Automated Manufacturing NYS

PURPOSE
To evaluate each contestant’s preparation for employment in automated manufacturing and the team approach to problem-solving work environment. To recognize outstanding students for excellence and professionalism in the field of automated manufacturing technology.

CLOTHING REQUIREMENT
Contest Specific – Machining
- White crew neck short-sleeved T-shirt
- Work pants or jeans,
- Leather or steel toed work shoes.
- Hair must be contained.
- Safety glasses with side shields or goggles,
  (Prescription glasses can be used only if they are equipped with side shields approved by OSHA(Z-87). If not, they must be covered with goggles.)

Note: Contestants must wear their official contest clothing to the contest orientation meeting. Also bring #2 pencil, resume, and safety assurance form.

ELIGIBILITY
Open to a team of three active SkillsUSA members enrolled in programs with precision machining, automated manufacturing, or CAD/CAM or CNC as the occupational objective.

EQUIPMENT AND MATERIALS
1. Supplied by the technical committee:
   a. CNC machining center with:
      1. Machinist vise
      2. Hold-downs and clamps
      3. Tool holders
      4. End mills
   b. Part(s) design
   c. Competition packet
   d. Pencils
   e. Material for machining
2. Supplied by the contestants:
   a. All competitors must create a one-page résumé and submit a hard copy to the technical committee chair at orientation. Failure to do so will result in a 10-point penalty.

Note: Your resume may be judged as part of your contest. Check the Contest Guidelines and/or the updates page on the NYS SkillsUSA Web site: http://www.nysskillsusa.org

b. Two computers:
   1. One computer loaded with CAD software for CAD program
   2. One computer loaded with software for CAM program. This computer must have an open LAN Port (Ethernet connection) and Windows XP SP3/Vista/7-32 or 64bit 8/10. (Must have administrator privilege to the computer to configure the address of the LAN Port.)
   c. One 6” dial or digital vernier caliper
   d. One dial indicator. Dial indicator must have 3⁄16” holding shank to fit into tool holder supplied by the technical committee.
   e. One calculator
   f. One pair of 9⁄16” and/or 1” parallels (complete set soft-jaw parallel pliers)
   g. One soft-face hammer
   h. One 6” or 12” steel rule
   i. Safety glasses with clear lenses
   j. Each team must provide a USB memory device
   k. Each team must provide a machinist handbook
   l. Each team can provide appropriate sized end mills
Note: Only the above listed items will be allowed in the contest area during the competition.

Scope of the Contest
The contest will test the ability to perform, exhibit and compile skills and knowledge from the following list of competencies determined by the SkillsUSA Automated Manufacturing Technology technical committee. Committee membership includes intelitek Inc., MasterCam/CNC Software, CG Tech, Verisurf, Learning Labs Inc.

Knowledge Performance
The contest includes a written math test assessing general knowledge related to automated manufacturing technology. Written portions may also exist during the skills portion of the contest. The exam is an evaluation that measures ability to solve various solutions to the process that is involved in quoting a job in a rapid prototyping environment.

Skill Performance
The contest includes a team skill performance for three students and evaluates teams for employment in integrated manufacturing technology fields of computer-aided drafting/design (CAD), computer-aided manufacturing (CAM) and computer numerical controlled machining (CNC).

Contest Guidelines
1. All equipment provided by the technical committee will be in place and set up on the Monday before the competition begins. On Tuesday, all teams assemble for a random placement drawing to decide competition day. Competition runs on Tuesday, Wednesday and Thursday. The team will compete on their scheduled day. Teams must bring their computers and above-listed equipment on Tuesday. Tampering with or removing any of the equipment provided during the days of the competition is grounds for disqualification.
2. Advisors are recommended to stay period but must leave during the competition.
3. All team members and advisors are required to attend a debriefing session on Friday morning.
4. Teams must be comprised of three members.
5. The teams will be presented with dimensioned drawing(s) of a part(s) to prototype during the contest.
6. The CAD operators construct the part geometry; the CAM operator generates the tool paths; and the CNC operator sets up and machines the part. When a team member has spare time, he or she will help others in the group.
7. One person should not dominate a team by doing the CAD drawing and the CAM toolpath and running the CNC machine while using the other members simply as support. The contest is designed to promote creativity in organization of production responsibility.
8. All group members are responsible for double-checking each other’s work and quality control.
9. When the teams finish machining the prototype part(s), they will present it to the client (judges). At this time, they will be presented with a second drawing(s) as either a change order or as an additional part(s).
10. Each team will be issued a contest guideline packet. Included in the packet will be all the necessary information and forms to complete the project. These forms will not be highly specific but will coach the teams.
11. All packets, forms and drawings must be turned in to the judges at the end of the competition.

Standards and Competencies

MFG1.0 — Perform mathematical and measurement calculations used in automated manufacturing situations
1.1 Measure work pieces to the nearest .001 inch
1.2 Calculate CNC speed and feeds
1.3 Calculate stock utilization and setup
1.4 Calculate tolerances
1.5 Calculate various variables to estimate costs and material usage written evaluation
MFG 2.0 — Design, sketch and plan machine work to U.S. National CAD Standards

2.1 Transfer information from provided drawing to CAD drawing
2.2 Create CAD file for manufacturing using standard CAD terminology and standard practice
2.3 Initiate manufacturing documentation process
2.4 Generate a process plan
2.5 Plot a CAD file
2.6 Export a CAD file
2.7 Process Engineering Change Orders (ECO)
2.8 Repeat steps as necessary to accommodate ECO

MFG 3.0 — Create a toolpath (CAM file) and the CNC code to related duty tasks of the National Institute for Metalworking Skills (NIMS) Duties and Standards for Machining Skills, Level I

3.1 Create process plan (job plan)
3.2 Read-in CAD export file
3.3 Create toolpath
3.4 Verify toolpath
3.5 Create CNC code
3.6 Send CNC code to machine tool
3.7 Process Engineering Change Orders (ECO)
3.8 Repeat steps as necessary to accommodate ECO

MFG 4.0 — Perform CNC machining functions given a scenario to the related duty tasks of the National Institute for Metalworking Skills (NIMS) Duties and Standards for Machining Skills, Level I

4.1 Verify CNC file existence
4.2 Verify toolpath
4.3 Set up fixture(s) and tooling on machine
4.4 Set up part(s) on mill
4.5 Set all offsets and tooling
4.6 Adjust machine speeds and feeds as needed
4.7 Complete an in-process quality assurance process
4.8 Perform tool changes
4.9 Perform multiple machining operations in one setup
4.10 Demonstrate proficiency in using a CNC machine tool and produce part(s)
4.11 Use Total Quality Management practices to verify process and part
4.12 Process Engineering Change Orders (ECO)

4.13 Repeat steps as necessary to accommodate ECO

MFG 5.0 — Perform and inspect part(s) using a Total Quality Management process

5.1 Verify part(s) to provided standards
5.2 Verify part(s) to ECO standards
5.3 Document process of verification and inspection

MFG 6.0 — Demonstrate safety practices in a working situation to the related duty tasks of the National Institute for Metalworking Skills (NIMS) Duties and Standards for Machining Skills-Level I

6.1 Carry out assigned responsibilities while adhering to safe practices in accordance with OSHA requirements and guidelines
6.2 Document safety activities as required
6.3 Demonstrate safety procedures in running and programming a CNC machine tool

MFG 7.0 — Provide an accurate quotation given an automated manufacturing technology simulated scenario

7.1 Solve various solutions to the process that are involved in quoting a job in a rapid prototyping environment
Special Instructions to Contestants

Due by Feb 1, 2020

Date submitted: March 8, 2020

Contest Name: Automated Manufacturing Tech

Chairperson: Bryan Reiber btr@harbec.com (585)880-7950

Only Special Instructions received by Feb. 28, 2020 will be posted on the website!!

EQUIPMENT AND MATERIALS

The committee will not be providing the following:

a. CNC machining center with:
   1. Machinist vise
   2. Hold-downs and clamps
   3. Tool holders
   4. End mills

d. Pencils

These materials, including the CNC machine must be supplied by the contestant.

The committee only provides:

b. Part(s) design

c. Competition packet

e. Material for machining

Other:

If a contestant does not have a machine to bring please contact the contest chairperson.