

SURFCAM Advanced 3-Axis Training

Objective

To provide a comprehensive understanding of the SURFCAM NURBS Surface modeler by various means using points, lines, arcs, splines and existing surfaces. To facilitate the use of SURFCAM to create and manipulate toolpaths and G-code output to produce quality parts accurately and efficiently using 3-axis single and multiple-surface milling techniques for 3-Axis Mills with or without rotary indexing tables.

Prerequisites

The prospective trainee should (a) have a good understanding of machining practices and shop floor terminology, (b) have been using SURFCAM for two weeks or longer, (c) have attended a Basic SURFCAM class, and (d) be reasonably proficient with creating, editing, and transforming 2D wireframe geometry. The Basic SURFCAM class requirement may be waived on an individual basis if the person has been using SURFCAM and is confident in his/her ability.

Scope and Disclaimer

While we endeavor to accomplish as much of this agenda as possible, classes do vary in scope and subject matter depending to a large degree on the make-up of the trainees in a particular session. Additional subjects may be covered and subjects deleted as the software is updated and changed. Any attendee is welcome to bring an actual file to class that may be of particular interest and an instructor may work one-on-one with that person if time and scheduling permits.

Class Duration & Classroom Hours

This class is intended to be taught in three 8-hour days. Classroom hours are from 8:30 AM to 12:00 noon, and from 1:00pm to 5:30pm, allowing one hour for lunch break.

SURFCAM Surface Creation

Surface Terminology

Explanation of NURBS surfaces, terminology, axes, symbols, requirements, origins, directions. Basic surface modeling demonstration.

Surface Creation

Discussion of construction view creation and the geometry used in the generation of various types of surfaces. Create surfaces using cross-section, drive curve, extrusion, primitive, extruded, trim-plane and revolution. Create constant radius simple or rolling ball fillets, or variable radius fillet surfaces between existing surfaces. Create blended surfaces tangent to two, three, or four adjacent surfaces. Detailed discussion of the Create Surfaces Options menu, how each option is used, and guidelines for creating quality surface models. Importing point data to create Splines or surfaces from 3D digitizers or laser scanners.

Advanced Spline Creation Techniques

Creation of Splines as Helixes, Ellipses, Projections of 2D geometry onto a surface, surface flow curves, surface edges, or cross sections. Creation or parting lines for injection mold and electrode machining. Creation of 2D splines wrapped around a cylinder for rotary CAM applications. Edit Spline control points, curvature, and tangency to adjacent elements. Associativity requirements for surface trimming.

Surface Editing

Manipulate surfaces to force tangency with neighboring surfaces, or join adjacent surfaces. Extend or trim surface edges using linear, bi-cubic, or combined extension control types. Edit surface corner, side, direction, arrow etc. to facilitate fillet surface creation and 3-Axis single-surface milling. Edit surface display curves to show native surface mathematics or a fixed number of rendering curves. Edit and break surfaces at node points or at wireframe elements. Trim surfaces via wireframe elements or where they intersect or become tangent to other surfaces.

SURFCAM Surface Machining

Surface Machining Terms

An in-depth explanation of the terminology used within SURFCAM that will be encountered in the creation of toolpaths. Tool descriptions, tool libraries, surface finish requirements, feeds and speeds, entry/exit controls, lead in/out moves, functional planes, construction vs. machining views etc.

Surface Machining of Single Surfaces

Learn the various methods that may be employed when machining a single surface (cut, patch or Spline containment, flow control, surface side, gouge protection with adjacent surfaces, etc.). Contour of 3D Splines or groups of Line, Arc, and Spline elements.

Machining of Multiple Surfaces

Use various examples to provide the knowledge required to machine unlimited numbers of surfaces in a single tool path. Planar, Z-rough, Z-finish, Steep-Shallow Controls, Planar with Flow Surface, 3D Rest, 3D FlatSurface, 3D ConstantOffset, Engraving, Auto-rough. Define construction geometry required for defining material shapes for Z-Rough and/or multi-surface planar with flow control. Discuss the advantage of using check surfaces, containment boundaries, fixed increment vs. scallop height step-over methods, etc. Demonstration of the Step Reduction Milling capabilities as applicable.

Construction View Machining

Defining the rotary pivot line for Vertical or Horizontal Machining Center programming. Model to machine coordinate system requirements. CView definitions for various rotary index positions. Clearance plane height setting vs. postprocessor Index sequence contents. NC Operations Manager toolpath transformation features that support index/copying of 2- and 3-Axis toolpaths for rotary indexing tables.

Advanced NC Verification

Use of the external NC Verify software, including multiple views, custom tool shapes, deep zoom, part-fixture-material component setup, standard animation vs. solid verification vs. turbo mode display types. Part feature inspection, cut-away section views, comparison of as-machined part to original surface model.