

Process Technology Skills (Demonstration Contest)

Purpose

To evaluate each student's preparation for employment and to recognize outstanding students for excellence and professionalism in the field of Process Technology.

Clothing Requirement

For men: Official SkillsUSA white polo shirt with black dress slacks, black socks and black leather shoes.

For women: Official SkillsUSA white polo shirt with black dress slacks or skirt, black socks or black or skin-tone seamless hose and black leather shoes.

These regulations refer to clothing items that are pictured and described at: www.skillsusastore.org. If you have questions about clothing or other logo items, call 800-401-1560 or 703-956-3723.

Note: Contestants must wear their official contest clothing to the contest orientation meeting.

Eligibility

Open to active SkillsUSA members with components of process technology in the course of study.

Observer Rule

Observers will be allowed to observe the demonstration part of the contest. No talking or gesturing will be permitted. No audio or video recording is allowed by members of the audience.

Equipment and Materials

1. Supplied by the technical committee:

- a. Stopwatch
- b. Computer
- c. Software containing troubleshooting scenarios or hands-on model.
- d. All necessary information and tools for judges.

2. Supplied by the Contestant:

- a. All competitors must create a one-page résumé using a word processor and submit the résumé electronically at: www.skillsusa.org/compete/updates.shtml. Check the Website for further instruction.

SCOPE OF CONTEST

Process Technology is a career and educational discipline that combines the industrial skill needed to safely operate plant manufacturing processes with electronics and computer-based controls, problem solving, and operation of modern automated manufacturing systems.

Knowledge Performance

There will be a skill-related written test.

Questions will be similar to the questions on the PTEX - CR written exit exam.

There will be a (60) minute time limit on the written test.

Skill Performance

The contest is designed to assess the ability of the competitor to safely operate a manufacturing plant. This portion of the competition will be evaluated by oral professional assessment and via simulations. Contestants will participate in an oral professional assessment scheduled for 20 minutes per student.

Demonstrate professionalism at all times.

Simulations

Be prepared to troubleshoot and solve plant upsets presented via simulation software or hands-on model.

The maximum time to troubleshoot and solve the plant upset is 120 minutes per each scenario.

Standards and Competencies

PT 1.0 Safety, Health and Environment

- 1.1 Maintain Safety, Health and Environmental Standards in a Plant
- 1.2 Understand and follow established procedures to operate safely and in an environmentally sound manner.
- 1.3 Understand and follow Federal Regulations
- 1.4 Use Personal Protective Equipment
- 1.5 Knowledge of Emergency Response
- 1.6 Identify Workplace Hazards

PT 2.0 Handling, Storing & Transporting Plant Materials

- 2.1 Understand and follow Federal Regulations
- 2.2 Knowledge of Material Hazards

2.3 Transport material from one location to another

2.4 Ensure appropriate storage container, for material being stored/transported

PT 3.0 Operating, Monitoring and Controlling Continuous & Batch Processes

For the following systems – Heat Exchange, Separation, Reaction, Generation, Waste Treatment & Utilities – be able to demonstrate knowledge of:

- 3.1 Process Variables
- 3.2 Operating Parameters
- 3.3 Safety Components
- 3.4 Process Drawings
- 3.5 Instrumentation

PT 4.0 Providing Routine and Preventive Maintenance and Services, to Processes, Equipment and Instrumentation

- 4.1 Plant Maintenance – Processes and Strategies
- 4.2 Proper use of Hand Tools
- 4.3 Plant Maintenance Procedures
- 4.4 Preparing Equipment for Maintenance Activities
- 4.5 Lubricants and Lubrication System

PT 5.0 Troubleshooting Process Abnormalities & Equipment Malfunctions

For the following systems – Heat Exchange, Separation, Reaction, Generation, Waste Treatment & Utilities – be able to:

- 5.1 Recognize an Abnormality
- 5.2 Collect and Analyze Information
- 5.3 Define Root Cause & Take Appropriate Action
- 5.4 Maintain Safe Operation

PT 6.0 Demonstrate Workplace Behaviors Necessary for Success

6.1 Communication

6.2 Teamwork

5.3 Adaptability

6.4 Leading Self and Others

Committee Identified Academic Skills

The SkillsUSA national technical committee has identified that the following academic skills are embedded in the process technology training program and assessment:

Math Skills

Use fractions to solve practical problems

Use proportions and ratios to solve practical problems

Solve practical problems involving percents

Solve single variable algebraic expressions

Solve multiple variable algebraic expressions

Measure angles

Find surface area and perimeter of two-dimensional objects

Construct three-dimensional models

Apply Pythagorean Theorem

Make comparisons, predictions and inferences using graphs and charts

Organize and describe data using matrixes

Find slope of a line

Solve practical problems involving complementary, supplementary and congruent angles

Find arc length and the area of a sector

Science Standards

Plan and conduct a scientific investigation

Use knowledge of the particle theory of matter

Describe and recognize elements, compounds, mixtures, acids, bases and salts

Describe and recognize solids, liquids and gases

Describe characteristics of types of matter based on physical and chemical properties

Use knowledge of physical properties (shape, density, solubility, odor, melting point, boiling point, color)

Use knowledge of classification of elements as metals, metalloids and nonmetals

Describe and identify physical changes to matter

Use knowledge of potential and kinetic energy

Use knowledge of mechanical, chemical and electrical energy

Use knowledge of heat, light and sound energy

Use knowledge of temperature scales, heat and heat transfer

Use knowledge of speed, velocity and acceleration

Use knowledge of Newton's laws of motion

Use knowledge of work, force, mechanical advantage, efficiency and power

Use knowledge of simple machines, compound machines, powered vehicles, rockets and restraining devices

Use knowledge of principles of electricity and magnetism

Use knowledge of static electricity, current electricity and circuits

Use knowledge of magnetic fields and electromagnets

Language Arts Skills

Demonstrate comprehension of a variety of informational texts
Use text structures to aid comprehension
Demonstrate knowledge of appropriate reference materials
Use print, electronic databases and online resources to access information in books and articles

Connections to National Standards

State-level academic curriculum specialists identified the following connections to national academic standards:

Math Standards
Numbers and operations
Algebra
Geometry
Measurement
Data analysis and probability
Problem solving
Communication
Connections
Representation

Source: NCTM Principles and Standards for School Mathematics. To view high school standards, visit: standards.nctm.org/document/chapter7/index.htm. Select "Standards" from menu.

Science Standards

Understands the structure and function of cells and organisms
Understands relationships among organisms and their physical environment
Understands biological evolution and the diversity of life
Understands the structure and properties of matter
Understands the sources and properties of energy

Understands forces and motion
Understands the nature of scientific inquiry
Understands the scientific enterprise

Source: McREL compendium of national science standards. To view and search the compendium, visit: www.mcrel.org/standards-benchmarks/.

Language Arts Standards

- Students read a wide range of print and non-print texts to build an understanding of texts, of themselves and of the cultures of the United States and the world; to acquire new information; to respond to the needs and demands of society and the workplace; and for personal fulfillment. Among these texts are fiction and nonfiction, classic and contemporary works
Students apply a wide range of strategies to comprehend, interpret, evaluate and appreciate texts. They draw on their prior experience, their interactions with other readers and writers, their knowledge of word meaning and of other texts, their word identification strategies and their understanding of textual features (e.g., sound-letter correspondence, sentence structure, context, graphics)
Students adjust their use of spoken, written and visual language (e.g., conventions, style, vocabulary) to communicate effectively with a variety of audiences and for different purposes
Students apply knowledge of language structure, language conventions (e.g., spelling and punctuation), media techniques, figurative language and genre to

create, critique and discuss print and non-print texts

Students conduct research on issues and interests by generating ideas and questions and by posing problems. They gather, evaluate and synthesize data from a variety of sources (e.g., print and non-print texts, artifacts, people) to communicate their discoveries in ways that suit their purpose and audience

Students use a variety of technological and information resources (e.g., libraries, databases, computer networks and video) to gather and synthesize information and to create and communicate knowledge

Students participate as knowledgeable, reflective, creative and critical members of a variety of literacy communities

Students use spoken, written and visual language to accomplish their own purposes (e.g., for learning, enjoyment, persuasion and the exchange of information)

Source: IRA/NCTE Standards for the English Language Arts. To view the standards, visit:

www.readwritethink.org/standards/index.html.