



## SCREEN PRINTING TECHNOLOGY



SkillsUSA Championships Technical Standards

### PURPOSE

To evaluate each competitor's preparation for employment and to recognize outstanding screen printers for their professionalism in the field of graphic communications.

### ELIGIBILITY

Open to active SkillsUSA members enrolled in programs with graphic imaging technology as an occupational objective.

### CLOTHING REQUIREMENTS

#### **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

*Note:* Wearing socks or hose is no longer required. If worn, socks must be black dress socks and hose must be either black or skin-tone and seamless/nonpattern.

These regulations refer to clothing items that are pictured and described at [www.skillsusastore.org](http://www.skillsusastore.org). If you have questions about clothing or other logo items, call 1-888-501-2183.

*Note:* Competitors must wear their official competition clothing to the competition orientation meeting.

## EQUIPMENT AND MATERIALS

1. Supplied by the technical committee:
  - a. All equipment and materials used during the performance test
2. Supplied by the competitors:
  - a. All competitors must create a one-page resume to submit online. See “Resume Requirement” below for guidelines. Additionally, and as part of the competition, competitors will submit a hard copy of their resume at orientation.

### RESUME REQUIREMENT

Competitors must create a one-page resume to submit online. SkillsUSA South Carolina competitors should submit their resume by the deadline published on the competition updates page of our website. Failure to submit a resume will result in a 10-point penalty.

Your resume must be saved as a PDF file type using file name format of “Last Name\_First Name.” For example, “Amanda Smith” would save her resume as Smith\_Amanda. If you need assistance with saving your file as a PDF, visit the Adobe website for more information.

Note: Check the Competition Guidelines and/or the updates page on the state website.

### PROHIBITED DEVICES

Cellphones, electronic watches and/or other electronic devices not approved by a competition’s national 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 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 Director of the SkillsUSA Championships. If confirmed that the competitor used the device in a manner which compromised the integrity of the competition, the competitor’s scores may be removed.

## SCOPE OF THE COMPETITION

The competition assesses knowledge and skills used by industries in the field of screen printing technology production processes.

### KNOWLEDGE PERFORMANCE

The knowledge competition will include a written exam assessing the general knowledge of screen printing technology processes. Written portions may be included during the skills portion of the competition. Knowledge of terms and principles used in screen printing processes will be

required for the skill demonstration portion of the competition. Competitors are also required to take the SkillsUSA Professional Development Test.

## **SKILLS PERFORMANCE**

The skills competition will include a demonstration of individual skills in producing screen-printed products using equipment and technologies meeting screen printing industry standards. The skills to be demonstrated will include, but will not be limited to, the following: screen tensioning, screen coating, stencil exposure/washout, image registration, garment printing, and quality assessment of completed screen printing.

## **COMPETITION GUIDELINES**

1. The competition will assess participants' knowledge and skills of screen printing technology at nine (9) testing stations:
  - a. Demonstrate the fundamentals of screen preparation and tensioning
  - b. Coat and dry screens with a direct photosensitive emulsion
  - c. Create screens (stencils) with film positive registration, exposure/washout procedures
  - d. Register screens on a rotary screen printing press, and proof the design
  - e. Print textiles while demonstrating production procedures that meet industry standards
  - f. Reclaim screens
  - g. Solve a quality control problem by assessing the printing quality of a garment production sample
  - h. Take a written technical knowledge test
  - i. Submit a resume to an interviewer and participate in an oral professional assessment
2. As soon as the competitors have completed an assigned job and have fulfilled all the requirements presented at the testing station, they should notify the judge. The scorekeeper and judge will gather the competitor's product or worksheet for evaluation and scoring.

## **STANDARDS AND COMPETENCIES**

### **SPT 1.0 — Demonstrate the fundamentals of screen preparation**

- 1.1. Define essential components of screen printing processes
  - 1.1.1. Design and image generation
  - 1.1.2. Image carrier (positives, screens) mesh and tension
  - 1.1.3. Squeegees and flood bars
  - 1.1.4. Substrates (textiles, ceramics, paper, plastics)
  - 1.1.5. Inks — formulate inks by weight usage per shirt per order
  - 1.1.6. File management
  - 1.1.7. Equipment clean up and shop housekeeping.
- 1.2. Calculations for image preparation
  - 1.2.1. Calculate proportional scaling solutions from designs to artwork to garment
- 1.3. Measure and set mesh tension on a screen designed for re-tensioning

### **SPT 2.0 — Coat and dry screens with a direct photosensitive emulsion**

- 2.1. Name the major types of stencil systems.
  - 2.1.1. Describe the properties of direct emulsion stencils
  - 2.1.2. Describe the properties of capillary film stencils

- 2.1.3. List the names of two indirect films used to create stencils
- 2.1.4. List two advantages provided by knife-cut film stencils
- 2.2. Evaluate stencil quality: related to resolution, definition and acutance
- 2.3. Measure a stencil system's EOM and Rz

### **SPT 3.0 — Create screens (stencils) with film positive registration, exposure/washout procedures**

- 3.1. Demonstrate knowledge of exposure sources
- 3.2. Coat screens with a photosensitive direct emulsion
- 3.3. Register film positives to unexposed screens
- 3.4. Use ultraviolet light source to expose emulsion coated screens
- 3.5. Wash out the unexposed emulsion from a screen to create a stencil

### **SPT 4.0 — Register screens on a screen printing press, and proof the design**

- 4.1. Set up press for preprint operation
  - 4.1.1. Determine printing order for screens
  - 4.1.2. Apply block-out tape to squeegee side of the screen
  - 4.1.3. Secure screens to a rotary press with clamps
  - 4.1.4. Demonstrate ability to square and center an image for printing
  - 4.1.5. Set off contact at the front and back of the screens
  - 4.1.6. Zero rotary press heads to center screens
  - 4.1.7. Register images with registration marks or images' outline
  - 4.1.8. Ink to the screens
  - 4.1.9. Select squeegee, according to size, type and durometer
  - 4.1.10. Check all screens and screen frames for unwanted ink
  - 4.1.11. Apply the adhesive to the platen
  - 4.1.12. Flood newly registered screen with ink
  - 4.1.13. Print a test image on appropriate substrate
  - 4.1.14. Tape over registration marks on the garment side of the stencil.

### **SPT 5.0 — Print textiles while demonstrating industry production procedures**

- 5.1. Print garments using the spot color process
  - 5.1.1. Comprehend and follow tolerances and printing order
- 5.2. Apply adhesive to platen
  - 5.2.1. Use proper type and amount of adhesive
- 5.3. Place a garment or substrate on the platen
- 5.4. Flood each screen with ink
- 5.5. Hold down each screen and print the image
- 5.6. Remove the garment from the platen
- 5.7. Cure garment design with an appropriate drying appliance
- 5.8. Use a temperature gun or temperature strip to determine curing temperature

### **SPT 6.0 — Reclaiming screens processes**

- 6.1. Demonstrate a consideration for a healthy working environment
- 6.2. Work safely in the reclaiming environment
  - 6.2.1. Remove ink and block out materials
  - 6.2.2. Remove the stencil

- 6.2.3. Remove ghost haze if needed
- 6.3. Store clean screens in dry, dust-free area with medium temperature levels
- 6.4. Clean up spills promptly
- 6.5. Dispose of reclaim waste properly

**SPT 7.0 — Solve a quality control problem by assessing garment printing quality of a production sample**

- 7.1. Use 10 quality factors for a saleable screen-printed image
  - 7.1.1. Image printed on correct vertical dimension
  - 7.1.2. Image printed on center
  - 7.1.3. Image not crooked
  - 7.1.4. Ink smudges on sample garment
  - 7.1.5. Color density does not vary across the image
  - 7.1.6. Ink printed in non-image area due to pinhole
  - 7.1.7. Last color covers previous colors
  - 7.1.8. Missed register between colors
  - 7.1.9. Ink transferred from a garment in lot pile
  - 7.1.10. Colors match the customer’s standard

**SPT 8.0 — Take a written technical knowledge test**

- 8.1. Achieve a score of 70% or greater on the written exam
- 8.2. Match various types of screen printing equipment to their function

**SPT 9.0 — Participate in an oral professional assessment**

- 9.1. Submit a one-page, typewritten resume to an interviewer
- 9.2. Respond positively to questions related to the five areas that follow:
  - 9.2.1. Describe personal ability to handle job assignments
  - 9.2.2. Ability to answer questions in technical terms
  - 9.2.3. Explain how to handle workplace situations in a professional manner
  - 9.2.4. Demonstrate critical thinking during the oral interview
  - 9.2.5. Present a realistic self-concept

**SPT 10.0 — SkillsUSA Framework**

The SkillsUSA Framework is used to pinpoint the Essential Elements found in Personal Skills, Workplace Skills, and Technical Skills Grounded in Academics. Students will be expected to display or explain how they used some of these Essential Elements. Please reference the graphic, as you may be scored on specific elements applied to your project. For more, visit: [www.skillsusa.org/who-we-are/skillsusa-framework/](http://www.skillsusa.org/who-we-are/skillsusa-framework/).



## **COMMITTEE IDENTIFIED ACADEMIC SKILLS**

The technical committee has identified that the following academic skills are embedded in this performance test.

### **Math Skills**

- Read a ruler (inch system, metric system, point/pica system)
- Use fractions to solve practical problems
- Use percentages multiplied times formula for inks mixing
- Simplify numerical expressions
- Solve practical problems involving percentagesSolve single variable algebraic expressions
- Calculations for image preparation (calculate proportional scaling solutions of two designs from artwork to garment, demonstrate ability to square and center an image during screen printing process)

### **Science Skills**

None Identified

### **Language Arts Skills**

- Provide information in conversations and in group discussions
- Provide information in oral presentations
- Demonstrate use of nonverbal communication skills: eye contact, posture and gestures using interviewing techniques to gain information
- Demonstrate knowledge of appropriate reference materials

## **CONNECTIONS TO NATIONAL STANDARDS**

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

### **Math Standards**

- Geometry
- Measurement
- Problem Solving
- Communication
- Connections
- Representation

*Source: NCTM Principles and Standards for School Mathematics. For more information, visit: [www.nctm.org](http://www.nctm.org).*

### **Science Standards**

- Understands the structure and properties of matter
- Understands the sources and properties of energy
- Understands forces and motion
- Understands the nature of scientific inquiry

*Source: McREL compendium of national science standards. To view and search the compendium, visit: <http://www2.mcrel.org/compendium/>.*

### **Language Arts Standards**

- Students read a wide range of print and nonprint 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, and 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 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 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.ncte.org/standards](http://www.ncte.org/standards).*