



## GRAPHIC IMAGING – SUBLIMATION



SkillsUSA Championships Technical Standards

### PURPOSE

To evaluate each competitor's preparation for employment and to recognize outstanding students for excellence and professionalism as a sublimation technician in the field of graphic imaging.

### ELIGIBILITY

Open to active SkillsUSA members enrolled in programs with graphic communications 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 official competition clothing to the competition orientation meeting and the post-competition meeting and debrief.

## EQUIPMENT AND MATERIALS

1. Supplied by the technical committee:
  - a. All equipment and materials used in the hands-on component of the competition.
2. Supplied by the competitor:
  - a. A graphic design enabled computer and software that can open/edit an Adobe Photoshop template that uses PNG and JPG elements. (Adobe Photoshop template will be provided to layout and create a sublimation printable design.) The competitor's computer will only be needed for the design portion of the competition.
    - 1). The competitor's computer and design software must be capable of creating/exporting PNG files, and then saving a copy of the PNG file to a USB thumb drive provided by the technical committee.
  - b. All competitors must create a one-page resume. See "Resume Requirement" below for guidelines.

**Note:** Computers must be preloaded with the fully licensed graphic software of choice and competitors must have administrative rights to the computers to implement changes if required. No Internet access is allowed during the competition. All software should be pre-installed and tested prior to arriving at the competition to ensure the system will run offline.\*

(See the Standards and Competencies section GIS 1.0 — Digital Image Design and Printing for more details.)

*\*No Internet access is permissible during the competition. If software is not installed or operating, and students are required to connect to the Internet, a 25-point penalty will be assessed. If it is confirmed that the competitor/team used the Internet during the competition without the knowledge and permission of the technical committee, the technical committee can assess a penalty of 100 points.*

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 graphic imaging sublimation technology production processes.

### **KNOWLEDGE PERFORMANCE**

The knowledge competition will include a written exam assessing the general knowledge of graphic imaging sublimation technology processes. Written portions may be included during the skills portion of the competition. Knowledge of terms and principles used in graphic imaging sublimation processes will be required for the skills demonstration portion of the performance test.

### **SKILLS PERFORMANCE**

The skills performance test will include a demonstration of individual skills in producing graphic imaging sublimation products using equipment and technologies meeting graphic imaging sublimation industry standards. Some of the procedures to be demonstrated include, but are not limited to, designing a graphics to be used with the sublimation process by using the template provided in the competition. Competitors will also be asked to save those designs in a print-ready format and print the transfer to a provided sublimation-enabled printer. Competitors will also be tested on transferring sublimation graphics to several different types of substrates, such as mugs, mouse pads, metal, glass, ceramic tiles, hardboard, polyester knit cloth, slate, and fiber reinforced plastic. A quality assessment will be performed on the product of each completed graphic imaging sublimation procedure. The competitors will also be judged on their capability to complete the product in a timely manner being aware of the need for repeatable production, salable product and a safe result.

### **COMPETITION GUIDELINES**

1. The competition will assess the competitor's knowledge and skills of graphic imaging sublimation at various testing stations that will include:
  - a. Design a digital image and print a transfer sheet using a provided sublimation printer.
  - b. Evaluation on other transferring stations that could include:

- 1). Transfer a graphic on a mug or other drinkware using a mug press.
  - 2). Transfer a graphic on a mug or other drinkware using a wrap and a convection oven.
  - 3). Transfer on a mouse pad or other neoprene or closed foam-based product.
  - 4). Transfer on a metal/aluminum surface. (e.g., license plate tag or frame)
  - 5). Transfer on a glass surface. (e.g., cutting board)
  - 6). Transfer on ceramic tiles. (e.g., mosaic tile)
  - 7). Transfer on hard board. (e.g., cellphone stand)
  - 8). Transfer on polyester knit fabric. (e.g., T-shirt)
  - 9). Transfer on stone. (e.g., slates)
  - 10). Transfer on fiberglass reinforced plastic (FRP). (e.g., key tags)
  - c. Take a written technical knowledge test.
  - d. Complete a quality control review assessment determining the level of defect for several products.
  - e. Participate in an oral professional assessment and review of the competitor's resume with an interviewer.
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 timekeeper. The scorekeeper and judge will gather the competitors' products or worksheets for evaluation and scoring.

## **STANDARDS AND COMPETENCIES**

### **GIS 1.0 — Digital Image Design and Printing**

- 1.1. Review the design brief from the Performance Testing Plan and the provided USB thumb drive with file.
  - 1.1.1. Insert the provided USB thumb drive into the graphic design enabled computer.
  - 1.1.2. Create a folder on the root of the flash drive with the following name: ContestantX (replacing X with your contestant number).
  - 1.1.3. Review graphics backgrounds and logos and images available for the design layout that can be found on the USB thumb drive.
- 1.2. Create the design layout of the specified product(s) using two provided product templates that are available as both a PSD file and an EPS file.
  - 1.2.1. Send one of the provided backgrounds onto the template and make sure that it is laid out so that there is ample bleed area as indicated by the product template.
  - 1.2.2. Only adding text or placing logos and images from the "SkillsUSA Official Art" folder design the item(s) based on the design brief provided in the Performance Testing Plan.
  - 1.2.3. Competitors may also add text and use the layers styles to enhance your designs. No outside graphics are allowed, and computers cannot be connected to the internet.
    - 1.2.3.1. Please make sure all needed software updates are done before the competition as the technical committee is unable to bend the internet rule and if the competitor's preferred computer does not operate, they will need to use a technical committee provided PC with Adobe Photoshop.

- 1.2.4. After designing, ensure the background images and other design elements are below the Template Layers and verify the alignment of the key elements that must be on the item (text and logo typically) are inside the bleed area.
- 1.2.5. Verify the background image to use to fill the “bleed off” outline of the templates if necessary.
- 1.2.6. Hide the Template Layers from view in the design program and then save the file as a PNG file onto the flash drive in your contestant folder titled “product1.png” - replacing product with the name of the item specified in the the Performance Testing Plan.
- 1.2.7. Close the template file without saving your edits so the template can be used again if needed.
- 1.2.8. Create a new blank document in your graphic design program that is sized to meet the required size of the full sheet of the sublimation printer being used. This will be noted in the Performance Testing Plan. The blank document should be 300 Pixels Per Inch in RGB Color Mode.
- 1.2.9. Drag or place both the “product1.png” files onto the new document.
- 1.2.10. Then duplicate the files equally to be able to place as many files as possible on the sheet, but still make the sheet easy to use and cut apart when it comes time to transfer the images. This is so the full sheet is being maximized to minimize waste.
- 1.2.11. Save the file as a PNG file onto the flash drive in your contestant folder titled “FINALlayout.png”
- 1.2.12. Once complete, close the design program and eject the USB thumb drive that has the “FINALlayout.png” file on it.
- 1.2.13. Inserting your USB thumb drive into a USB port on the provided printing computer which the judge will direct you to.
  - 1.2.13.1. Note - These are instructions for printing to a Sawgrass Printer via their print manager. Should the printer change the steps will be similar, but might vary based on that brand's software and the exact steps to print to the provided computer and program will be laid out on the Performance Testing Plan.
- 1.2.14. Click on the small Print Manager Icon in the bottom right of the computer in the system tray.
- 1.2.15. Choose “Open Local File”
- 1.2.16. Then locate the file on the jump drive, “FINALlayout.png” layout you created.
- 1.2.17. Click on that file and select the “open” button. That will open the document in the Sawgrass print manager.
- 1.2.18. From the “materials” tab select “ceramic/glass” in the substrate drop down and leave all the rest on that tab the same. Double checking the “Mirror” is checked.
- 1.2.19. Go to the “Color” tab and make sure the color mode “Photographic” is selected.
- 1.2.20. Finally select the pink “Print” button in the bottom right corner of the dialog box. This will print your first transfer.
- 1.2.21. Close the print manager dialog box.
- 1.2.22. Back in the same system tray, find the jump drive icon and left-click on it to “eject” the Jump Drive.
- 1.2.23. After clicking eject, remove the jump drive from the computer.

- 1.2.24. Write your contestant number at the top of each transfer sheet without writing onto the printed portion.
- 1.2.25. Give the completed transfers and jump drive to the judge to indicate you are done.

**GIS 2.0 — Transfer a graphic on a ceramic drinkware product using a mug press.**

- 2.1. Set up mug press for printing operation.
  - 2.1.1. Preheat mug press to 400 degrees. (Some products may vary. The Performance Testing Plan with have final details.)
  - 2.1.2. Set timer for 2 minutes 15 seconds. (Some products may vary. The Performance Testing Plan with have final details.)
  - 2.1.3. With the press open, adjust the pressure setting to medium pressure.
- 2.2. Apply sublimation transfer to the provided ceramic drinkware product.
  - 2.2.1. Measure and cut the image transfer to fit the ceramic drinkware.
  - 2.2.2. Wrap the transfer around the ceramic drinkware and center the transfer.
  - 2.2.3. Tape the transfer to the ceramic drinkware with heat resistant tape.
  - 2.2.4. Place a blow out sheet outside of the sublimation transfer to protect the press.
  - 2.2.5. Place the ceramic drinkware in the press with the handle facing out.
  - 2.2.6. Close the press (the handle will lock into place when closed) to start the timer.
  - 2.2.7. Open the press when the timer sounds and remove the ceramic drinkware.
  - 2.2.8. Remove heat tape from transfer and peel paper from the ceramic drinkware.
    - 2.2.8.1. Take care to avoid scratching the poly coating while the ceramic drinkware is hot.
    - 2.2.8.2. Use heat resistant gloves as ceramic drinkware is VERY hot. SAFETY is a priority.
  - 2.2.9. Set the ceramic drinkware onto the concrete surface or cooling rack to stop the dye sublimation process.
- 2.3. Evaluate image quality.
- 2.4. Equipment cleanup and workstation housekeeping.

**GIS 3.0 — Transfer a graphic on drinkware using a wrap and a convection oven.**

- 3.1. Set up convection oven for printing operation.
  - 3.1.1. Preheat convection oven to 400 degrees. (Some products may vary. The Performance Testing Plan with have final details.)
  - 3.1.2. Set timer for 11 minutes. (Some products may vary. The Performance Testing Plan with have final details)
- 3.2. Apply sublimation transfer to the provided drinkware product.
  - 3.2.1. Prepare images, drinkware and wraps.
  - 3.2.2. Crop the image transfer.
  - 3.2.3. Wrap the transfer around the drinkware and center.
  - 3.2.4. Tape the transfer to the drinkware with heat resistant tape.
  - 3.2.5. Place a blow out sheet outside of the sublimation transfer.
  - 3.2.6. Place the drinkware on the wrap.
    - 3.2.6.1. Hold wrap against the drinkware handle in correct position should the drinkware have a handle.
    - 3.2.6.2. Wrap silicone rubber around the drinkware and secure properly.

- 3.2.6.3. Squeeze two halves of the wrap until it locks together. Should the product be utilizing shrink film, skip directions for wrap and use the following instructions for shrink film:
  - 3.2.6.3.1. Place the provided shrink film sleeve around the drinkware so it is evenly spaced allowing the shrink film to have overlap on both sides.
  - 3.2.6.3.2. Heat the shrink film with the provided heatgun using heat resistant gloves as evenly as possible without putting holes in the film
- 3.2.7. Place the drinkware on the oven rack.
- 3.2.8. Check timer setting and start timer for heating drinkware.
- 3.2.9. On timer signal, remove the drinkware from oven.
- 3.2.10. Use heat resistant gloves as ceramic drinkware mug is VERY hot. SAFETY is a priority.
- 3.2.11. Remove the wrap or shrink film and transfer as quickly and safely as possible.
- 3.3. Evaluate image quality.
- 3.4. Equipment cleanup and workstation housekeeping.

#### **GIS 4.0 — Transfer on a mouse pad.**

- 4.1. Set up press for preprint operation.
  - 4.1.1. Preheat transfer press to 400 degrees. (Some products may vary. The Performance Testing Plan will have final details.)
- 4.2. Pre-press the mouse pad. (*Note:* Section 5.2 pre-press is optional and may be omitted.)
  - 4.2.1. Set timer for 10 seconds.
  - 4.2.2. Adjust the press pressure.
  - 4.2.3. Place mouse pad on press and cover with a cover/blowout sheet.
  - 4.2.4. Press mouse pad to remove excess moisture.
  - 4.2.5. Remove mouse pad from press and lay on flat surface for cooling.
- 4.3. Transfer the print for to a mouse pad.
  - 4.3.1. Measure and cut the transfer to proper size to fit the mouse pad.
  - 4.3.2. Place the transfer onto the mouse pad in proper position.
  - 4.3.3. Use heat transfer tape to attach the mouse pad to the transfer.
  - 4.3.4. Place a cover /blow-out sheet on the press.
  - 4.3.5. Put the mouse pad and the transfer on the press, transfer on top face down.
  - 4.3.6. Put another cover /blowout sheet on top of the transfer.
  - 4.3.7. Reset heat transfer press timer for 50-second dwell. (Some products may vary. The Performance Testing Plan will have final details)
  - 4.3.8. Check heat transfer press temperature for 400 degrees.
  - 4.3.9. Press the mouse pad and transfer with medium pressure until the timer alarm sounds.
  - 4.3.10. Use heat resistant gloves as ceramic drinkware mug is VERY hot. SAFETY is a priority.
  - 4.3.11. Remove the transfer immediately after printing.
  - 4.3.12. Place mouse pad on counter and let it cool.
- 4.4. Evaluate image quality related to resolution, definition and acutance.
- 4.5. Equipment cleanup and workstation housekeeping.

### **GIS 5.0 — Transfer on a metal surface.**

- 5.1. Check that the heat press temperature is set to 350 degrees F. (Some products may vary. The Performance Testing Plan will have final details.)
- 5.2. Check that the heat press dwell time is set to 105 Seconds (1 minute and 45 seconds). (Some products may vary. The Performance Testing Plan will have final details.)
- 5.3. Check that the heat press pressure is set to 20 psi or Light Pressure.
- 5.4. Align the metal onto the center of the pre-printed transfer face down. Tape on two sides of the transfer paper, so it does not ghost when removing it from the heat press.
- 5.5. Place a blowout sheet of tissue/Kraft paper down to protect the bottom pad of the heat press.
- 5.6. Place substrate face down, with attached transfer face up, on top of protective paper on the bottom table. For thin aluminum, we want to transfer the heat through it so it gets even heat. Note: The printed side of the transfer should be facing up towards the heat with the back of the metal being visible before putting down the top blowout sheet.
- 5.7. Place a blowout sheet of tissue/Kraft paper down over the top of the metal and transfer sheet to protect the top heating element of the heat press.
- 5.8. Engage the heat press to transfer ink to the metal insert for 105 Seconds (1 minute and 45 seconds). specified when setting up the press.
- 5.9. After the dwell time has finished, remove the metal sign and transfer from the heat press.
- 5.10. Separate the transfer from the metal insert quickly but carefully so there is no ghosting and set aside to cool. Note: Metal will be hot! Please use precautions and safety gloves.
- 5.11. Place the used transfer paper in the trash.
- 5.12. After the metal has cooled to be able to comfortably touch it with your bare hands, inspect it for quality defects.
- 5.13. Place all tissue/Kraft paper and transfer paper in the trash.
- 5.14. Inspect the rest of the work area to ensure it is put back the way it was before you started.
- 5.15. Alert the judge that you have completed the project and they will inspect your work and place the completed project on the display table.
- 5.16. Evaluate image quality.
- 5.17. Equipment clean up and workstation housekeeping.

### **GIS 6.0 — Transfer on a glass surface (like cutting boards).**

- 6.1. Transfer image on a glass surface.
  - 6.1.1. Measure and cut the image transfer to fit the glass surface.
  - 6.1.2. Position transfer and glass product on the heat press.
    - 6.1.2.1. Place transfer face down on the glass product.
  - 6.1.3. Apply heat resistant tape to hold transfer and glass product in position.
  - 6.1.4. Place a ½ " to ¾" Nomex felt pad on heat press lower platen.
  - 6.1.5. Place a cover/blowout sheet on felt pad.
  - 6.1.6. Place the glass product face up on cover/blowout sheet.
  - 6.1.7. Place transfer face down on glass product.
  - 6.1.8. Place a second cover/blowout sheet atop the transfer and cutting board.
  - 6.1.9. Check press temperature for 400 degrees and timer for approximately 9 minutes. (Some products may vary. The Performance Testing Plan will have final details.)
  - 6.1.10. Check press setting for medium pressure.
  - 6.1.11. Close the heat press.



- 6.1.12. Press glass product and transfer until the timer alarm sounds.
- 6.1.13. Open the heat press, wearing gloves. (Note: The 400-degree heat press, transfer paper and glass product will burn hands.)
- 6.1.14. Remove top cover/blowout sheet.
- 6.1.15. Remove the glass product from heat press.
- 6.1.16. Remove heat resistant tape and peel transfer paper from glass product.
- 6.1.17. Place glass product on a cool smooth surface and let it air cool.
- 6.2. Evaluate image quality.
- 6.3. Equipment cleanup and workstation housekeeping.

### **GIS 7.0 — Transfer on tiles (ceramic).**

- 7.1. Set up press for preprint operation.
  - 7.1.1. Preheat heat press to 400 degrees. (Some products may vary. The Performance Testing Plan with have final details.)
  - 7.1.2. Set timer for 8 minutes. (Some products may vary. The Performance Testing Plan with have final details.)
  - 7.1.3. Adjust the press for medium pressure.
- 7.2. Print sublimation transfers on tiles (ceramic).
  - 7.2.1. Measure and cut image transfer to fit tile.
  - 7.2.2. Position transfer and tile on the heat press.
    - 7.2.2.1. Place transfer face down on the tile face.
  - 7.2.3. Apply heat resistant tape to hold the sublimation transfer and tile in position.
  - 7.2.4. Place a ½" to ¾" Nomex felt pad on bottom platen of heat press.
  - 7.2.5. Place a piece of protective cover/blowout sheet atop Nomex pad.
  - 7.2.6. Place tile face up on cover/blowout sheet. (**Note:** Transfer image will be taped to the tile face to face.)
  - 7.2.7. Place a second cover/blowout sheet atop the transfer and tile.
  - 7.2.8. Check heat press timer for an 8- minute dwell.
  - 7.2.9. Check heat press temperature for 400 degrees.
  - 7.2.10. Close the heat press.
  - 7.2.11. Press tile and transfer until the timer alarm sounds.
  - 7.2.12. Open the heat press, wearing gloves. (**Note:** The 400-degree heat press, transfer paper and tile will burn hands.)
  - 7.2.13. Remove top cover/blowout sheet.
  - 7.2.14. Remove heat resistant tape and peel transfer paper from tile.
  - 7.2.15. Place tile on a cool smooth surface and let it air cool.
- 7.3. Evaluate image quality.
- 7.4. Equipment cleanup and workstation housekeeping.

### **GIS 8.0 — Transfer on hard board.**

- 8.1. Set up press for preprint operation.
  - 8.1.1. Preheat heat press to 400 degrees. (Some products may vary. The Performance Testing Plan with have final details.)
  - 8.1.2. Set timer for approximately 1 minute. (Some products may vary. The Performance Testing Plan with have final details.)
  - 8.1.3. Adjust the press for medium pressure.
- 8.2. Print sublimation transfers for hardboard.

- 8.2.1. Measure and cut the image transfer to fit the hardboard.
- 8.2.2. Place the sublimation transfer on the table face up.
- 8.2.3. Place the hardboard face down onto transfer and center it in all directions.
- 8.2.4. Place heat tape to hold sublimation transfer and hardboard together.
- 8.2.5. Place a ½" to ¾" Nomex felt pad on bottom platen of heat press.
- 8.2.6. Place a piece of protective cover/blowout sheet atop Nomex pad.
- 8.2.7. Place hardboard face up on the cover/blowout sheet.  
*Note:* Transfer image will be taped to the hard board face to face.
- 8.2.8. Place a second cover/blowout sheet atop the transfer and hardboard
- 8.2.9. Check heat press timer for a 1-minute dwell.
- 8.2.10. Check heat press temperature for 400 degrees.
- 8.2.11. Close the heat press
- 8.2.12. Press tile and transfer until the timer alarm sounds.
- 8.2.13. Open the heat press, wearing gloves.  
*Note:* The 400-degree heat press, transfer paper and hard board will burn hands.
- 8.2.14. Remove top cover/blowout sheet.
- 8.2.15. Remove heat resistant tape and peel transfer paper from hard board.
- 8.2.16. Place the hard board on a cool surface and let it air cool.
- 8.3. Evaluate image quality.
- 8.4. Equipment cleanup and workstation housekeeping.

### **GIS 9.0 — Transfer on polyester knit (soft goods).**

- 9.1. Set up press for preprint operation.
  - 9.1.1. Preheat heat press to 400 degrees. (Some products may vary. The Performance Testing Plan with have final details.)
  - 9.1.2. Set timer for approximately 10 seconds. (Some products may vary. The Performance Testing Plan with have final details.)
  - 9.1.3. Adjust the press for medium pressure.
- 9.2. Pre-press polyester knit.
  - 9.2.1. Use lint roller to remove dust and lint.
  - 9.2.2. Place cover/blowout sheet on the lower platen of heat press.
  - 9.2.3. Place polyester knit on heat press with a second cover/blowout sheet between shirt back and front.
  - 9.2.4. Press for 10 seconds at 400 degrees with medium pressure.
  - 9.2.5. Allow polyester knit to cool before positioning transfer.
- 9.3. Transfer sublimation transfers to polyester knit.
  - 9.3.1. Trim excess edges from transfer.
  - 9.3.2. Place cover/blowout sheet on the lower platen of heat press.
  - 9.3.3. Place polyester knit on heat press with a second cover/blowout sheet between front and back of shirt.
  - 9.3.4. Position transfer face down on polyester knit. Use heat transfer tape or spray tack adhesive to attach the transfer to polyester knit.
  - 9.3.5. Place cover/blowout sheet on top of transfer.
  - 9.3.6. Reset heat transfer press timer for 55-second dwell. (Some products may vary. The Performance Testing Plan with have final details.)
  - 9.3.7. Check heat transfer press temperature for 400 degrees.
  - 9.3.8. Close the heat press.

- 9.3.9. Press polyester knit and transfer until the timer alarm sounds.
- 9.3.10. Open the press.
- 9.3.11. Remove the cover/blowout sheets.
- 9.3.12. Remove tape and peel transfer paper from polyester knit promptly.
- 9.4. Evaluate image quality.
- 9.5. Equipment clean up and workstation housekeeping.

### **GIS 10.0 – Transfer on stone.**

- 10.1. Transfer sublimation transfers on stone.
  - 10.1.1. Measure and cut image transfer to fit stone.
  - 10.1.2. Position transfer and stone on the heat press.
  - 10.1.3. Place transfer face down on the stone face.
  - 10.1.4. Apply heat resistant tape to hold the sublimation transfer and stone in position.
  - 10.1.5. Place a ½" to ¾" Nomex felt pad on bottom platen of heat press.
  - 10.1.6. Place a piece of protective cover/blowout sheet atop Nomex pad.
  - 10.1.7. Place stone face up on cover/blowout sheet.
    - Note:* Transfer image will be taped to the stone face to face.
  - 10.1.8. Place a second cover/blowout sheet atop the transfer and stone.
  - 10.1.9. Check heat press timer for a 1 minute 20 seconds dwell. (Some products may vary. The Performance Testing Plan with have final details.)
  - 10.1.10. Check heat press temperature for 400 degrees. (Some products may vary. The Performance Testing Plan with have final details.)
  - 10.1.11. Close the heat press.
  - 10.1.12. Press stone and transfer until the timer alarm sounds.
  - 10.1.13. Open the heat press wearing gloves.
    - Note:* The 400-degree heat press, transfer paper and stone will burn hands.
  - 10.1.14. Remove top cover/blowout sheet.
  - 10.1.15. Remove heat resistant tape and peel transfer paper from stone.
  - 10.1.16. Place stone on a cool smooth surface and let it air cool.
- 10.2. Evaluate image quality.
- 10.3. Equipment cleanup and workstation housekeeping.

### **GIS 11.0 – Transfer on fiberglass reinforced plastic.**

- 11.1. Transfer sublimation transfers to fiberglass reinforced plastic (FRP) materials.
  - 11.1.1. Remove from the FRP sign blank's protective film.
  - 11.1.2. Place the transfer face up on workstation table.
  - 11.1.3. Center the FRP sign blank to be printed on in all directions.
  - 11.1.4. Tape the FRP sign blank to be printed to the transfer.
  - 11.1.5. Place a cover/blowout sheet on the lower platen of heat press.
  - 11.1.6. Place the transfer face up on the cover/blowout sheet.
  - 11.1.7. Place the FRP sign blank on the transfer followed by a second sheet of cover/blowout.
  - 11.1.8. Check heat press timer for a 1 minute 45-second dwell. (Some products may vary. The Performance Testing Plan with have final details)
  - 11.1.9. Check heat press temperature for 400 degrees. (Some products may vary. The Performance Testing Plan with have final details.)
  - 11.1.10. Close the heat press.

- 11.1.11. Open the heat press wearing gloves.
- 11.1.12. Remove cover/blowout and transfer from the FRP sign blank, which has a transferred image.
- 11.1.13. Place the FRP sign on a cool surface and let it air cool.
- 11.2. Evaluate image quality.
- 11.3. Equipment cleanup and workstation housekeeping.

**GIS 12.0 – Transfer on pennant or car flag.**

- 12.1. Transfer an image to a pennant or car flag.
  - 12.1.1. Measure and cut the transfer to proper size to fit car flag.
  - 12.1.2. Accurately position a transfer onto a car flag blank.
  - 12.1.3. Place a cover/blowout sheet on the press.
  - 12.1.4. Put car flag and transfer on the heat press, transfer on top face down.
  - 12.1.5. Put another cover/blowout sheet on top of the transfer and car flag.
  - 12.1.6. Check heat transfer press timer for 45-second dwell. (Some products may vary. The Performance Testing Plan will have final details.)
  - 12.1.7. Check heat transfer press temperature for 400 degrees. (Some products may vary. The Performance Testing Plan will have final details.)
  - 12.1.8. Close the heat press.
  - 12.1.9. Press car flag and transfer with medium pressure.
  - 12.1.10. Open the heat press when the timer alarm sounds.
  - 12.1.11. Remove cover/blowout sheet and peel transfer paper from car flag immediately.
  - 12.1.12. Place car flag on counter and let it cool.
- 12.2. Evaluate image quality.
- 12.3. Equipment cleanup and workstation housekeeping.

**GIS 14.0 – Take a written technical knowledge test.**

- 14.1. Test knowledge of the overall sublimation process and surrounding skills of design and printing.

**GIS 15.0 – Participate in an oral professional assessment.**

- 15.1. Create and submit a one-page resume.
- 15.2. Respond positively to questions related to the five areas that follow:
  - 15.2.1. Describe personal ability to handle job assignments.
  - 15.2.2. Demonstrate ability to answer questions in technical terms.
  - 15.2.3. Explain how to handle workplace situations in a professional manner.
  - 15.2.4. Demonstrate critical thinking during the oral interview.
  - 15.2.5. Present a realistic self-concept.

**GIS 16.0 – Perform a Quality Control Assessment.**

- 16.1. Evaluate decorated products and assess the quality of the image. Criteria include image placement, image alignment, flaws in the printed image, etc.

## GIS 17.0 — 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 competition.

### 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 percentages.
- Solve 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 graphic imaging sublimation process.)

### Science Skills

- Phase Transition: Sublimation is when a substance changes directly from solid to gas without becoming a liquid in between.
- Sublimation Temperature: Every substance has a specific temperature at which it turns from solid to gas, skipping the liquid state.
- Sublimation Inks: These inks contain dyes that turn into gas when heated, bonding with surfaces and creating vibrant prints.
- Polyester Requirement: Sublimation works best on polyester fabrics or materials coated with polyester due to their molecular structure.
- Heat and Pressure: Sublimation needs even heat to change ink to gas and even pressure to ensure good contact between transfer paper and the substrate.
- Color Reproduction: Sublimation creates detailed and vivid prints by making ink a permanent part of the substrate, not just sitting on top.
- Cooling Process: Allowing the substrate to cool solidifies the sublimated gas, ensuring the ink becomes a permanent part of the material.
- Surface Compatibility: Sublimation works only on materials that can withstand the heat and allow molecular-level bonding of ink.

- Challenges: Controlling factors like temperature and pressure is crucial, and working with suitable substrates limited to those with polyester content or coatings.

### **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: [www2.mcrel.org/compendium/](http://www2.mcrel.org/compendium/).*

### **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 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).*