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# Glossary

Defines common terms and concepts.

## **action**

A mapping between time and a parameter (in animation).

## **Action window**

This tool displays the animation of selected objects using line graphs called *animation curves*. Each animation curve represents one of the object's parameters. An animated parameter is referred to as a channel.

## **AFFS**

Advanced Free Form Surfacing. A method of transferring data between Unigraphics and StudioTools.

## **Alias**

The former name of the **StudioTools** family of applications. The abbreviated name of Alias Systems Corp. Alias is a registered trademark of Alias Systems Corp.

## **ALS**

See **pix**.

## **alpha**

A value representing transparency, usually of an image or texture. Alpha values are usually stored as a range from 0-255.

## **animation channel**

An animated parameter is referred to as a channel.

**animation curves**

Each animation curve in the Action Window represents one of the object's parameters.

**anti-alias**

A group of methods for avoiding unwanted visual effects due to limited display resolution. These effects include staircasing along diagonal lines, moiré effects in checkerboards, and temporal aliasing (strobing) in animated scenes.

Aliasing is caused by limited display resolution. Effects include staircasing along diagonal lines, moiré patterns in checkerboards, and strobing in animated scenes.

**API**

Application Programmer Interface.

**ASCII**

American Standard for Computer Information Interchange. This is a text format that defines alphanumeric and other printable characters. It is readable by many machines and programs.

**aspect ratio**

The ratio of width to height, for example, for an image, view window, pixel, or screen.

**attribute**

See [parameter](#).

**axis**

One of the three vectors (X, Y, and Z) that define the three dimensions of a scene.

**backdrop**

An image, texture, or color that appears in a view (for reference during modeling) but is not rendered.

**background**

An image, texture, or color that is rendered behind all objects in a scene.

**baking constraints**

Bake creates animation curves with keyframes at regularly specified intervals. You can view these curves and edit them by hand.

**bitmap**

A technique for creating a graphics display by describing it in terms of pixels.

**blend curve**

A special type of curve you draw by placing constraints on its shape, relative to other curves or surfaces. Choose [Curves > Blend curve toolbox](#) to show a palette of blend curve tools.

**Blinn**

A method of shading surfaces often used to simulate metallic materials.

**bookmark**

A view of a model containing camera position, hardware shading attributes (from Diagnostic Shading panel) and annotations (from sketching tools) that is saved and can be easily restored.

**boolean**

Tools that work on shells by logic (AND, OR, XOR, NOR). They allow you to combine, remove, or keep only the intersections of shell volumes. See [Surface Edit > Shells](#) (See also [NURBS](#)).

**bone**

The connection between each joint (rotation pivot point) in a skeleton. The bone is purely visual thing, not a DAG object.

**bounding box**

A cube that encloses an object (including its CVs) and appears in a view.

**BREP solids**

Stitched geometry that describes a closed volume is written out as a G5 Brep Solid.

**brush**

A tool that you use to apply paint, remove paint, or modify paint (for example, blur, sharpen, smear, or clone paint) in strokes on a canvas.

**B-spline**

A particularly smooth class of approximating splines. B-splines (basis splines) are fully approximating: such a curve generally passes through its control points only if several of them lie on the same straight line. See also **NURBS**.

**buffer**

A memory area in which information is stored for later retrieval.

**bump map**

A texture or image used to simulate a bumpy surface. However, the silhouette of a bump mapped surface appears smooth.

**cache**

Temporary storage for frequently used data.

**C4 format**

IGES subset file format.

**CAD**

Computer Aided Design.

**CAI**

CATIA/Alias neutral format or CATIA-Alias Interoperability file format. File names are of the form \*.cai.

CATIA is a file filter based on CAD/CAM packages. The translator, CATIA DirectConnect, is created using the EXPRESS language from STEP.

**CAID**

Computer Aided Industrial Design. The method of designing electrical and mechanical devices, components, and systems using computer systems. CAID typically makes extensive use of computer graphics.

**CAM**

Computer Aided Manufacturing.

**camera**

An object having position, orientation, and optical properties that is used to view a scene or render an image from.

**CATIA**

Computer-aided design software from Dassault Systemes in France.

**canvas plane**

A two-dimensional rectangular object used for drawing and sketching in StudioTools (on Windows operating systems only).

**channel**

A set of data that describes what values its animation parameter should assume at different frame times.

**checkpoint**

A manually or automatically saved wire file of the current scene that allows you to re-load a model at various stages of its construction.

**chord-length**

Type of parameterization. Assigns parameter 0.0 to the start of the curve, then increases the parameter value proportionally to the *chord length*, or the shortest linear distance, between the surrounding edit points. Constrain **uniform**.

**chrome texture**

The **Chrome** texture simulates a showroom environment. The texture consists of a ground plane and a sky plane (with fluorescent style light rectangles), and provides a simple but effective environment to simulate reflections off chrome surfaces.

**clampers**

In dynamic shape modeling tools, clampers are hints the designer places outside the intended region of interest to help the software understand the designer's desired region of interest.

**clip**

Ignore objects in a scene that are beyond certain boundaries (for example, outside the camera's field of view).

**clipping plane**

Two planes (the near clipping plane and the far clipping plane) that face the camera and only allow objects between them to be rendered. For example, objects that are beyond the far clipping plane or in front of the near clipping plane (relative to the camera) will not be rendered.

**closed solid**

A white wireframe display indicates a closed solid model. Additional solid features may be added to the Import Feature and then manipulated parametrically.

**cloud**

1. A cloud of data points (for example, generated from a 3D scanner). 2. A simulation of an atmospheric cloud.

**cluster**

A group of CVs and DAG nodes that can be transformed and manipulated together. A cluster has no geometry of its own, but refers to other geometry. You specify the members of the cluster and can name it.

**comb plot**

A graph that displays some measure of a curve (such as curvature or deviation) at regular sample points along the length of the curve.

**component**

Part of an object, such as one face of a cube. A component is easily identified by examining the Object Lister or SBD (Scene Block Diagram). Any node beneath the top node (object level) and above the bottom node (control vertex level) represents a component of the object.

**composite**

An image formed by combining two or more images.

**constraint**

A limitation applied to a DAG node. Constrains an object to always match the position of another object, match the orientation of another object, or point toward another object.

In dynamic shape modeling tools, constraints are used to constrain or secure parts of the target geometry to prevent shape modifications.

**construction history**

Saved information about how a given object was created. Modifying objects or tool options used in the construction history will automatically update the resulting surface.

For example, you can project a curve onto a surface, then trim the surface to that curve-on-surface. If you then change the original curve, both the projected curve-on-surface and the trim are automatically updated.

**contiguous**

Being in contact with. For example, a surface is contiguous with another surface when it shares an edge.

**continuity**

The measure of how well two curves or surfaces “flow” into each other. The three major types of continuity are **positional continuity**, **tangent continuity**, and **curvature continuity**.

**control vertex (CV)**

Controls the shape of a curve or surface. They are the most basic means for controlling the shape of a curve. Lines between consecutive CVs are called *hulls*.

**coordinate**

A method of describing the placement of a point in some space. In computer graphics, there are several coordinate systems, each one holding the values for the picture at some stage of the graphics process.

**construction plane**

A temporary coordinate space. You can switch between **world space** and the coordinate space defined by a reference plane. When you are in the coordinate space of a reference plane, that plane is the construction plane.

**cubic**

**degree 3.**

**Cube environment texture**

The cube environment texture simulates an environment by mapping six image files onto the inner surfaces of a cube or box. The size and shape of the texture placement object determines the size and shape of the cube or box.

**curvature**

A measure of how much a curve curves.

Curvature is measured by fitting a circle into the curve, then taking the reciprocal of the circle's radius.

Several tools in StudioTools, such as **Locators > Curve curvature**, allow you to display a **comb plot** of a curve's curvature.

**curvature continuity**

**tangent continuity**, plus the curvature of the two curves matches at the common endpoint. The two curves appear to have the same "speed" at the common endpoint.

Also called G2 continuity.

**curve**

A connected sequence of straight or curved lines.

**curve-on-surface**

A type of curve that exists in the parameter space of a surface. A curve-on-surface is typically used to trim the surface. You can draw curves-on-surface manually but you will usually create them by intersecting or projecting.

**CV**

See **control vertex (CV)**.

**CV multiplicity**

Multiple consecutive CVs of a curve or surface occupying the same point. Generally undesirable.

**DAG**

Directed acyclic graph. The internal representation of all the objects and data in the scene. Represented visually in the Object lister and SBD window.

**data transfer**

The process of converting data from StudioTools formats to external formats (such as for use in CAD/CAM) and vice versa.

**degree**

A mathematical property of a curve or of a surface dimension that controls how many CVs are available for modeling. The default is *degree 3*, which has four CVs for the first **span**.

The degree of your curves can affect data transfer to CAD packages. Some other packages cannot accept curves with degree higher than 3.

Surfaces can have different degrees across their width and length.

**depth**

A value that can be contained in each pixel of an image that represents the distance of each object from the camera that rendered the image. Depth values are used to composite rendered images together so distant objects appear behind objects that are closer to the camera.

**DES**

Design Exchange Specification (DES) format describes degree 1 curves Polylines. DES format require less disk space than IGES and has the same data as the IGES format.

**descriptive isoparametric curve**

An isoparametric curve drawn for purposes of visualizing a surface, but not representing actual surface data. You can change the number of descriptive isoparametric curves drawn within each patch using the Patch precision tool. Compare **edit point isoparametric curve**.

**displacement map**

A texture or image used to simulate a bumpy surface. The silhouette of a displacement mapped surface also appears bumpy.

**Degree of Freedom (D.O.F.)**

The D.O.F. stands for degrees of freedom viewed from the point of IK control. D.O.F. controls the rotation and translation parameters displayed when you click the joint expansion button for a joint node.

**dolly**

Move the camera forward (dolly in) or backward (dolly out).

**drag**

With the cursor on an object click the left mouse button and hold it down, move the mouse to another location, and release the mouse button.

**DXF™ (Drawing Exchange Format)**

A file format developed by Autodesk, Inc. for the exchange of geometric and drawing information between microCAD systems.

The Drawing Exchange Format (DXF) from AutoDesk is a verbose ASCII geometry format capable of representing lines, simply defined surfaces, and polygons (3D faces).

**EAI**

A file-based translator developed by Alias Systems for Engineering Animation Inc.. It is used to convert AutoStudio native format wire files to EAI's native formatted DirectModel files in Jupiter or .jtc file format.

**edit point**

The point on a curve where consecutive curve segments (**spans**) are joined. A side-effect of the mathematical basis of **NURBS** curves. Although you can pick and move edit points, this is not generally considered good practice. Use the Object editor tool instead.

**edit point isoparametric curve**

An isoparametric curve defined by data. That is, more isoparametric curves of this type represent a more complex surface. Compare **descriptive isoparametric curve**.

**end effector**

The bottom-most joint in the hierarchy controlled by the handle (for example, a wrist joint).

**environment**

1. A texture that is rendered behind all objects in a scene.
2. A texture that is applied to a surface to simulate reflections of an environment.

**EPS (Encapsulated PostScript)**

A standard PostScript format.

**EvalViewer**

An Alias Systems software application used for cloud data manipulation and surface evaluation.

**exploded view animation**

Animation technique used to display the assembly of components of a product or model. The technique is basically setting keyframes to each component of the model in a sequential order of assembly.

**expression**

Expressions enable you to establish dynamic links between animatable parameters, so that a change in one parameter (as in the rotation of a joint) can update another parameter (as in the deformation of a surface) automatically.

**filter**

An algorithm for converting data, for example from IGES to wire file format. Also, in non-technical uses, anything that chooses some items while rejecting others.

**geometric data**

Surfaces contain the geometric data of a solid model. The geometric data describes the basic shape of an object and is represented using NURBS (Non-Uniform Rational B-Splines).

**global parameters**

Global parameters control different animation parameters for all objects. This includes DAG nodes, curve CVs, surface CVs, cameras, lights, and shaders.

**Granite format**

The Granite format is supported as an Alias DirectConnect product for StudioTools. This translator allows you open, save as, export and import Granite files. Granite One is a CAD technology platform for the design collaboration of solid models. This format is available on Windows NT only.

**group**

A collection of objects treated as a single object. When an object is part of a group, it retains its own transformations (position, rotation and scale) and is also affected by transformations applied to the group.

**hidden line**

A **shading** and **rendering** technique that resembles wireframe, but removes lines that are hidden behind surfaces for a more realistic look.

**HLS**

A method of representing a color by its hue, lightness, and saturation.

**HSV**

A method of representing a color by its hue, saturation, and value.

**hue**

One component of color. Hue describes the tone of the color (red, yellow, blue, etc.).

**hull**

A line joining adjacent CVs, or a complete series of lines joining all CVs on a curve, or an entire row or column of CVs on a surface.

**hybrid models**

A combination of Manifold Shells, Wireframe, Surface and BREP models.

**IFF**

Image File Format. A 2D image format used by Maya.

**IGES™**

Initial Graphics Exchange Specification. A file format for transferring graphics data between CAD/CAM systems.

**Illustrator format**

A file filter based an Adobe Illustrator file.

**image plane**

An object that allows you to load an image file into a view. This image appears in the view and in images rendered from the view's camera (either in front of or behind 3D objects). There are two types of image planes: animation image planes and canvas planes.

**inflection**

A curve on a surface that lies between saddle-shaped regions and the rest of the surface. Saddle shaped regions, or *ogees*, occur near a pucker in a surface, and these regions often represent flaws in the shape of the surface.

**Inventor format**

Inventor is an object-oriented C++ based language that describes complete 3D-scenes which can be made interactive and that are optimized for OpenGL. It is an ASCII file format. This format is available on IRIX only.

**inverse kinematics animation**

Inverse Kinematics animation provides goal-directed posing in your skeleton animation. For example, you can pose a joint chain at the lowest joint in the hierarchy and all the joints above it will rotate automatically.

**isoparametric curve**

1. A line of constant U or V value on a surface. 2. A line of constant U or V value at an edit point.

**JAMA-IS format**

Japanese Automotive Manufacturers Association Iges Subset, JAMA-IS is a file format subset to IGES. JAMA-IS has the same .igs extension and has exactly the same file structure as the IGES format, it only supports less entities.

**joints**

A DAG node that is acting as a joint at the end of a bone. Also known as joint nodes.

**keyframe**

A keyframe represents an object's position at a certain time.

**keypoint curve**

A type of curve that retains mathematical definitions and constraints (for example, radius, sweep angle and center point). Similar to 2D drafting tools in CAD packages. Examples include lines, arcs, circles, and rectangles.

**knot**

Another name for an **edit point**.

**Lambert**

A method of shading surfaces often used to simulate dull materials such as chalk or flat paint.

**lasso**

A shape drawn from the point where you press the mouse button to the point where you release it. The objects or points inside the shape are picked or unpicked depending on the mouse button you pressed.

You can set an option in the Interface Options window to use **pick boxes** instead of lassos.

**lattice**

In dynamic shape modeling tools, geometries used to articulate the desired changes to the targets. In the Transformer Rig toolbox, these are Modifiers; in the Lattice Rig, they are called Lattices.

**layer**

An association or a collection of objects completely independent of any group hierarchy in your model. Each stage has a different set of layers.

**leaf**

Among DAG nodes, leaf nodes have no nodes below them. For more information, see **DAG**.

**light**

An object that can illuminate surfaces, simulate optical effects (such as glows or halos) or illuminated fog, or emit particles.

**lightness**

A component in the HLS and HSV color systems that represents how light or dark a color is.

**Lightsource**

A special shading model that has *no shading*. Can be used to represent, for example, the surface of a switched-on lightbulb. Objects shaded with this model do not actually cast light into the scene.

**linear**

1. Changing at a fixed rate. 2. **degree 1**.

**local parameters**

Local animation parameters control active objects only.

**locator**

Objects in the scene showing location, distance, curvature, and other measurement information. These objects are not geometry, but exist in the scene just like other objects.

Locators are not “one-time” measurements. They persist until you delete them. Locators that are attached to geometry update their measurement when the geometry is modified.

**log files**

Log files are produced during import and export of data, as well as during Rendering. A translation log file contains entity mappings, entity counts, and Information, Error, and Warning messages

**luminance**

The amount of brightness, or white, in a color.

**manifold shells**

A collection of stitched surfaces that do not describe a volume is saved out as a G3 Manifold Shell.

**map**

Assign a texture or image file to a parameter.

**mask**

A mask overlay is used to partially or completely prevent painting over an area of the image. The mask can be edited, like the image. A mask can be used to selectively restrict file input operations.

**matte**

A matte is like a mask, but it defines the areas of an image to which file input operations are to occur. The file format for matte files describes the matte area by scanline. It is valid under IRIX and Windows.

**mesh**

A large polygonal object resulting from scanning and digitizing physical objects to create data models. Meshes can contain several million triangles and, because of their internal representation, are a more efficient way than polysets to store large and detailed data models representing real objects.

**modifier**

In dynamic shape modeling tools, geometries used to articulate the desired changes to the targets. In the Transformer Rig toolbox, these are Modifiers; in the Lattice Rig, they are called Lattices.

**motion path action**

A reference to a 3D NURBS curve. It is evaluated in the following way: the channel gives a percentage value to the motion path action. The motion path action uses this percentage to determine the 3D point that corresponds to that percentage along the curve. This 3D coordinate (X, Y, Z) is returned to the channel. The channel then extracts one of these components (X, Y, or Z), and uses this value as the value for the channel.

**multi-knot**

Multiple edit points on a curve or surface occupying the same point in space to create a sharp corner. Generally not allowed in many CAD/CAM packages and some modeling tools. Use multiple curves or surfaces instead. See also [CV multiplicity](#).

**multiplicity**

See [CV multiplicity](#).

**non-rational**

Curves or surfaces that do not have a weight associated with control vertices, or where the weight for each CV is 1. This geometry is simpler than rational geometry and is faster to display and render, but is not sophisticated enough to represent spheres, cones, and other conic objects without some small variation in shape from the true object. NURBS are non-rational.

**normal**

An imaginary line perpendicular to a given point on a surface. The direction of U and V isoparms on a surface determines the direction of the surface's normals. You can reverse the direction of a surface's normals with the Reverse tool.

**NURBS**

*Non-Uniform Rational B-Splines.*

*Non-Uniform* refers to the *parameterization* of the curve. Non-Uniform curves allow, among other things, the presence of multi-knots, which are needed to represent Bezier curves.

*Rational* refers to the underlying mathematical representation. This property allows NURBS to represent exact conics (such as parabolic curves, circles, and ellipses) in addition to free-form curves.

*B-splines* are piecewise polynomial curves that have a parametric representation.

## **OBJ**

The OBJ file format is a ASCII form. It supports a variety of geometry ranging from polygons to high degree NURBS surfaces.

## **object**

Primitives, text, lights, patches, or other items, especially when at the top level of the Scene Block Diagram. See also [component](#).

## **object lister**

Window in StudioTools that shows the objects and components of a scene and their relationships.

## **one-to-many relationships**

The ability for a channel to use many actions is called a one-to-many relationship, because one channel uses many actions to determine what values its animation parameter should assume.

## **opacity**

A value (from 0 to 1) that represents how see-through something is (for example, paint, a shader). An object with an opacity of 0 is entirely clear and invisible; an object with an opacity of 1 is entirely opaque. Opacity is the opposite of transparency.

## **orthographic**

A type of camera or view which does not represent the effect of perspective (an object appears the same size no matter how near or far it is from the camera).

**paint layer**

Each canvas plane contains one or more paint layers. A paint layer is like a piece of transparent acetate that you can sketch or paint on. By sketching different elements on different paint layers you can easily make changes to individual elements or re-arrange paint layers to change their order.

**palette**

1. A window containing the StudioTools tools. 2. A grid containing color swatches that you can choose from.

**parameter**

1. A number defining an exact point along a curve, or on a surface. Which numbers correspond to which points on the curve or surface is a function of the **parameterization** of the curve or surface. 2. A property of an object or shader that can change over time and/or space.

**parameterization**

How StudioTools numbers the points along a curve or across a surface. Studio has two parameterization methods: **uniform** and **chord-length**.

**particle**

A small object emitted by a surface or light, whose motion is calculated by StudioTools during a dynamic simulation, and that is used to simulate effects such as smoke, fire, water, or hair.

**patch**

The rectangular portion of a surface bounded by adjacent **edit point isoparametric curves**.

**periodic**

Curves and surfaces whose ends or edges are connected, creating a closed object. Surfaces can be periodic (closed) in the U, V, or both directions. Periodic objects cannot be *opened* by moving their vertices.

**path**

1. The trail along which an object is animated. 2. The location of a file on a file system.

**perspective**

A type of camera or view which represents the effect of perspective (when an object is near the camera it appears larger than when it is far from the camera).

**Phong**

A method of shading surfaces often used to simulate shiny materials such as glass or glossy plastic.

**pick**

To choose a component or object with the mouse, making it active. To select.

**pick box**

A rectangle dragged from the point where you press the mouse button to the point where you release it. The objects or points inside the rectangle are picked or unpicked depending on the mouse button you pressed.

You can set an option in the Interface Options window to use **lassos** instead of pick boxes.

**pick chooser**

A menu that appears when you click a point occupied by more than one object. The menu allows you to pick the exact object you wanted.

**pick mask**

Controls which kinds of components can be picked by the Pick component tool.

**pick walk**

Using Shift + Ctrl and the arrow keys to pick objects next to the currently picked object in the **DAG**.

**pivot point**

The point around which an object rotates and scales, and which represents the point location of the object when it moves. Represented in view windows by a small green dot.

**pix**

A 2D image format used by StudioTools.

**playback**

StudioTools function that lets you review previously created animation sequences.

**point cloud**

A cloud of data points (for example, generated from a 3D scanner).

**polygon**

A portion of some plane in space bounded by straight lines. Triangles, rectangles, and pentagons are all polygons. A polygonal surface comprises multiple polygons that share bounding straight lines. The shared lines are called “edges” and the polygons themselves are called “faces”. For example, a cube is a polygonal surface with six faces and twelve edges.

**polyset**

A set of polygons, usually triangles, making up a polygonal surface.

**PortfolioWall**

An Alias Systems software application used for viewing, presenting, and annotating digital assets.

**positional continuity**

The endpoints of two curves meet exactly at the common endpoint. Note that two curves that meet at any angle can still have positional continuity.

Also called G0 continuity.

**primitive**

One of the basic geometric building blocks of object modeling (sphere, cube, cone, etc.) built into the StudioTools system.

**procedural texture**

A texture generated from an algorithm based on various settings, as opposed to from an image file.

**project**

*n.* a collection of folders that contains all the files (such as **wire files** and **textures**) used in a certain piece of work.

*v.* to map the points of one object along a vector onto another object, similar to casting a shadow. For example, to project the outline of one surface as curves-on-surface on another surface.

### **quadratic**

degree 2.

### **quadrilateral**

A 4-sided polygon. In StudioTools, a quadrilateral is made up of four normals, vertices, and parametric coordinates. See also [polygon](#).

### **rational**

Curves or surfaces whose control vertices have different weight values (greater than or less than 1). CVs with lesser weight influence the surface or curve less. The weight must be above zero. This geometry is more sophisticated than non-rational geometry, but it may create multi-knots and is slower to display and render. Compare with [parameter](#).

Rational geometry contains CVs that do not have a uniform weight. Rational geometry is a ratio of sums of polynomials. Rational geometry is considerably more complex mathematically.

### **raycast**

Fast rendering technique which produces smooth shaded renderings that include shadows. Does not produce reflections or refraction (although you can simulate these using clever shaders). Compare [raytrace](#).

### **raytrace**

High quality rendering technique which produces smooth shaded renderings that include optical effects such as reflections and refraction. The most realistic rendering possible in StudioTools. Compare [raycast](#).

### **reference**

A surface in StudioTools that is not modified but considered for both position and continuity constraints when you are modifying another surface with ClayMate.

**render**

The process of creating a 2D image from a 3D scene.

**rendering**

Rendering is the process of generating a two-dimensional image of a three-dimensional scene, somewhat like taking a photograph with a camera, or filming with a motion picture camera.

**rendering environment**

The environment defines the appearance of your scene's surroundings. It can be a simple colored background or a complex three-dimensional texture. The environment also defines global lighting, shader glow, and dynamic properties (for example, gravity and turbulence) for your scene.

**resolution**

The density of pixels in a given image (for example, 300 dots per inch). For instances where a fixed density is assumed (for example, 96 dpi on a PC monitor), resolution can refer to the number of pixels along the horizontal and vertical dimensions of an image (for example, 640 by 480).

**rest pose**

A rest pose is a set of values for each joint that provide an initial value for the IK solution. Each skeleton joint "remembers" a rest value for its translation and rotation, X, Y, and Z values. The rest pose can be copied and mirrored onto a similar skeleton.

**RGB**

A method of representing a color by its red, green, and blue components.

**Rigid targets**

Rigid targets are used in the Transformer Rig Global Shape Modeling tool. In some cases, there are geometries or objects within the target geometry that should keep their shape. Usually these are carry-over parts like buttons, door handles and lights. These rigid targets, or hard points, will be moved embedded in the free targets, but they cannot lose their shape during the warp. Rigid targets help preserve shapes of the rigid targets, but they

move with the surface. Imagine grommets moving on a rubber tarp that is stretched to cover a load: the grommets remain the same shape and size on the flexible surface of the tarp.

**root**

In UNIX systems, the base of the system. The system administrator account or the level of file storage that is not in any directory.

**saturation**

The amount of white mixed in a color (for example, red is *more* saturated than pink).

**SBD**

A diagram depicting the **DAG**. The SBD window displays the hierarchical structure of the objects and data in a scene. You can pick objects in the SBD window, and track and dolly its view of the graph.

**scene**

A collection of objects, either in wireframe form or rendered Scene Description Language (SDL). Used to control all coloring and lighting attributes of all rendered scenes and animations. SDL files are generated by the renderer and can be hand-edited for greater control of the final rendered images. pixels per inch.

**scene block diagram**

See **SBD**.

**scene description language (SDL)**

A format for ASCII text files to specify all the information necessary to render a scene, including models, shaders, lights, and animation. SDL files are generated automatically by the StudioTools program.

**SDL**

See **scene description language (SDL)**.

**section data**

Type of degree 1 NURBS used for cross-sections on meshes to aid the workflow of Reverse Engineering. They are also produced in Spider.

**set**

A selection of objects that are grouped together, but do not have a hierarchy. Sets can be exclusive sets, meaning that their members can not belong to any other sets, or multi-sets, whose members can belong to other sets.

**shader**

A description of a look or material you can apply to a surface. Defines base color, **shading model**, and other intrinsic properties, which can then be modified over the surface by various **textures**.

You can store shaders in libraries independent of any **wire files** that might use them.

**shading**

Real-time display of surfaces along with the **wireframe**. You can shade surfaces with colors or diagnostic displays as you work on them.

**shading model**

In rendering, a mathematical representation of how light bounces when it hits a surface. Different models simulate different types of materials better. The available models are **Lambert**, **Phong**, **Blinn**, and **Lightsource**.

**shape**

A combination of curves or surfaces with fill and/or outline properties used to create precise sketches.

**shell**

Collections of adjacent NURBS surfaces. Every surface stitched into a shell must meet the edge of another surface in the shell at some point. Sometimes used in **data transfer** procedures.

Shells are stored as a single node in the **DAG**.

**sketch**

A two-dimensional image created in a view with brushes and/or shapes.

**sky texture**

The **Sky** texture simulates a planetary environment viewed from the surface of a planet.

Environment textures map to *directions*.

Surface textures and solid textures map to *positions*

### **snap**

The ability to place a point or object in exactly the same location as another point or object, to guarantee continuity. You can snap to CVs and edit points (by holding down the Ctrl key—also called *magnet snap*), grid lines (by holding down the Alt key—also called *grid snap*), or curves (by holding down both the Ctrl and Alt keys).

### **span**

The section of a curve between consecutive edit points. Compare **patch**.

### **sphere texture**

The **Sphere** texture simulates an environment by mapping a texture or image file directly onto the inner surface of an infinite sphere. The best way to create a sphere environment is to use a ramp texture and paint objects onto it, being sure to avoid the poles and edges.

### **Spider**

An Alias Systems application used for manipulating scan data.

### **spline**

A curved line, made up of polynomial segments and defined by control vertices (CVs). Includes polylines, cardinal splines, B-splines, and non-uniform rational B-splines (NURBS).

### **stage**

Objects, lights, and environment saved together as a wire file for retrieval into a scene.

### **STEP**

Standard for the Exchange of Product Data (STEP) is a ISO standard industrial automation systems product data representation and exchange format. The file structure for a STEP file is a modular.

**stitch**

The process by which NURBS surfaces are converted to shells using the Shell stitch tool. Some **data transfer** procedures require the model to be converted to shells, or benefit from it. Stitching is also useful for exposing gaps between surfaces.

**StudioPaint**

An Alias Systems software application used for creating 2D sketches and painting 3D models. You can now use the sketching functionality built in to StudioTools.

**StudioTools**

A family of Alias Systems software applications used for sketching, modeling, animation, and rendering. Includes Studio, DesignStudio, SurfaceStudio, and AutoStudio.

**subdivide**

The division of a surface into tessellated polygons.

*Adaptive subdivision* is based on the curvature of the surface and divides it into the minimum number of polygons to produce that curve.

*Uniform subdivision* divides each patch of the surface into a fixed number of polygons, which are specified in the U and V directions. The rectangular polygons of initial subdivision are divided into triangles to create the tessellation.

*Approximate total subdivision* divides the surface into a number of polygons close to the specified total.

**surface**

A 2D parametric shape that defines the boundary or skin of an object in three dimensions. The shape may be flat or warped. Examples of surfaces are patches and faces.

**surface quilt**

A complete surface quilt has all internal edges displayed in pink (quilted) and a closed outer boundary displayed in yellow (unquilted). A surface quilt can be converted to a thin solid. A thin solid is defined as a surface or surface quilt that is offset to form a closed volume solid.

**surface texture**

Surface textures are two-dimensional textures that simulate various types of surface materials by using either an image file (**File** and **Stencil** textures) or a computer graphic procedure (**Bulge, Checker, Cloth, Curvature, Fractal, Grid, Highlight, Mountain, Noise, Ramp, and Water** textures).

**tangent**

The slope of a curve or a surface at a given point. See also [continuity](#).

**tangent continuity**

Same as positional continuity, plus the end tangents match at the common endpoint. The two curves will appear to be travelling in the same direction at the join, but they may still have very different apparent “speeds” ([curvature](#)).

Also called G1 continuity.

**target**

In dynamic shape modeling tools, the geometry that can be globally modified is called a target. It can be surfaces and/or meshes

**template**

An object can be made into a template for use as a background drawing or modeling reference (the way a grid is used). The template remains visible, but cannot be picked as an object (it is protected). A template can also be turned back into an object.

**tessellate**

Convert to polygons.

**texture**

An image or algorithm that supplies a 2D map of values that can be applied to various shader properties across a surface.

Shaders have properties that can be measured at each point on a surface: color, shininess, displacement, and so on. In a new shader these values are uniform. To create more interesting materials, you can map a texture onto the

properties of the shader. There are many different types of textures available, such as color ramps, checkerboard patterns, and fractal noise.

For example, you could map a blue-to-green ramp to a shader's *color* parameter, and a checkerboard pattern to a shader's *reflectivity* parameter, to create a material with a smooth transition from blue to green across the surface, and that alternates between reflective and dull in a checkerboard pattern.

### **texture mapping**

Texture mapping is the process of assigning a texture to a parameter. You can map a texture to any environment, shader, texture, or light parameter that has a **Map** button.

### **time slider**

Use the time slider (Animation > Tgl time slider) to play back animation and view specific frames within an animation. You can also use it to change the frame range of animation playback, the frame rate, and to go to the next and previous frame or keyframe.

### **toggle**

A mode or a button that turns on or off. Each selection of the mode or button causes the action to be switched.

### **tolerance**

The allowable variation in any measurable property, such as fitting, continuity, and curve-on-surface/trim used in Studio.

### **tool**

A menu of tools in StudioTools grouped by function and represented by icons.

### **topology**

1. The totality of a surface's shape, number of spans, and degree. 2. The relationships between surfaces in a solid model: loops, edges, and vertices.

**transform**

To move (translate), rotate, or scale an object. Transformations are relative to an object or group's **pivot point**.

**transparency**

The amount of light that travels through a surface. Complete transparency allows all light through; no transparency makes the surface completely opaque.

**trim**

To make a portion of a NURBS surface defined by a curve-on-surface invisible using the Trim tool.

**trim curve**

A curve-on-surface, especially one that has been used to trim a surface.

**turntable animation**

An object or group of objects animated 360 degrees around a pivot point, as though revolving them on a turntable.

**uniform**

A type of parameterization. Assigns integral parameter values to the edit points, and evenly distributes parameters along the spans between edit points. The first edit point is always parameter 0.0, the second edit point is always 1.0, the third is always 2.0, and so on. Contrast **chord-length**.

**Unigraphics**

Unigraphics is a solid modeling package based on the Parasolid kernel. The file structure is binary.

Unigraphics DirectConnect is a stand-alone utility that allows the exchange of 3D model data between StudioTools and Unigraphics.

**UV**

A grid system for identifying points on a surface. The U represents a grid line in one direction and the V represents a grid line in the perpendicular direction.

In the Texture Placement window, the surface's U and V are mapped to the window's S and T dimensions.

See also [parameterization](#).

**value**

The lightness or darkness of a color: one component of the HSV (Hue, Saturation, Value) color model.

**VDAFS format**

Verband des Automobilindustrie is based on the IGES standard.

**VDAIS format**

Verband des Automobilindustrie - IGES Subset (VDAIS) is a well defined collection of IGES entities carefully selected for optimized exchange of geometry between manufacturers and subcontractors in the car industry.

**vertex**

A point in a network of lines that terminates or serves as a connection for another line (the plural of vertex is vertices).

**voxel**

Volume element: a space at the intersection of a 3D grid. EvalViewer can convert point clouds to voxels.

**VRML format**

VRML (Virtual Reality Modeling Language) was developed with the intention of providing people with a standard tool that they could use to view and interact with 3D models on the Web. The file structure of the VRML files is based on the Inventor format where there are hierarchical arrangements of nodes. This format is available on IRIX only.

**weight**

A value assigned to a CV defining how much it "pulls" the curve. [rational](#) geometry works by assigning different weights to CVs. Note that many CAD/CAM packages cannot work with rational geometry.

**wire file**

The proprietary compressed scene file format used by Alias Systems StudioTools products.

**wireframe**

The display mode showing only curves and the isoparametric curves/edges of surfaces (that is, not **shading** surfaces).

**world space**

A coordinate system used in computer graphics that is used to represent an object in terms you define. For example, a car might be defined in terms of millimeters. Also known as “modeling coordinates.”

**zoom**

To increase the length of a camera lens, magnifying an aspect of a scene. Note that the results of zoom and dolly are quite different. Dolly physically moves the camera closer to the point of interest without changing the length of the lens; perspective distortions peculiar to the lens length may result at the edges of the scene. Zoom increases the size of the point of interest by increasing the lens length; depth is not as well perceived as with a shorter lens.