SkillsUSA WI Technical Standards

Industrial Robotics
High School / Technical College

PURPOSE
To evaluate each competitor's ability to plan, program, and execute an automated solution to a real-world, material-handling challenge using a 6-axis Industrial Robot workcell.

ELIGIBILITY
This contest is open to active SkillsUSA members.

A limit of **three** students per team from each school may enter.

This is a state-only contest. *There is no corresponding national contest. Winning this contest does not qualify the participant to attend the National Leadership and Skills Contest.*

CLOTHING REQUIREMENT
Class E: Competition Specific – Business Casual

- Official SkillsUSA white polo shirt
- Black dress slacks or black dress skirt (knee-length minimum)
- Black closed-toe dress shoes

These regulations refer to clothing items that are picture and described at www.skillsusastore.org. If you have questions about clothing or other logo itmes, call 1-888-501-2183.

EQUIPMENT AND MATERIALS
1. Supplied by the technical committee:
    a. FANUC 6-Axis Industrial Robot Workcell
    b. Robot End-of-Arm-Tooling
    c. Workholding Fixtures and Material Handling Challenge Components
    d. Robot Program Planning Matrix
2. Supplied by the competitor:
    a. USB Flash Drive – 8GB or less and blank (to save and submit final program documentation)
    b. Ballpoint pens or sharpened pencils
    c. Blank notebook paper
    d. Machinist Rule and/or Tape measure (METRIC)
    e. All competitors must create a one-page resume. See "resume Requirement" below for guidelines.
    f. Optional: Calculator
    g. Optional: Dial Calipers
    h. Optional: Laptop Computer for planning and program notes (usage will be monitored)

RESUME REQUIREMENT

Competitors must create a one-page resume to submit in-person on the day of your schedule competition session. Failure to submit a resume will result in a 10-point penalty.

PROHIBITED DEVICES

Cell phones or other electronic devices not approved by the competition's technical committee are ***NOT*** allowed in the competition area. Please follow the guidelines in each technical standard for approved exceptions. Technical committee members may also approve excptions onsite if deemed appropriate.

Penalties for Prohibited Devices

If a competor's electronic device makes noise or if the competitor is seen using it any time during the competition, an official report will be documented for review by the SkillsUSA Director. If confirmed that the competitor used the device in a manner which compromised the integrity of the competition, the competitor's scores may be cancelled.

SCOPE OF THE COMPETITION

The competition uses competencies identified in the FANUC HandlingTool Operations and Programming Course. The specific Material Handling Challenge chosen for this competition will be determined by the Wisconsin Industrial Robot Competition technical committee.

KNOWLEDGE PERFORMANCE

At your scheduled Skill Performance Session, all competitors must complete a written test assessing knowledge of the core FANUC HandlingTool Operations and Programming course competencies.

SKILL PERFORMANCE

The competition includes a Material Handling challenge consisting of background information and program specifications using provided End-of-Arm-Tooling (EOAT), workcell fixtures, and description of program output requirements. An appropriate, (successfully executable) robot program from design notes and instructions will be developed.

COMPETITION GUIDELINES

1. All competitors will receive a competition rubric at your scheduled Skill Performance Session during the State Conference
2. Robot program solutions will be scored on the following criteria: completeness, efficiency of code, program documentation, recorded validation of completed program solution, and quality of work.
3. The competition will also include a knowledge-based, multiple choice test to assess competitor's ability to answer questions typical of an entry-level position for a robot programmer and operator. All competitors will take the knowledge-based test individually.

STANDARDS AND COMPETENCIES

See attached HandlingTool Operations & Programming Course Overview Document.

Sample Resume for Job Interview Contest

Shiloh Misoki
5445 Old Rd.
Cooksville, WI 54245
715.431.0982
Shiloh.misoki@gmail.com

Objective

To obtain a position in the field of culinary arts where I can utilize my existing skills while learning additional techniques.

Education

Cooksville High School, Cooksville, WI GPA 3.85/4.0
2011-present

Employment

Cooksville Café, Cooksville, WI 5/2012-present
Waitress

- Deliver food with excellent customer service
- Manage cash register to process payments
- Promptly resolve customer concerns

Sharon Hill, Lisbon, WI
Childcare Provider 8/2010-5/2012

- Supervised three children
- Prepared meals and snacks
- Developed structured activities with neighborhood children

Activities

- SkillsUSA 8/2011-present
    - Chapter Vice-President 8/2012-present
    - Fundraising Committee Member 8/2011-5/2012
    - 2nd Place Job Demonstration 5/2011
    - Active Participant in Community Service Projects
- Volleyball 8/2011-present
- Holy Family Church 8/2012-present
    - Sunday School Volunteer

Achievements

- High Honors 2011
- Varsity Letter—Volleyball 2011
- Completed Level 2 of Professional Development Program 2012

Skills

- Proficient with Microsoft Word, Excel, Powerpoint and Outlook
- Demonstrated ability to work effectively independently as well as contribute to teams
- Current CPR/1st Aid Certification for adults, children and infants

References

Available upon request

1 Course Overview

1 COURSE OVERVIEW

(32 hours)

This course is intended for an operator, technician, engineer or programmer who must setup and record programs on a robot. The course covers the Robot Operations outline intermixed with the tasks required to set up the specific application, test, run and refine the program and production setup.

1.1 Course Goal:

Upon successful completion of this course, the student will be able to perform the following:

- Power up and jog the robot
- Recover from common program and robot faults
- Execute production operations
- Create, modify, and execute a material handling program
- Create and execute MACROs
- Monitor, force, and simulate input and output signals
- Backup and restore individual programs and files

Recommended safety procedures are integrated into all training exercises.

The course consists of lectures, demonstrations, and a series of lab exercises designed to reinforce what the student has learned.

In addition to lab exercises, a pre-test and a post-test are used to measure mastery of objectives.

1.2 Audience:

This course is intended for the person who must setup and record a program on a robot with an application software package.

1.3 Prerequisites:

None; although it may be easier if the student has taken the Robot Operations class first.

1.4 Course schedule

Session 1
Administrative
Introduction – Course Description
Pre-Test
Safety
Power up/down the robot's controller
Review servo faults recovery
Operating Procedures
Jog the robot in JOINT

Session 2
Check the software limits and set as needed
Cartesian– Frames
Tool Frame Setup

Session 3
Motion Programming
Test a program
Place the program into production mode

Session 4
Editing a program
Looping instructions

Session 5
Registers
Position registers

Session 6
I/O review and instructions
Miscellaneous instructions

Session 7
Macro setup and execution
Program Adjust

Session 8
Program and file manipulation
Post-Test
Review Post Test
Complete Evaluations & Issue Certificates

1.5 Task List

1. Turning on & Jogging the Robot	Perform the power up procedure. Jog the robot in JOINT, WORLD, and TOOL. Change the Jog Speed of the robot. Perform the power down procedure. Use SHIFT and COORD to access the current Jog Menu.
2. Change the Robot Software Limits	Check/Change the software limits of the work envelope. Change the manual jog motion of the robot.
3. Set up Frames	Set the User Frame to zero. Set a Tool Frame using Direct Entry with 4/5 axis robots. or Set a Tool Frame using 3Point Method with 6 axis robots.
4. Recover from Common Faults	Look up each Error Message in the Alarm Log. Recover from servo down faults. Locate Error Code- Cause and Remedy
5. Create Teach Pendant Program	Create a teach pendant program. Modify default motion instructions. Teach motion instructions. Teach a pre-defined position to a position register. Test a program using SHIFT and FWD/BWD. Write comments for programs, signals, positions, and/or position registers. Document some feature of the program in a REMARK.
6. Select/Modify Teach Pendant Program	Select a teach pendant program. Place a program into production. Modify the logic of a program. Use the [INST] softkey to add program instructions. Use [EDCMD] to modify line features in the program. Touchup Points. Use SHIFT and POINT to replace an existing program line with a motion instruction. Modify motion instruction components.

7. Display & Setup I/O	Use I/O instructions in an application. Force I/O signals. Simulate I/O signals. Monitor I/O signals. Configure I/O
8. Use the Program Adjust Feature	Adjust a teach pendant program during production.
9. Setup and execute macros	Create MACRO Headers. Assign MACRO Headers to a specific teach pendant program. Assign the motion control to the MACRO. Execute a MACRO.
10. Program & File Manipulation	Load programs/files from the default device. Save programs/files to the default device. Copy programs in active RAM to another name. Copy files from one device to another. Backup teach pendant programs, application files, or system files.

1.6 Objectives

Students successfully completing this course will be able to:

1. Safely power up the robot from a complete shutdown.	Identify all components of the cell that are part of the power-up sequence. Recognize the main components of the robot Identify all safety considerations related to operating the cell. Describe the correct sequence for powering up the cell. Recognize and clear alarms that would inhibit cell operation.
2. Recover from common programming and servo alarm conditions.	Clear servo alarm faults. Correct programming faults.
3. Safely and predictably jog the robot in specific manual jog systems.	Lab safety in a robot cell in our Plant setting. Jog the robot in the Joint system. Setup and use Cartesian Frames while jogging.
4. Create/Teach/Test a program.	Login with a Password. Create a program Header. Setup the User and Tool Frames. Teach the motion instructions. Test a program using the three-step method.
5. Select/Modify/Execute a teach pendant program.	Select a teach pendant program. Edit the motion components of a program. Execute the program. Put it into production.
6. Use signals and specific cell and controller parameters.	Force, simulate, and monitor signals. Set needed system variables. Add signals and I/O instructions to the program.
7. Save/Load individual programs and files to/from a default device.	Initialize a port. Set the default device. Perform file maintenance.