – Output STL (triangle based) or SLC (contour based) formats.

VRML Tools

Creating and converting 3D interactive worlds.

- **Output VRML 2** – Save VRML 2 files to view and interact with 3D models on the web.

OPTIONS

- **I-DEAS Direct Connect** – I-DEAS Open Architecture plug-in for SDR I-DEAS Master Series™ enables direct data exchange with DesignStudio.
- **CAT Direct Connect** – CATIA Application Architecture™ module provides interoperability between Dassault Systemes' CATIA and DesignStudio.
- **UG Direct Connect** – Enables DesignStudio to directly read and write Unigraphics enterprise CAD/CAM system part files.
- **Alias PowerTracer™/Alias PowerCaster™** – Raytrace and raycast images using the parallel capabilities of multi-processor systems.

* Only available for Microsoft® Windows® XP and Windows 2000 Professional operating systems

** Only available for SGI® IRIX® operating system, Sun™ Solaris™ operating environment, and HP-UX® operating system



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Toaster image courtesy of Alias|Wavefront, a division of Silicon Graphics Limited.
John Deere lawn tractor image courtesy of Henry Dreyfuss Associates and Deere & Company.
Bicycle image courtesy of Trek Bicycle Corporation.



Studio[™]

Advanced Software for Product Designers

Studio[™] delivers a sophisticated, intuitive environment in which to build freeform models and accurate machineable surfaces. It provides concept sketching and painting, advanced design tools for precision surfacing, with powerful conceptual modeling and rendering capabilities, all in one integrated package.

Integrated sketch and paint tools enable designers to use imported 3D engineering/ergonomic data as a reference while developing concepts. Sketch tools can be used throughout the design process for exploration and annotation of 3D models.

Studio delivers our industry-leading 3D modeling and visualization tools, providing designers with the freedom and flexibility to experiment with shape and form. Studio delivers additional functionality for the creation of highly refined and ultra-high quality geometry. More control over geometry is provided using higher order geometry. Additional controls in surface creation tools enable the automatic creation of high quality curvature continuous geometry, saving time while creating the quality required by the most demanding designers.

Rendering and animation are powerful tools to create virtual prototypes for exploring and communicating design concepts while saving time and money required to build physical prototypes.

Data integration with other tools such as CAD software preserves the design intent of models developed in Studio.

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Technical Features Studio – Version 10

Usability

- **Efficient UI** – The intuitive user interface shortens learning time for new users and features like context-sensitive gestural marking menus allow experienced users to work quickly.
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- **Menu Presets** – Streamline the interface for design tasks like sketching, modeling or rendering by displaying only the tools required for the job.
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- **Curve Planarize** – Make a curve, or the boundary of a surface, planar along a specified or best-fit plane.
- **Curve Section** – Trim, detach, edit, and create curves using surfaces, point, planes or curves.

- **Basic Modeling** – Create surfaces by revolving, extruding, skinning, boundary curves, bounded planes and filleting.
- **Rotational Scaling** – Scale a set of curves or surfaces around a common pivot point.
- **Round** – Create variable or constant radius fillets between multiple surfaces.
- **Trimmed Surfaces** – Interactively trim away regions of a surface.
- **Tubular Offset** – Automatically trim out regions for cut lines, grooves and ridges.
- **Stitching** – Form shells by stitching together adjacent NURBS surfaces.
- **Boolean Operations** – Produce new shells formed by the union, intersection or difference of two shells.
- **Align** – Creates high quality surfaces by modifying existing curves or surfaces to achieve G0, G1 or G2 continuity between them.
- **Smooth** – Interactively modify curves or surfaces to improve curvature distribution.
- **Rebuild Surface** – Interactive tool for surface fitting through data reduction, degree elevation or reduction, surface smoothing and control of parameterization.
- **Layers** – Organize related parts of a model into groups that can be picked, displayed, and edited individually or together.
- **Proportional Modification** – Move groups of CV's proportionally relative to a master CV.
- **Fit Curve** – Interactive tool which enables the user to automatically create curves from cross-section data.
- **Symmetry Plane Align** – Automatically aligns an object tangent to a defined axis.
- **Construction Planes** – Free Planes, Surface Planes and Three Point Planes.

Advanced Surfacing Tools

Surface creation tools that maintain positional, tangent plane or curvature continuity between surfaces with Construction History.

- **Rail** – Create surfaces by sweeping one or more curves along path curves.
- **Square** – Create surfaces by blending four bounding curves.
- **Draft/Flange** – Create surfaces with draft angles or flange surfaces. Create more complex surfaces by setting multiple pull depths and angles using interactive manipulators.
- **Multi-Surface Filleting** – Create circular, circular with lead radius or freeform fillets across multiple surfaces with constant, variable radius or user-defined chordal distance blending options.

Evaluation Tools

Tools to analyze and evaluate the styling and physical properties of curves and surfaces interactively, while creating and editing geometry.

- **Curve Curvature Display** – Interactively plot curvature information by displaying vectors normal to the curve.

- **Parting Lines** – Dynamic Parting Line on a surface relative to a specified angle and pull direction.
- **Continuity Checker** – Evaluate G1 and G2 continuity across multiple surfaces.
- **Min/Max Curve Curvature** – Identify points of minimum and maximum curvature.
- **Min/Max Distance** – Measure the minimum and maximum distance between points, curves and surfaces.
- **Mass Properties** – Examine mass properties such as volume and surface area.
- **Diagnostic Shading** – Interactive shaded display of surfaces for surface quality evaluation using colors, zebra stripes and horizon reflections.
- **Fast Shaded Mode Display** – Realistic, real-time, interactive shaded display of 3D models that supports textures and transparency.
- **Check Model** – Check geometry for potential data transfer problems to CAD.
- **3D Stereo Viewing** – 3D stereo viewing mode using liquid-crystal shutter glasses enhances your ability to interactively view and evaluate 3D models.

Animation

Animations can be used to communicate function and for high quality design presentations.

- **Design Animation** – Present your design with turntable animation. Define parameter-based animations using key frames and motion paths.

Rendering

Tools to create photorealistic images using textures, colors, highlights, shadows, reflections and backgrounds.

- **Project Sketch** – Project a 2D sketch as a texture onto the surfaces of a 3D model. Explore ideas by quickly sketching details and projecting them onto a model.
- **RayTracing** – Achieve realistic effects for glass, water or shadows.
- **Rendering Effects** – Realistic effects such as motion blur, camera lens flare, fog, light beams, object and light glows.

Alias Open Digital Studio™ and Data Integration

Support for industry-standard data formats and a wide range of peripheral devices.

- **OpenAlias™** – Develop plug-ins that can be integrated with Studio's user interface.
- **Alias OpenModel™** – Write your own programs to manipulate models and animations.
- **CAD/CAM Data Input/Output** – STEP (AP203/214), IGES, ACIS SAT, VDA/FS, VDA/IS, DES, DXF, JAMA-IS, Pro/RENDER input, UG FAC input.
- **Granite™ Data Import/Export*** – Share data with CAD packages that support PTC® Granite file format such as Pro/ENGINEER® and Pro/DESKTOP®.

- **Vendor-Specific IGES Interfaces** – CATIA®, Pro/ENGINEER, I-DEAS®, UNI-GRAPHICS®, COMPUTERVERSION®, EUCLID®.
- **Rapid Prototype** – Output STL (triangle based) or SLC (contour based) formats.

OPTIONS

Advanced Modeling

Includes a number of modeling features within Studio and the tools to work with scan data. Scan data tools are provided by the standalone applications EvalViewer™ (Unix) or Spider™ (Windows™).

- **Global Deformation** – Modify the shape of a collection of surfaces, including trim surfaces, while maintaining full curvature continuity of the model.
- **Trim Convert** – Convert a trimmed surface into an untrimmed (natural) surface.
- **Fit Scan** – Automatically modifies a surface to fit section data or a polygonal surface.
- **EvalViewer Cloud Data Tools** or Spider*** – Process Cloud Data from 3D scanners to create section data or polygon meshes for surface development. For more information about these products, see their respective brochures.

Advanced Evaluation

Tools to interactively verify the aesthetic and objective quality of complex models.

- **Dynamic Cross Section** – Drag discreet sections across a surface while displaying curvature in real time. Sections may be captured to be used for modeling.
- **Iso-Angle** – Displays iso-angle lines across surface boundaries as either white shaded lines, color shaded lines or curves on surface.
- **EvalViewer** or Spider* Evaluation Tools** – Interactively evaluate surface quality details. Please see their respective brochures for details.

Advanced Animation

- **Inverse Kinematics** – Position articulated objects in full 3D.

OPTIONS

Alias PowerTracer™/Alias PowerCaster™, I-DEAS® Direct Connect, CAT Direct Connect, UG® Direct Connect

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Auto|Studio™

Software for Automotive Design

Used by virtually all automotive manufacturers, AutoStudio™ is the industry standard for automotive design and styling. AutoStudio provides transportation designers both the freedom and flexibility for total creativity, and the precision and accuracy of CAD software. This is the industry's best technology for automotive styling, 3D modeling, surface evaluation, rendering and engineering integration.

AutoStudio provides a comprehensive suite of tools that enable complete integration throughout the entire shape definition process, from concept sketches through Class-A surfacing. This includes advanced modeling functionality with the accuracy to build precise surface models for integration with the engineering and manufacturing process and tools for working with cloud data from 3D scanners. AutoStudio also includes sophisticated evaluation features for interactively verifying the aesthetic and objective quality of complex models.

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*Image courtesy of Alias|Wavefront,
a division of Silicon Graphics Limited.*

Technical Features

AutoStudio – Version 10

Usability

- **Efficient UI** – The intuitive user interface shortens learning time for new users and features like context-sensitive gestural marking menus allow experienced users to work quickly.
- **Customizable UI** – Hot keys, marking menus and tools shelves can be customized to suit your workflow.
- **Menu Presets** – Streamline the interface for design tasks like sketching, modeling or rendering by displaying only the tools required for the job.

Modeling

Industry-leading, NURBS-based surface modeler with Construction History.

- **Construction History** – Most tools retain the history of how objects were constructed so that they can be automatically rebuilt if the curves or surfaces they were constructed from are modified.
- **History View** – A graphical interface that allows you to view and edit construction history.
- **Global Deformation** – Modify the shape of a collection of surfaces, including trim surfaces, while maintaining full curvature continuity of the model.
- **Fit Scan** – Automatically modifies a surface to fit section data or a polygonal surface.
- **Curve Tools** – Create and edit lines, arcs, circles and high quality freeform NURBS curves.
- **Blend Curves** – Curves automatically update to maintain constraints set by the user. Constraints may be position, direction, or continuity with other geometry (degree 1,2,3,5,7).
- **Sweep Curves** – Set of industry standard sweep (French) curves for sketching or modeling. Create and save custom curves.
- **Curve Planarize** – Make a curve, or the boundary of a surface, planar along a specified or best-fit plane.
- **Curve Section** – Trim, detach, edit, and create curves using surfaces, point, planes or curves.
- **Basic Surfacing** – Create surfaces by revolving, extruding, skinning, boundary curves, bounded planes and filleting.
- **Rotational Scaling** – Scale a set of curves or surfaces around a common pivot point.
- **Round** – Create variable or constant radius fillets between multiple surfaces.
- **Trimmed Surfaces** – Interactively trim away regions of a surface.
- **Tubular Offset** – Automatically trim out regions for cut lines, grooves and ridges.
- **Stitching** – Form shells by stitching together adjacent NURBS surfaces.
- **Boolean Operations** – Produce new shells formed by the union, intersection or difference of two shells.

- **Align** – Creates high quality surfaces by modifying existing curves or surfaces to achieve G0, G1 or G2 continuity between them.
- **Smooth** – Interactively modify curves or surfaces to improve curvature distribution.
- **Layers** – Organize related parts of a model into groups that can be picked, displayed, and edited individually or together.
- **Proportional Modification** – Interactively move groups of CV's proportionally, relative to a master CV.
- **Fit Curve** – Interactive tool which enables the user to automatically create curves from cross-section data.
- **Symmetry Plane Align** – Automatically aligns an object tangent to a defined axis.
- **Construction Planes** – Free Planes, Surface Planes and Three Point Planes.

Advanced Surfacing Tools

Surface creation tools that maintain positional, tangent plane or curvature continuity between surfaces with Construction History.

- **Rail** – Create surfaces by sweeping one or more curves along path curves.
- **Square** – Create surfaces by blending four bounding curves.
- **Draft/Flange** – Create surfaces with draft angles or flange surfaces. Create more complex surfaces by setting multiple pull depths and angles using interactive manipulators.
- **Multi-surface Filleting** – Create circular, circular with lead radius, or freeform fillets across multiple surfaces with constant, variable radius or user-defined chordal distance blending options.

Direct Modeling Functions

The Direct Modeling Panel increases user productivity for direct surface modeling.

- **Explicit Control** – Control degree and segmentation while viewing deviation from the original object.
- **Align Hull** – Move CV's to planar positions creating smooth control hull forms.
- **CV and Hull Movement** – The Direct Modeling panel allows for the control of both CV's and Hulls using XYZ, NUV, Slide and Project. Incremental micro movements with either the mouse or arrow keys.
- **Deviation Display** – Interactively displays Min, Max and Mean deviation to scan data.
- **Cross Section** – Create cross sections from X, Y, Z orientations or allows the use of background data for irregular section detail.
- **Curvature Control** – Control the Scale, Density and Sampling of curvature display on curves, curves on surface, and surfaces.

Sketching*

A complete set of tools for 2D design work tightly integrated in a 3D modeling environment.

- **Integrated Paint** – Create concept sketches and annotate models with integrated pencils, markers and brushes.
- **Brushes** – Paint Brushes, Airbrushes, Smear, Clone, Blur, Sharpen, Flood Fill, Hide and show. Highest interactive performance and quality.
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- **Multiple Layers** – Sketch in front or behind geometry.
- **Masks** – Protect parts of an image while painting.
- **Snap to Geometry** – Use curves or other reference geometry as sketching guides.

Raw Data Processing using EvalViewer™** or Spider™**

Process scan data points from measurement systems, such as 3D laser scanners. EvalViewer and Spider are standalone applications that offer fast, interactive tools for cloud data processing and are tightly integrated for use with AutoStudio. For more information about these products, please see their respective brochures.

Evaluation Tools

Tools to analyze and evaluate the styling and physical properties of curves and surfaces interactively, while creating and editing geometry.

- **Iso-Angle** – Displays iso-angle lines across surface boundaries as either white shaded lines, color shaded lines or curves on surface.
- **Diagnostic Shading** – Interactive shaded display of highlights, reflections, curvature, and draft angle.
- **Check Model** – Check geometry for potential data transfer problems to CAD.
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- **Continuity Checker** – Evaluate G1 and G2 continuity across multiple surfaces.
- **Min/Max Curve Curvature** – Identify points of minimum and maximum curvature.
- **Min/Max Distance** – Measure the minimum and maximum distance between points, curves and surfaces.
- **Mass Properties** – Examine mass properties such as volume and surface area.
- **Surface Evaluation Tool** – Interactive tool that creates modeling curves on surfaces. Generates highlight, curvature, horizon, contour and parting lines.
- **Dynamic Cross Section** – Drag discreet sections across a surface while

displaying curvature in real time. Sections may be captured to be used for modeling.

- **3D Stereo Viewing** – 3D stereo viewing mode using liquid-crystal shutter glasses enhances your ability to interactively view and evaluate 3D models.

Animation

Animation can be used to create the highest quality design presentations.

- **Design Animation** – Present your design with turntable animation. Define parameter-based animations using key frames and motion paths.
- **Inverse Kinematics** – Position articulated objects in full 3D.

Rendering

Tools to create photorealistic images using textures, colors, highlights, shadows, reflections and backgrounds.

- **ClearCoat™** – Rendering technology that simulates the lacquer finish typical of automotive paint finishes.
- **Project Sketch** – Project a 2D sketch onto the surfaces of a 3D model.
- **RayTracing** – Achieve realistic effects for glass, water or shadows.
- **Rendering Effects** – Apply realistic effects such as motion blur to individual objects or an entire scene. Create camera and lighting effects including lens flare, fog, light beams, object and light glows, projector glows.

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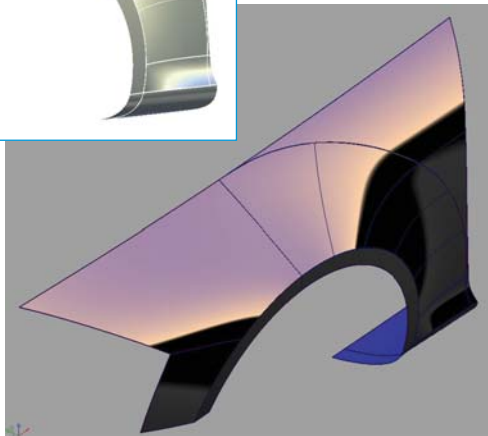
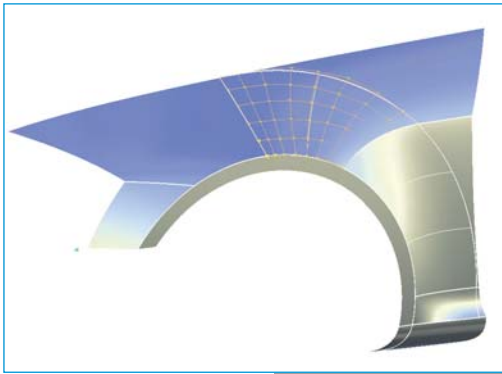
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Surface|Studio™

Software for Class-A Surfacing

SurfaceStudio™ is a technical surfacing product for the development of Class-A surfaces. It offers advanced modeling and reverse engineering tools, real-time diagnostics and scan data processing technology.

It provides a complete suite of tools for creating surface models that meet the stringent levels of quality, accuracy and precision required in automotive styling.

- Cloud Data Processing
- Direct, Patch-based Modeling
- Procedural, Curve-based Modeling
- Real-time Diagnostic Feedback
- Dynamic Surface Evaluation
- CAD Integration

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Technical Features

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- **Global Deformation** – Modify the shape of a collection of surfaces, including trim surfaces, while maintaining full curvature continuity of the model.
- **Fit Scan** – Automatically modifies a surface to fit section data or a polygonal surface.
- **Fit Curve** – Interactive tool which enables the user to create smooth and accurate curves to polyline data. The degree and span concentration are controlled while managing the curves' smoothness and accuracy to the data.
- **Curve Tools** – Create and edit lines, arcs, circles and high quality freeform NURBS curves.
- **Blend Curves** – Curves automatically update to maintain constraints set by the user. Constraints may be position, direction, or continuity with other geometry (degree 1,2,3,5,7).
- **Basic Modeling** – Create surfaces by revolving, extruding, skinning, boundary curves, bounded planes and filleting.
- **Stitching** – Form shells by automatically stitching together adjacent NURBS surfaces.
- **Align** – With explicit control this feature enables the user to align a surface to surface edges and trim edges without changing the degree of the original surface.
- **Smooth** – Interactively modify curves or surfaces to improve curvature distribution.
- **Rebuild Surface** – Interactive tool for surface fitting through data reduction, degree elevation or reduction, surface smoothing and control of parameterization.
- **Layers** – Organize related parts of a model into groups that can be picked, displayed, and edited individually or together.
- **Proportional Modification** – Interactively move groups of CV's proportionally, relative to a master CV.
- **Cloud Fit** – Display and manipulate cloud data. Build surfaces with best-fit approximation to cloud data points.
- **Symmetry Plane Align** – Automatically aligns an object tangent to a defined axis.
- **Construction Planes** – Free Planes, Surface Planes and Three Point Planes.

Advanced Surfacing Tools

Surface creation tools that maintain positional, tangent plane or curvature continuity between surfaces. Surfaces maintain a Construction History and automatically update when modifications are made to the construction curves, parameters or adjacent surfaces.

- **Rail** – Create surfaces by sweeping one or more curves along one or two paths. Control both the degree and number of spans with the explicit control.
- **Square** – Create surfaces using four points, an edge and two points, or four boundaries. The degree and span counts can be altered iteratively using the explicit control option.
- **Draft/Flange** – Create surfaces with draft angles or flange surfaces. Create more complex surfaces by setting multiple pull depths and angles using interactive manipulators.
- **Multi-Surface Filleting** – Create circular, circular with lead radius or freeform fillets across multiple surfaces with constant, variable radius or user-defined chordal distance blending options.

Direct Modeling Functions

At the heart of SurfaceStudio lies the Direct Modeling Panel. The central location and dedicated nature of this tool increases user productivity.

- **Tool Shelf** – Commonly used tools can be stored in an editable shelf environment.
- **Display Pick List** – Select objects from a graphic list of the data model.
- **Explicit Control** – Permits the user to rebuild surface and curve information from the Direct Modeling Panel. Degree and span count can be manipulated while viewing any error from the original object. Accept or cancel keeps the user in control of the process.
- **Display Features** – Direct access to repetitive tasks such as viewing curvature, cross sections, isoparametric lines and control meshes are available within the Direct Modeling Panel.
- **Align Hull** – Moves control vertices to planar positions creating smooth control hull forms.
- **CV and Hull Movement** – The Direct Modeling panel allows for the control of both CV's and Hulls using XYZ, NUV, Slide and Project. Incremental micro movements with either the mouse or arrow keys.
- **Deviation Display** – Interactively displays Min, Max and Mean deviation to scan data. Minimums and maximums can be specified to focus on problem areas. Used in conjunction with CV and Hull movement, surfaces can be tuned to the data while highlights are reviewed for aesthetic quality.
- **Cross Section** – Creates cross sections from X, Y, Z and arbitrary planar orientations

or allows the use of background data for irregular section detail.

- **Curvature Control** – Controls the Scale, Density and Sampling of curvature display on curves, curves on surface, and surfaces.
- **Deviation Table** – This information window gives X, Y, Z coordinates, positional, tangential and curvature errors. Banding allows minimum and maximum requirements to be keyed in. The table displays all information or can be made more specific by clipping to the band specified by the user. A text file is made available of all information to expedite the verification process.

Evaluation Tools

Tools to analyze and evaluate the styling and physical properties of curves and surfaces interactively, while creating and editing geometry.

- **Annotation*** – A selection of fully integrated, multi-colored pencils for annotating surface models.
- **Iso-Angle** – Displays iso-angle lines across surface boundaries as either white shaded lines, color shaded lines or curves on surface.
- **Diagnostic Shading** – Interactive shaded display of highlights, reflections, curvature and draft angle.
- **Curve Curvature Display** – Interactively plot curvature or inverse curvature information by displaying vectors normal to the curve.
- **Parting Lines** – Dynamic Parting Line on a surface relative to a specified angle and pull direction.
- **Continuity Checker** – Evaluate G1 and G2 continuity across multiple surfaces simultaneously.
- **Min/Max Curve Curvature** – Identify points of minimum and maximum curvature.
- **Min/Max Distance** – Measure the minimum and maximum distance between points, curves and surfaces.
- **Mass Properties** – Examine mass properties such as volume and surface area.
- **Surface Evaluation Tool** – Interactive tool that creates modeling curves on surfaces. Generates highlight, curvature, horizon, contour and parting lines.
- **Dynamic Cross Section** – Drag discreet sections across a surface while displaying curvature in real time. Sections may be captured to be used for modeling.
- **Check Model** – Check geometry for potential data transfer problems to CAD.
- **3D Stereo Viewing** – 3D stereo viewing mode using liquid-crystal shutter glasses enhances your ability to interactively view and evaluate 3D models.

Alias Open Digital Studio™

Support for industry-standard data formats and a wide range of peripheral devices.

- **OpenAlias™** – Develop your own programs as plug-ins that can be integrated with SurfaceStudio's user interface.
- **Alias OpenModel™** – Write your own programs to manipulate SurfaceStudio models.
- **CAD/CAM Data Input/Output** – STEP (AP203/214), IGES, ACIS SAT, VDA/FS, VDA/IS, DES, DXF, JAMA-IS, Pro/RENDER input, UG® FAC input.
- **Rapid Prototype** – Output STL (triangle based) or SLC (contour based) formats.

OPTIONS

EvalViewer™**

Interactive 3D surface evaluation and point cloud processing.

- **Digitized Data** – Support for multiple formats including: Hymarc, Steinbichler, EOIS, Sharnoa, Cyberware®, Digibotics, IGES-106, VDA Point Sets, Ascii XYZ Image, Binary Polyline, Perceptron® and Kreon™.
- **Cloud Point Editing** – Cloud point editing/subsetting/ cropping tools, including box, trace/lasso, circle functions.
- **View Meshes** – Cloud to polygon conversion for smoothing, curvature analysis and visualization.
- **Cloud Visualization** – Visualize cloud data in shaded mode or using a variety of reflection and environment maps.
- **Alignment Functions** – Allow scan data to be placed in design position.
- **Inspection** – Measure deviation using color error analysis for cloud to cloud, cloud to lines, cloud to polys and cloud to surface.
- **Sections** – Cut coaxial, radial or arbitrary sections through cloud data.
- **Feature Line Definition** – Allows for character line elements to be traced from cloud and/or polygon representations.

Spider™**

A cloud data processing and evaluation tool for development of polygonal surfaces from digitized or scanned parts and models.

I-DEAS® Direct Connect

CAT Direct Connect

UG Direct Connect

* Only available for Microsoft® Windows® XP and Windows 2000 Professional operating systems

** Only available for SGI® IRIX® operating system, Sun™ Solaris™ operating environment, and HP-UX® operating system

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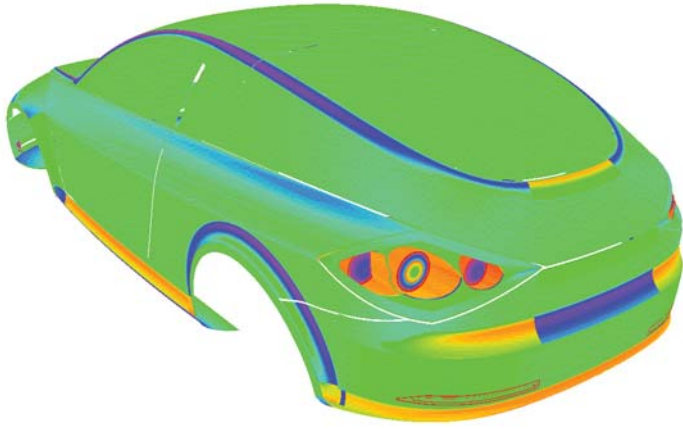
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Studio | Tools™

EvalViewer

Cloud Data Processing and Surface Evaluation Tool

EvalViewer™ is a cloud data processing and surface quality evaluation tool for engineering teams specializing in technically constructed, high-quality surfaces. EvalViewer offers fast, interactive digital tools for cloud data processing, surface quality evaluation and surface refinement.

It's ideal for automotive and industrial product designers and engineers who are working with freeform organic models. It helps designers and engineers work with physical models, improve surface quality, and drastically reduce model development time.

- Surface Quality Evaluation for CAD Modeling
- Dynamic Interactive Shading
- Surface Curvature Analysis
- Environment Shading
- Improved Communication

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Key Features

EvalViewer – Version 10

Surface Quality Evaluation For CAD Modeling

A perfect complement to the StudioTools family of software products or CAD modeling packages like CATIA®, I-DEAS®, Unigraphics®, or Pro/ENGINEER™, EvalViewer lets you find costly design flaws before prototypes or hard metal is cut. Surface Evaluation tools provide extensive surface diagnostics. You evaluate surface smoothness with dynamic shading, reflection lines, and surface curvature analysis. As your designs unfold in your modeling software, you can toggle back to the EvalViewer and check surface quality before committing the model to manufacturing.

Dynamic Interactive Shading

EvalViewer lets you view your design from any angle and under different lighting conditions. You can tumble your design around in real-time to better view the surface. You can use multiple light sources with dynamic shading to view highlights.

Surface Curvature Analysis

EvalViewer features advanced, dynamic surface curvature analysis, including Gaussian, Mean, Max, Min, Total, X, Y, Z, U, and V curvature maps – all the essential tools for reviewing surface quality.

Surface curvature diagnosis zeroes in on surface discontinuities which might otherwise go unnoticed. Use color ramps to spot dents or hyperbolic saddle shapes that mark unwanted inflections or potential machining problems.

Environment Shading

EvalViewer lets you visualize your design with physical environment features, reflected on its surfaces. You can easily visualize how the surface behaves with a chrome or mirrored finish. EvalViewer also computes highlight lines by simulating an infinitely long linear light source reflecting off the model. You can also cut discrete cross-sections from the model, at any angle, to analyze tangency and curvature.

Improved Communication

EvalViewer facilitates better communication within design teams. Using Save JPEG you can capture a screen image as an HTML document so it can easily be shared with other members of the design team. EV Script is used to replay review sessions so other team members can see the same review at a different time. With Net Sessions, designers in different locations can simultaneously view the same review session in real-time.

TECHNICAL FEATURES

Cloud Processing Features:

EvalViewer processes large amounts of cloud data from rapid point data acquisition systems, such as 3D laser scanners, and creates section data for surface development.

- Cloud input from vendor-specific file formats: ATOS, CATIA®-CPT, Cyberware® Echo, EOIS XYZ, Hymarc, Kreon™ CBK, Sharnoa, Steinbichler AC, Arius 3D Color ASCII
- Cloud input from 3 different generic point formats (IGES 106, VDAFS PS, ASCII XYZ) for additional input capability from Digi-botics, 3D-Scanners, Laser Design, Lemoine, Cyrax and other scanners
- Cloud input from Alias Pix or SGI® RGB, so that 2D paint packages can be used to create Intensity = Depth surfaces
- Cloud output to IGES 106 or ASCII XYZ
- Section output to IGES 106 or DES
- Polygon output to Wavefront OBJ
- Cloud point editing/subsetting/cropping tools, including box, trace/lasso, circle functions
- Cloud move, scale, and rotate options
- Cloud QuickRender
- Cloud XYZ cross-sections
- Cloud to polygon conversion
- Cloud to polyline section conversion
- Section editing tools: delete point, section, break, join
- Section smoothing filters

- Section chordal deviation point reduction
- Section resampling (uniform by point count or segment length)
- Support for arbitrary line/radial sections
- Support for feature line definition
- Interactive model refinement
- Curve creation on polygon models
- Ability to create 3D polygonal meshes from point cloud data
- Fill holes in polygonal meshes automatically or manually

Surface Evaluation Features:

EvalViewer evaluates surface quality using color curvature maps, reflection maps, highlight lines, and arbitrary cross-sections. Edit the position of control vertices interactively.

- View surfaces from Alias Wire Files, IGES Files, and VDA Files
- View picked surfaces from within AutoStudio™ and Studio™
- Easy-to-use reflection maps
- Apply any Alias Pix file or SGI RGB file as painted or chrome reflection
- XYZ surface sections/radial sections/user-specified arbitrary sections
- Surface curvature color mapping: visualize subtle surface variations with Gaussian, Mean, Max, Min, Total, X, Y, Z, U, V curvature maps
- Four directional hardware lights with longitude/latitude controls
- Pick surface point for maximum highlight
- Interactive maximum colorbar range adjustment
- Edit one or more surface control vertices (CVs) in screen, world, or normal-UV coordinates
- Fine/medium/coarse gain factor on CV movements
- Save wire files with selected modified surfaces
- Save sections as IGES or DES
- Moving highlight lines/fixing highlight lines (auto-update during CV-Edit)

- Diagnostic sections (auto-update during CV-Edit)
- Saddle lines (convex/concave/saddle separation lines) (auto-update during CV-Edit)
- Random colors for surface patch layout visualization
- Mirror function available for NURBS and polygon viewing
- Screen based tape measure and protractor for fast measurement
- Draft analysis
- Inspection functions to compare surfaces to cloud data or to compare cloud data to surfaces, polygons, lines, or other clouds
- Share surface evaluations to HTML browser

Surface Modification:

- Surface Offset provides accuracy with minimal increase in geometry complexity
- Surface Simplify reduces geometry complexity while maintaining accuracy

Platforms:

- SGI® IRIX® operating system, Sun™ Solaris™ operating environment, Hewlett Packard® HP-UX® operating system.

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Studio | Tools™

Spider™

Cloud Data Processing

Spider™ is a cloud data processing tool for development of polygonal surfaces from digitized or scanned parts and models. It offers fast, interactive tools for cloud data processing and surface to cloud comparison. It can be used in conjunction with Studio™ or other modeling systems for the reverse modeling process.

Spider helps designers and engineers evaluate designs, incorporate changes and reduce product development cycle time.

- Integrated Workflow with StudioTools™
- Advanced Mesher with 3D Tolerancing
- Large Data Set Management
- Evaluation Tool

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Key Features

Spider – Version 10

Integrated Workflow with StudioTools

A great addition to the StudioTools product family – Spider works closely with SurfaceStudio™, AutoStudio™, or Studio™ with Advanced Modeling to deliver quality surfaces.

Advanced Mesher with 3DTolerancing

A powerful new approach to meshing which allows the user to set a 3D tolerance to manage the density of the mesh. Zero deviation or user specified deviation meshes can be created.

Large Data Set Management

Spider helps you to process large files rapidly with efficient system utilization. You can select portions of the cloud to mesh, or mesh the entire cloud all at once.

Evaluation Tool

In order to ensure that polygonal meshes maintain the correct tolerances to original point clouds, Spider has shaded color comparison tools for mesh to cloud evaluation.

Interactive shaded display of highlights, reflections, curvature and draft.

TECHNICAL FEATURES

• Digitized Data Formats

– Support for multiple vendor-specific formats: ATOS, CATIA®-CPT, Cyberware® Echo, EOIS XYZ, Hymarc, Kreon™ CBK, Arius 3D Color ASCII, Sharnoa, Steinbichler AC

– Support for 3 different generic point formats: IGES 106/116, VDA-FS PS, ASCII XYZ for additional input capability from Cyrax, Digibotics, 3D-Scanners, Laser Design, Lemoine, and other scanners

– Export support for ASCII XYZ and IGES 106

• **File I/O** – Import of Alias Wire, DXF, IGES, OBJ, STL (ASCII and Binary), VDA, DES. Export support for Alias Wire, DXF, IGES, OBJ, STL (ASCII and Binary), DES

• **Cloud Point Editing** – Cloud point editing, subsetting, merging, and filtering

• **Mesh Creation** – Creation of 3D meshes with a given 3D tolerance

• **Mesh Editing** – Polygonal mesh smoothing, reduction via a 3D tolerance or to a given percentage or polygonal count, hole filling, normals repair (unify and flip normals)

• **Fill Hole** – Fills holes manually or automatically with three different options: Coarse, Taut, and Faired

• **Cross Section Creation** – Cut coaxial or arbitrary sections through polygonal meshes

• **Cross Section Editing** – Cross section smoothing and chordal deviation-based point reduction

• **Conversion to Cloud** – Convert polygonal meshes or NURBS surfaces to point clouds

• **NURBS Tesselation** – Convert NURBS surfaces to polygons for viewing or STL export

• **Inspection** – Measure deviation between point cloud and polygonal mesh using color deviation analysis

• **Measurement** – Screen based digital tape measure for point to point measurement

• **Display Tools** – display boundary, folded, and non-manifold edges

• **Checking Tools** – Allow for solid, fold, and self-intersection checks

• **Communication** – Capture screen snapshots and save them directly to an HTML document for easy sharing and reviewing

• **Evaluation** – Interactive shaded display of surfaces for surface quality evaluation using colors, curvature maps, zebra stripes and horizon reflections

Platforms

- Microsoft® Windows® XP and Windows® 2000 Professional operating systems

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Studio | Tools™

Direct Connect Products

- CAT
- I-DEAS®
- UG®

The optional Direct Connect products enable the efficient exchange of data between StudioTools and CAD products from a number of leading CAD vendors.

When used in conjunction with the vendor-specific Construction Option presets in StudioTools, data can be used directly in the CAD environment, eliminating rework, saving time and preserving design intent. These interfaces bring a new level of integration to the collaborative work between industrial designers and engineers.

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Key Features

Direct Connects

CAT Direct Connect

The CAT Direct Connect product enables the StudioTools family of software products to share data with CATIA.

Technical Features

- CATIA®/Alias Interoperability (CAI) file format allows CATIA and Alias to share data efficiently
- Geometry stitched together as a shell within Alias is translated into a skin when imported into CATIA
- High-level data representation maintains precise surface and topology information, including G2 tangency
- Tolerances and units maintained and properly transferred during translation
- Graphical User Interface works inside standard Alias Studio File Open/File Save dialog box
- Supplemental Command Line Interface designed to facilitate batch conversion of data files
- Translation log documents entity mappings, entity counts, and other translation information

Software Requirements:

- StudioTools:
 - DesignStudio™ 10
 - Studio™ 10
 - AutoStudio™ 10
 - or SurfaceStudio™ 10
- CATIA 4.2.x

Platforms:

- SGI™ IRIX®, Microsoft® Windows® XP, Windows® 2000 Professional and Hewlett-Packard® HP-UX® operating systems and Sun™ Solaris™ operating environment

I-DEAS Direct Connect

I-DEAS® Direct Connect is a plug-in for I-DEAS Master Series that enables it to directly read or write Alias|Wavefront wire files.

Technical Features

- Effective data sharing with I-DEAS Master Series™
- Direct import and export of Alias|Wavefront™ wire files
- High-level data representation maintains precise surface and topology information, including G2 tangency
- Tolerances and units maintained and properly transferred during translation
- Uses SDCR® Open I-DEAS architecture and Alias OpenModel™ toolkit
- Translation log documents entity mappings, entity counts, and other translation information

Software Requirements:

- StudioTools:
 - DesignStudio™ 10
 - Studio™ 10
 - AutoStudio™ 10
 - or SurfaceStudio™ 10
- I-DEAS Master Series 8.0 or 9.0

Platforms:

- SGI™ IRIX®, Microsoft® Windows® XP, Windows® 2000 Professional and Hewlett-Packard® HP-UX® operating systems and Sun™ Solaris™ operating environment

UG Direct Connect

The UG Direct Connect product enables the StudioTools family of software products to read and write Unigraphics part files.

Technical Features

- Provides a significant productivity improvement by being able to accurately and quickly move complex surface models between the Alias|Wavefront™ Studio family of products and the Unigraphics® Enterprise CAD/CAM system
- High-level data representation maintains precise surface and topology information, including G2 tangency
- Maintains data organization and product structure, eliminating significant reconstruction of information
- Tolerances and units maintained and properly transferred during translation
- Graphical User Interface works inside standard Alias Studio File Open/File Save dialog box
- Supplemental Command Line Interface designed to facilitate batch conversion of data files
- Translation log documents entity mappings, entity counts, and other translation information

Software Requirements:

- StudioTools:
 - DesignStudio™ 10
 - Studio™ 10
 - AutoStudio™ 10
 - or SurfaceStudio™ 10
- Unigraphics version 17 or 18
- Access to Unigraphics license

Platforms:

- SGI™ IRIX®, Microsoft® Windows® XP, Windows® 2000 Professional and Hewlett-Packard® HP-UX® operating systems and Sun™ Solaris™ operating environment

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