AUTODESK

Autodesk Certified Professional in CAM for 3 Axis Milling

Exam objectives

Target audience

The Autodesk Certified Professional (ACP) certification is designed for candidates who have advanced skills and can solve complex challenges in workflow and design. This type of experience typically comes from having worked with the software on a regular basis for at least two years, or equivalent to approximately 400 hours (minimum) to 1,200 hours (recommended) of Autodesk software experience. Certification at this level demonstrates a comprehensive skill set that provides an opportunity for individuals to stand out in a competitive job market.

Candidates who obtain this certification will have demonstrated advanced skills in computer-aided manufacturing (CAM) for 3-axis milling using Fusion 360. The certification exam will also validate a candidate's abilities in job preparation, process planning, 3-axis milling, operational options such as workflow and efficiency options, documentation and output, and inspection. These skills are in demand across a wide range of engineering and design industries, including aeronautical, aerospace, defense, automotive, mechanical, industrial design, manufacturing, medical, and energy.

Prerequisite skills

It's expected that candidates will already know how to:

- Navigate the user interface.
- Identify areas of the browser.
- Transition through various environments.
- Know the available file types for import of manufacturer parts and workholding.
- Display a part or assembly.
- Create fully constrained sketches.
- Common design features.
- Identify various planes and axes.
- Identify and create workholding devices for computer numerical control (CNC) milling.

- Create a distributed design.
- Fully constrain assembly parts.
- Create a CAM setup for CNC Milling.
- Use Probing to locate a work coordinate system (WCS).
- Create and manage a tool library.
- Calculate toolpath parameters including federate and spindle speed.
- Use CAM Expressions.
- Create 3-axis toolpaths for roughing and finishing.
- Optimize toolpath parameters.
- Create toolpath templates and patterns.
- Modify toolpath states such as suppress or protect.
- Simulate toolpaths.
- Create numerical control (NC) programs.
- Create a setup sheet.
- Modify post processor options.
- Export NC code for a single setup.

Exam objectives

Here are some topics and software features that may be covered in the exam.

1. **Plan and setup work**

  1.1. **Analyze supplied drawing and/or model and select appropriate manufacturing process**

    1.1.a. Use Fusion 360 inspection tools, including Measure, Minimum Radius Analysis, and Accessibility Analysis

    1.1.b. Select tools based on geometric and/or surface finish specifications

    1.1.c. Analyze a print and determine setups and order of operations

  1.2. **Apply procedural concepts to perform stock selection based on print, model, and job requirements**

    1.2.a. Review models and prints to determine stock shape and size

  1.3. **Determine how to design fixturing method, ensure collision avoidance, and evaluate cutting forces.**

    1.3.a. Determine stock position in workholding

    1.3.b. Determine workholding, including soft jaws, vise, and fixture

    1.3.c. Determine how cutting forces affect fixturing

1.4. Apply procedural concepts to perform CAM setup within Fusion 360

1.4.a. Define stock in a CAM setup

1.4.b. Define model and fixture in a CAM setup

1.4.c. Define WCS offset in a CAM setup

1.4.d. Define a machine configuration in Fusion 360

2. Machine setup

2.1. Apply procedural concepts to plan tools needed for each operation

2.1.a. Identify the appropriate tool for specific toolpaths

2.1.b. Identify the appropriate size tool for specific geometry

2.2. Apply procedural concepts to plan tool holders required for each tool

2.2.a. Define tool holder parameters

2.2.b. Select appropriate tool holders based on application

2.3. Describe how to assemble physical and digital tooling required for all operations

2.3.a. Define tool parameters in a tool library

3. Program toolpaths

3.1. Determine toolpath inputs

3.1.a. Define toolpath inputs to contain a toolpath to selected areas or surfaces

3.1.b. Define toolpath inputs to contain a toolpath to select slopes

3.1.c. Define toolpath model overrides

3.1.d. Define toolpath heights

3.2. Determine how to optimize toolpath

3.2.a. Define CAM expressions to drive toolpath functionality

3.2.b. Use Derive, Duplicate, and Templates for toolpaths

3.2.c. Identify toolpath parameters and strategies

3.2.d. Optimize 3D toolpath inputs for stepover, stepdown, load, and containment

3.3. Apply toolpaths

3.3.a. Understand and apply toolpath inputs to control tool contact

3.3.b. Understand and apply toolpath strategies based on geometry

3.3.c. Understand and apply toolpath adjustments based on geometric requirements

4. Verify and simulate

4.1. Validate stock removal strategies and verify removal of material as intended

4.1.a. Use stock comparison simulation and stock tolerance

4.1.b. Verify toolpath cutting, linking, and rapid motions with simulation

4.2. Evaluate lessons learned from verifications to toolpaths

4.2.a. Determine toolpath adjustments from simulation results

4.3. Apply procedural concepts to review collisions for toolpath adjustments

4.3.a. Review and verify toolpath collisions with simulation

5. Output code and create setup sheets

5.1. Apply procedural concepts to select program settings, post configurations, and properties

5.1.a. Create and configure an NC program

5.1.b. Evaluate errors and warnings from NC files

5.2. Identify critical components of a setup sheet

5.2.a. Review setup sheets for critical information

6. Part inspection

6.1. Use probing to set the WCS location

6.1.a. Create a probe operation to set a WCS

6.2. Use precision inspection tools to validate first article

6.2.a. Use inspection tools to validate a part, including calipers, micrometers, Bluetooth calipers, and manual inspection

6.3. Evaluate program prove out