

# TSA Events by Career Cluster

## Architecture and Construction Technology

### **Architectural Design HS**

In response to the annual design challenge, participants develop a set of architectural plans and related materials, and construct both a physical and computer-generated model to accurately depict their design. Semifinalists deliver a presentation and participate in an interview.

### **Computer-Aided Design (CAD), Architecture HS**

Participants use complex computer graphic skills, tools, and processes to respond to a design challenge in which they develop representations of architectural subjects, such as foundation and/or floor plans, and/or elevation drawings, and/or details of architectural ornamentation or cabinetry. The solution to the design challenge and participant answers in an interview are evaluated.

### **Computer-Aided Design (CAD), Engineering HS**

Participants use complex computer graphic skills, tools, and processes to respond to a design challenge in which they develop three-dimensional representations of

engineering subjects, such as a machine part, tool, device, or manufactured product. The solution to the design challenge and participant answers in an interview are evaluated.

### **Construction Challenge MS**

Participants submit a scale model, display, and documentation portfolio for a design that fulfills a community need related to construction. Semifinalists deliver a presentation about their entry and participate in an interview.

### **FORE!**

Participants (one elementary and one high school student) design and build a miniature golf course hole for a fictitious parks and recreation department which is renovating a municipal golf course.

### **Off the Grid- MS**

Based on the annual theme, participants conduct research on a sustainable architectural design for a home in a country not their own. Participants produce a portfolio and create a display and a model. Semifinalists present their design and participate in an interview.

### **Structural Design and Engineering HS**

Participants apply the principles of structural engineering to design and construct a structure that complies with the

annual challenge. An assessment of the required documentation and the destructive testing of the structure (to determine its design efficiency) determine both semifinalists and finalists.

### **Structural Engineering MS**

Participants apply the principles of structural engineering to design and construct a structure that complies with the annual challenge. An assessment of the required documentation and the destructive testing of the structure (to determine its design efficiency) determine both semifinalists and finalists.

### **Theatrical Set Design**

Participants develop a set of architectural plans and related materials for an annual theatrical set design challenge and construct a computer-generated model to accurately depict their design.

## **Communication** **Technology**

### **Audio Podcasting HS**

Participants use digital audio technology to create original content for a podcast piece that addresses the annual theme. The podcast must feature high level storytelling techniques, voice acting, and folly sound effects; the full entry must include documentation of the podcast development process and elements. Semifinalists participate in an interview.

### **Challenging Technology Issues MS**

Following the onsite random selection of a technology topic from a group of pre-conference posted topics, participants work to prepare for and deliver a debate-style presentation, in which they explain opposing views of the selected topic.

### **Children's Stories MS/HS**

Participants create an illustrated children's story based on the annual theme. The entry product is a physical storybook of artistic, instructional, and social value. Semifinalists read their story aloud and participate in an interview.

### **Comic Book Design MS/HS**

Participants design and produce a comic book as well as a documentation portfolio containing thumbnails, pencil drawings, inks, color, and cover artwork.

### **Debating Technological Issues HS**

Participants research the annual topic and subtopics and prepare for a debate against a team from another chapter. Teams are instructed to take either the pro or con side of a selected subtopic, submit a summary of references, and use their research to support their assigned position. The quality of a team's debate determines semifinalists and finalists.

### **Essays on Technology MS/HS**

Participants are given two hours to write a research-based essay - with citations - using an essay prompt and two (2) or more sources provided onsite. The essay must include insightful thoughts about the

current technological topic presented in the prompt.

### **Prepared Speech MS**

Participants deliver a timed speech that relates to the theme of the current national TSA conference. Semifinalists and finalists are determined using the same competition procedure.

### **Promotional Design HS**

Participants use computerized graphic communications layout and design skills to produce a promotional resource packet. The resource must address the annual theme/problem and include at least four printed publication items and required documentation. Semifinalists demonstrate publishing competency in an onsite technical design challenge.

### **Promotional Marketing MS**

Participants create and submit a marketing portfolio and required elements that address the annual theme/problem. Semifinalists complete a layout and design assignment for evaluation.

## **Computer Science and Information Technology**

### **Coding MS/HS**

Participants take a written test, which concentrates on aspects of coding, to qualify for the semifinal round of competition. Semifinalists develop a software program – in a designated

amount of time – that accurately addresses an onsite problem.

### **Cybersecurity Foundations MS**

Participants take a written test that assesses knowledge of cybersecurity vocabulary and the skills needed to execute common cybersecurity tasks. Using digital presentation software, semifinalists deliver a presentation that addresses the annual theme/problem.

### **Cybersecurity HS**

Participants respond to a cybersecurity challenge by identifying a breach in computer security. Participants will solve onsite challenges in a specified, limited amount of time.

### **Data Science and Analytics MS**

Participants conduct research on the annual topic, collect data, use analytics to assess the data and make predictions, and document their work in a portfolio and a display. To address a challenge presented onsite at the conference, semifinalists review specific data sets, provide insights, make predictions, and present their findings for evaluation.

### **Foundations of Information Technology (FIT) MS**

Participants take a written exam that covers the essential IT skills and knowledge that are needed to execute tasks commonly performed by IT professionals. Topics include operating systems, network connectivity, and software applications.

## **Microcontroller Design MS**

To address the annual theme/problem, participants design and create a working digital device, document the development process, and demonstrate their product as part of a presentation.

## **Software Development HS**

Participants use their knowledge of cutting-edge technologies, algorithm design, problem-solving principles, effective communication, and collaboration to design, implement, test, document, and present a software development project of educational or social value. Both semifinalists and finalists are determined based on the quality of the presentation and project.

## **System Control Technology HS**

Participants develop a solution to a problem (typically one from an industrial setting) presented onsite at the conference. They analyze the problem, build a computer-controlled mechanical model, program the model, demonstrate the programming and mechanical features of the model-solution in an interview, and provide instructions for evaluators to operate the model.

## **Video Game Design MS/HS**

Participants design, build, and launch an E-rated online video game – with accompanying required documentation - that addresses the annual theme. Semifinalists participate in an interview to demonstrate the knowledge and expertise they gained during the development of the game.

## **Virtual Reality Visualization (VR) HS**

Participants use video and 3D computer graphics tools and design processes to create a two-to-three-minute VR visualization (accompanied by supporting documentation) that addresses the annual theme. Semifinalists deliver a presentation about their visualization and participate in an interview.

## **Webmaster MS/HS**

Participants design, build, and launch a website that addresses the annual challenge. Semifinalists participate in an interview to demonstrate the knowledge and expertise gained during the development of the website.

## **Leadership**

### **Career Prep MS/MS**

Based on the annual theme, participants conduct research on a technology-related career, prepare a letter of introduction to a potential employer, and develop a job-specific resume. Semifinalists participate in a mock job interview.

### **Chapter Team MS/HS**

Participants take a parliamentary procedure written test to qualify for the semifinal round of competition. Semifinalists conduct an opening ceremony, items of business, parliamentary actions, and a closing ceremony.

### **Colorado Statesman**

The Colorado Statesman pin recognizes Colorado TSA members who excel in

knowledge of the organization, its foundation, and its history. The Colorado Statesman exam is given at the annual State Conference.

### **Community Service Video MS**

Participants create a video that depicts the local TSA chapter's involvement in a community service project. Semifinalists deliver a presentation on the project and participate in an interview.

### **Extemporaneous Speech HS**

Participants select a technology-related or TSA topic from among three topic cards and prepare and give a three-to-five-minute speech that communicates their knowledge of the chosen topic. The quality of the speech determines advancement to the semifinalist level of competition, for which an identical competition procedure is followed to determine finalists.

### **Future Technology Teacher HS**

Participants research a developing technology, prepare a video showing an application of the technology in the classroom, and create a lesson plan/activity that features the application and connects to the Standards for Technological and Engineering Literacy (STEL), as well as STEM initiatives and integration. Semifinalists demonstrate the lesson plan and answer questions about their presentation.

### **Leadership Strategies MS**

Participants prepare for and deliver a presentation about a specific challenge that officers of a TSA chapter might encounter. Semifinalists follow the same competition

procedure but must respond to a different chapter challenge.

### **Prepared Presentation HS**

Participants deliver a three-to-five-minute oral presentation related to the current national TSA conference theme. Both semifinalists and finalists are determined based on the quality of the presentation and the appropriate use and content of the accompanying required slide deck.

### **Tech Bowl MS**

Participants demonstrate their knowledge of TSA and concepts addressed in technology content standards by completing a written, objective test. Semifinalists participate in a head-to-head, team competition.

## **Manufacturing and Transportation Technology**

### **Crash Test MS**

Participants (one elementary student and one middle school student) design and build a "crash test car" that will be tested in multiple head-on and rear-end collisions. The survivability of the passenger, a regular raw egg, will be a determining factor in the car's success.

### **Dragster Design MS/HS**

Participants design, draw, and construct a CO<sub>2</sub>-powered dragster that adheres to specifications, design and documentation requirements, and the annual theme.

Semifinalists compete in a double-elimination race and participate in an interview.

### **Drone Challenge (UAV) HS**

Participants design, build, assemble, document, and test fly an open-source Unmanned Aerial Vehicle (UAV) according to the stated annual theme/problem specifications. The required documentation portfolio must include elements such as a photographic log, wiring schematics, and a description of the programming software used. Semifinalists participate in an interview.

### **Flight MS**

Participants submit a documentation portfolio and fabricate a glider designed to stay in flight for the greatest elapsed time. Semifinalists use their technical drawing skills to construct a glider that is flown onsite.

### **Flight Endurance HS**

Participants design, build, fly, and adjust (trim) a rubber-band powered model aircraft to make long endurance flights inside a contained airspace. Documentation (including elements such as attributes of the model design, drawings, and an analysis of the trim modifications), an inspection of the model and the required model flight box, and official times for two flights are aspects of the evaluation.

### **Junior Solar Sprint (JSS) MS**

Participants apply STEM concepts, creativity, teamwork, and problem-solving skills to design, construct, and race a solar-powered model car. Documentation of the process is required. [Learn more about JSS](#), then [register on Cvent](#) to begin the JSS journey.

### **Manufacturing Prototype HS**

Participants design, fabricate, and use Computer Integrated Manufacturing (CIM) to create a product that addresses the annual theme. A documentation portfolio and the completed product prototype are submitted for evaluation. Semifinalists give a product “sales pitch” and demonstration.

### **Mass Production MS**

Participants manufacture a marketable product that addresses the annual theme. The development of the product prototype is documented in a portfolio that presents participant knowledge and skills related to the mass production process. Through a demonstration of the prototype and an interview, semifinalists support the viability of the prototype.

### **Mechanical Engineering MS**

Participants design, document, and build a mechanical device (mousetrap car) that incorporates the elements of the annual theme/problem – and then race the car. Finalists are determined based on an evaluation of the documentation portfolio, the race exit interview, and the race placement.

## **Mines Formula Junior Design**

The Society of Automotive Engineers (SAE) hosts a collegiate design series that challenges universities to design a  $\frac{3}{4}$  formula racing car (FSAE). To show the skill of young engineers, teams will design a system of a Formula SAE car.

## **Rat Trap Drag Race**

Participants demonstrate their ability to design and construct a vehicle powered only by a standard rat trap spring, to travel a specified distance as fast as possible.

## **Rubber Band Powered Car**

Participants demonstrate their ability to design and construct a vehicle powered only by a rubber band and a bladed propeller, to travel a specified distance as fast as possible.

## **Senior Solar Sprint HS**

The Senior Solar Sprint (SSS) competition is funded by the [Army Educational Outreach Program \(AEOP\)](#) and managed by TSA. Students apply scientific understanding, creativity, experimentation, and teamwork to design, build, and race a model solar vehicle that carries a payload; documentation of the process is required. Students must [register on Cvent](#) to participate and begin the SSS journey.

## **Transportation Modeling HS**

Participants research, design, and produce a scale model of a vehicle that complies with the annual design problem. A display for the model and a documentation portfolio – containing elements such as a description

of the vehicle, photographs and commentary detailing the vehicle production, and technical illustrations – are required. Semifinalists participate in an interview.

## **VEX Robotics Competition MS/HS**

Participants collaborate on a robotics project in which they build a robot that incorporates the relationship among STEM fields; the competition culminates in a head-to-head game that assesses the efficiency and productivity of the robot.

## **STEM General**

### **CAD Foundations MS**

Participants demonstrate their understanding of CAD fundamentals by creating a two-dimensional (2-D) graphic representation of an engineering part or object and answering questions from evaluators about their entry.

### **Catapult MS/HS**

Participants design and produce a working catapult, within specified guidelines, that is adjustable and propels hacky sacks (weighing about 50 grams each) at a scoring target between 15' and 25' away.

### **Electrical Applications MS**

Participants take a written test on basic electrical and electronic theory. In response to an onsite challenge, semifinalists assemble a specified circuit from a schematic diagram, make required electrical measurements, and explain their solution in an interview.

## **Engineering Design HS**

Participants develop a solution to an annual theme that is based on a specific challenge noted by the National Academy of Engineering (NAE) in its compilation of the grand challenges for engineering in the 21st century. The solution will include a documentation portfolio, a display, and a model/prototype. Semifinalists deliver a presentation and participate in an interview.

## **Inventions and Innovations MS**

To address the annual theme, participants research a need - and brainstorm a solution - for an invention or innovation of a device, system, or process. Participants document their work in an interactive display and the creation of a model/prototype. Semifinalists deliver a presentation about their work and participate in an interview.

## **Problem Solving MS**

Participants use problem-solving skills to design and build a solution to an onsite challenge. Solutions are evaluated using measures appropriate to the challenge, such as elapsed time, horizontal or vertical distance, and/or strength.

## **Robotic Design HS**

Participants will design, build and test a remote-controlled robot to carry out a specific challenge (ex: bomb disposal).

## **Technical Design MS**

Participants demonstrate their ability to use the technical design process to solve an engineering design problem provided onsite

at the conference. Required elements of the entry are presented in a portfolio that includes technical drawings for a minimum of three viable solutions.

## **Technology Problem Solving HS**

Participants use problem-solving skills to design and construct a finite solution to a challenge provided onsite at the conference. Solutions are evaluated at the end of 90 minutes using measures appropriate to the challenge, such as elapsed time, horizontal or vertical distance, and/or strength.

## **Video Game Design MS/HS**

Participants design, build, provide documentation for, and launch an E-rated, online game on a subject of their choice. Onsite at the conference, semifinalists deliver a presentation and participate in an interview to demonstrate the knowledge and expertise gained during the development of the game.

## **STEM and the Arts**

### **Animatronics HS**

To address the annual design challenge, participants exhibit and demonstrate their knowledge of mechanical and control systems by creating an animatronic device with a specific purpose (i.e., communicate an idea, entertain, demonstrate a concept, etc.) that includes sound, lights, and an appropriate surrounding environment (a display).



### **Board Game Design HS**

Participants develop, build, and package a board game that focuses on a subject of their choice. Creative packaging, and the instructions, pieces, and cards associated with the pilot game will be evaluated. Semifinalists set up the game, demonstrate how the game is played, explain the game's features, and discuss the design process.

### **Digital Photography MS**

Participants produce and submit a digital photographic portfolio that relates to the annual theme. Semifinalists participate in an onsite photographic challenge and a presentation/interview.

### **Digital Video Production HS**

Participants develop and submit a digital video and a documentation portfolio (including such items as a storyboard, script, summary of references and sources, and equipment list) that reflects the annual theme. Semifinalists participate in an interview.

### **Fashion Design and Technology MS/HS**

To address the annual theme, participants demonstrate expertise in fashion design principles by creating a wearable garment, garment patterns, and a documentation portfolio. Semifinalist teams present their garment designs (worn by team models), discuss the design process with evaluators, and respond to interview questions.

### **Music Production HS**

Participants produce an original musical piece designed to be played during the closing session of the national TSA conference. The quality of the musical piece and required documentation (including elements such as a plan of work, self-evaluation, and a list of hardware, software, and instruments used) determines advancement to the semifinal level of competition, during which semifinalist participants are interviewed.

### **On Demand Video MS/HS**

Once participants receive the challenge details (required criteria, such as props and a line of dialogue) at the national TSA conference, they have 36 hours to produce a 60-second film that showcases video skills, tools, and communication processes. The quality of the completed video production determines the finalists.

### **Photographic Technology HS**

Participants produce a photographic portfolio - demonstrating expertise in photo and imaging technology processes - to convey a message based on the annual theme. Semifinalists have 24 hours to complete a portfolio of photos (with required documentation) taken onsite at the national TSA conference. Finalists are determined based on the quality of the semifinal portfolio, the portfolio presentation, and interview responses.

### **Silent Movie**

Participants use video production skills to create a silent movie and a musical score to

accompany the film. Silent films encourage students to think about music and its application to other forms of art and technology.

### **STEM Animation MS**

Participants design and create a STEM animation video and documentation portfolio to address the annual theme/problem. Semifinalists present their animation and explain the elements of their portfolio/entry.

## **Technology and Research**

### **Assistive Technology Design**

Participants research, design, and display an assistive technology device or product for a special population within their local community.

### **Biotechnology MS/HS**

Participants select a contemporary biotechnology problem that addresses the annual theme and demonstrates understanding of the topic through documented research, the development of a solution, a display (including an optional model or prototype), and an effective multimedia presentation. Semifinalists deliver a presentation and participate in an interview.

### **Forensics MS/HS**

Participants take a written test of basic forensic science to qualify for the semifinal round of competition. Semifinalists examine a mock crime scene and demonstrate their knowledge of forensic science through

crime scene analysis, with the findings synthesized in a written report/analysis.

### **Medical Technology MS**

Participants conduct research on a contemporary medical technology issue related to the annual theme, document their research, create a display, and build a prototype. Semifinalists deliver a presentation about their entry and participate in an interview.

### **System Control Technology MS/HS**

Participants develop a solution to a problem (typically one from an industrial setting) presented onsite at the conference. They analyze the problem, build a computer-controlled mechanical model, program the model, demonstrate the programming and mechanical features of the model-solution in an interview, and provide instructions for evaluators to operate the model.