LEVEL UP 2026 - 2027

NYS SkillsUSA



CNC PROGRAMMING 3 AXIS MILLING



PURPOSE

The purpose of this competition is to evaluate each competitor's skills / knowledge to independently plan and program jobs and to provide instructions for an Operator running a 3-Axis CNC Mill.

QUESTIONS AND CONCERNS / STUDY MATERIAL

For any questions regarding the competition as well as training material please tell your SkillsUSA Advisor to contact the Contest Cluster chair for any help in acquiring CAD/CAM software or study material.
All contest Updates will be sent out to SkillsUSA Advisors with Competitors Enrolled into the Competition.

DOCUMENT GUIDE:

This Document has been divided into multiple sections. Provided below are summaries of each section.

Sec. 1: **SKILLSUSA STANDARDS IN RESPONSIBILITY AND INTEGRITY**

Covers General Rules and Requirements that apply to most if not all competitions. Most of these are also covered in the SkillsUSA Leadership Handbook.

Sec. 2 **COMPETITION STANDARDS**

Covers Competition focuses on rules and requirements including the equipment each party is required to bring.

Sec. 3 **COMPETITION OVERVIEW**

Covers what Competitors may see on the competition date.

ELIGIBILITY

Competition is open to active NYS SkillsUSA members enrolled in programs pertaining to precision machining, automated manufacturing, or CNC as the occupational objective.

CLOTHING REQUIREMENTS

NYS SkillsUSA Business Professional

- White polo shirt (plain or with NYS SkillsUSA or SkillsUSA NY monogram) or white dress shirt with plain black tie with no pattern or a SkillsUSA black tie, or business like white collarless shirt or white shirt with small plain collar.
- Black dress slacks or black dress skirt (knee-length).
  Black leather shoes that are not backless or open toe
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Note: Contestants must wear their contest clothing to the contest orientation meeting. Also bring #2 pencil, resume, and safety assurance form.

RESUME REQUIREMENT

Competitors must provide a one-page resume to bring to orientation. Failure to submit a resume will result in a 10-point penalty.

PROHIBITED DEVICES

Cell phones or other electronic devices not approved by the contest chair are NOT allowed in the competition area. Please follow the guidelines in each technical standard for approved exceptions. Technical committee members may also approve exceptions onsite during the SkillsUSA Championships if deemed appropriate. Penalties for Prohibited Devices If a competitor's electronic device makes noise or if the competitor is seen using it at any time. During the competition, an official report will be documented for review by the Contest Chair. If confirmed that the competitor used the device in a manner which compromised the integrity of the competition, the competitor's scores may be canceled.

Cell Phones shall be collected with Do Not Disturb mode on at the beginning of the competition

RULE VIOLATIONS:

If a contestant violates the rules the following course of action will be taken.

1st Violation:

The Contestant will be issued a written warning.

2nd Violation:

The Contestant will have 50 points deducted.

COMPETITION RULES

1. Contestants are not to have personal conversations with the judges.
2. Contestants shall only be known by their contestant number.
3. No names or school names shared with judges. Anything that denotes Identity beyond contestant number shall be covered before entering the competition area.
4. Any personal equipment brought into the competition area once receiving your contestant number shall be marked with said number.
5. The Contestant cannot confer with other contestants, visitors, or watchers but contestants may ask questions of the judges. It is highly recommended you seek out your answers on your own first. No disrupting other contestants.
6. All Laptops and Electronic devices used during the competition shall not be connected to the internet during the time of the competition. (Unless needed for Login)
7. Each contestant may utilize a Machinery's Handbook or the Haas Operators Manual without penalty. Class notes are prohibited from being used inside the competition.
8. Any Documentation and Notes taken during the competition must be marked with the Contestant #, since all documentation will be collected at the end of your time.
9. Program #'s must be the contestants number followed by zeros until reaches proper NC format (Example Contestant 152 would be O15200)

BREAKS

Breaks are based upon one's own decisions except for lunch. The Chairperson shall notify contestants how lunchtime will be handled. Please let the Chairperson know if you need a break. Contestants must notify the Chairperson before leaving for a bathroom break. Only one Contestant can be outside of the contest area at a time, except Lunch.

EQUIPMENT AND MATERIALS

Provided by the technical committee:

a. Software license for Fusion 360 MasterCAM, And Vericut
b. Pens and paper

Provided by the competitor:

a. Competitors are required to bring their own laptop with pre-installed CAD/CAM Software, I.E Autodesk Fusion / MasterCAM.
b. Competitors who choose to use CAD/CAM software outside of what is advised by the technical committee are responsible for ensuring the post-processor is compatible with Vericut.
c. One 6' multiple-outlet surge protector
d. All competitors must create a one-page resume. See "Resume Requirement" below for guidelines. Additionally, and as part of the competition, competitors will submit a hard copy of their resume at orientation.
e. Scientific Calculator
f. Machinery's handbook

The competition will include tests that evaluate a competitor's knowledge of general Machine Shop theory in areas such as: safety, materials, measuring and test equipment, mathematics, engineering drawings, GD&T, troubleshooting program alarms, cutting tool and holder technologies, and CAD/CAM software.

Competitors will take a NYS SkillsUSA PDT at orientation.

SKILL PERFORMANCE

This competition will assess the ability to program CNC milling machines, interpret prints (including GD&T), and measure/gauge parts. The competitor will also demonstrate theoretical knowledge of CNC machine configuration, setup, and operations.

COMPETITION COMPONENT

The CNC competition is divided into four main components:

CAM Programming: assesses competitor's skills using CAM software to program part features and generate NC file(s).

CNC Theory Exam: assesses competitor's skills and knowledge in CNC Machining and some general machine shop knowledge.

Process Control assesses competitor's knowledge in quality control applications.

Utilizing basic measuring tools / Ability to create proper notes for operators.

DOCUMENTATION PROVIDED:

A. Programming instructions

B. Dimensional drawing and/or digital product definition data set

C. Solid models

D. Resource list (CNC machine, part material, cutting tools, holders, and work holding devices)

DEMONSTRATED PROGRAMMING

a. Document process plans

b. Create and/or modify solid models

c. Align and position models in CAM programming environment

d. Create 3-axis toolpaths

e. Simulate program in virtual machine environment

f. Post process NC program file(s)

g. Create technical documentation

h. Troubleshoot G-code errors

SUBMITTED FILES/DOCUMENTATION:

a. NC program file (.NC)

b. Tool list(s)

c. Setup sheet(s)

d. Process plan

All Submitted Documentation Shall have Contestant # in Title