OVERVIEW

Participants create a 3D computer model(s) of an engineering or machine object, such as a machine part, tool, device, or manufactured product.

PURPOSE

Participants have the opportunity to use complex computer graphic skills, tools, and processes to develop three (3)-dimensional representations of engineering subjects.

ELIGIBILITY

Participants may compete in CAD 2D, Architecture or CAD 3D, Engineering, but not both. Participants are limited to two (2) individuals per state.

TIME LIMITS

A. One (1) hour set-up time
B. Four (4) hours to develop the drawing(s)
C. One (1) hour for final evaluation

ATTIRE

Business Casual dress as described in Competitive Events Attire is the minimum requirement.

PROCEDURE

A. Participants bring their own computer systems (see regulations below) to the event area at the time and place stated in the conference program.

B. Each participant with one (1) assistant (an instructor, fellow student, or adult chaperone) is allowed one (1) hour to set-up and test equipment. At the end of the one (1)-hour set-up period, assistants are required to leave the area.
C. Participants are given a design problem to solve during a four (4)-hour work session.

D. Participants work independently, without assistance from evaluators, teachers, fellow participants, other students or observers.

E. Participants are advised to save their work onto their hard drives every fifteen (15) minutes.

F. At the end of the session, participants save their work on their hard drives and on a CD or DVD.

G. Printed entries are labeled with each participant’s conference identification number and collected.

H. One (1) additional hour is spent interviewing the participants and evaluating the entries from each participant’s computer monitor.

I. Participants break down and remove their equipment.

REGULATIONS

A. Participants provide their own systems, including hardware [only one (1) CPU and one (1) monitor are allowed per student], software, two blank CDs or DVDs, a grounded 50’ extension cord, power strip/surge protector, and reference materials. It is not necessary to bring a printer for this event. Laptop computers are recommended; computers must be equipped with a CD or DVD drive with which to save the solution.

B. Conference coordinators supply a table, chair, sketching paper, pencil, and electricity for each participant.

C. Participants are not permitted to leave the event room without permission from the event coordinator. If a participant must use the rest room, s/he is accompanied by an escort.

D. Participants are not permitted to share solutions to problems, reference materials, hardware, or software.

E. Participants identify their work using only their conference identification number.

F. All disks and the work they contain become the property of TSA, Inc.

G. Breakdown of equipment is permitted only after the work of all participants has been evaluated.

Read the General Rules and Regulations in the front of this guide for information that applies to all of TSA’s competitive events.
EVALUATION

Entries are evaluated on screen according to the criteria on the official rating form.

STEM INTEGRATION

This event has connections to the STEM standards noted below. Please refer to the STEM integration section of this guide.

Science, Technology, Engineering, Mathematics

PRIMARY LEADERSHIP SKILLS

Leadership skills promoted in this event:

- COMMUNICATION — Students use CAD to communicate a design. Suggested leadership lessons: *Promote It* and *Put It Together*
- CREATIVE THINKING — Students create representations of ideas. Suggested leadership lessons: *Color Hunt* and *Creative Techniques*
- EVALUATION — Students evaluate a design according to requirements. Suggested leadership lessons: *Evaluation Methods* and *Seven Components of Effective Evaluation*

*Additional leadership skills promoted in this event: organization, problem solving, self-esteem, teamwork*

TSA AND CAREERS

This competition has connections to one or more of the career areas featured in the TSA AND CAREERS section of this guide. Use *The 16 Career Clusters* chart and the *TSA Competitions and Career Clusters* grid as resources for information about careers.

CAREERS RELATED TO THIS EVENT

Architect
Automobile designer
CAD professional
Machine designer
COMPUTER-AIDED DESIGN (CAD) 3D, ENGINEERING

EVENT COORDINATOR INSTRUCTIONS

PERSONNEL
A. Event coordinator
B. Evaluators, two (2) or more
C. Assistants, one (1)

MATERIALS
A. Coordinator’s notebook, containing:
   1. Event guidelines, five (5) copies
   2. Official rating forms, nine (9) copies (3 per evaluator)
   3. List of entries with finalist report
   4. List of evaluators/assistants
   5. Four (4) pens and three (3) calculators
   6. Results envelope
B. Tables and chairs for competitors and evaluators
C. One hundred twenty (120) sharpened #2 pencils and one (1) ream of 8½" x 11" white copier paper
D. Statement of problem as a hard-copy sketch, fifty (50) copies.

RESPONSIBILITIES
A. Upon arrival at the conference, report to the CRC room and check the contents of the coordinator’s notebook. Review the event guidelines and check to see that enough evaluators/assistants have been scheduled.
B. Inspect the area(s) in which the event is being held for appropriate set-up, including room size, chairs, tables, outlets, etc. Notify the event manager of any potential problems.
C. At least one (1) hour before the event is to begin, meet with your evaluators and assistants to review time limits, procedures, regulations, evaluation and all other details related to the event. If questions arise that cannot be answered, speak to the event manager before the event begins.
D. As participants arrive, check the entry list and assign them to work stations.
E. Begin the event at the scheduled time. All participants and evaluators should be in the room at this time. Participants not present may be disqualified. In order to compete, participants must be on the entry list or must have approval of the CRC chairperson.

F. Allow one (1) hour for participants and their assistants [no more than one (1) per participant] to set up equipment. At the end of the one (1) hour set-up time, non-participants are required to leave the event area. Review with the participants the time limits, procedures, regulations, and protocol of the event.

G. Remind participants to save their work at regular time intervals.

H. Distribute copies of the CAD problem. Answer any appropriate questions concerning the problem. Begin the event and announce the ending time.

I. During the event, the evaluators and assistants monitor and evaluate the participants’ progress and work.

J. Announce time remaining to work at one (1) hour, thirty (30) minutes, fifteen (15) minutes, and five (5) minutes before time is called.

K. When time is called, participants stop and save their work on their hard drives and on their CDs or DVDs.

L. Collect the entries, checking to be sure each one is labeled with the student’s conference identification number.

M. Participants remain at their computers for up to one (1) hour as evaluation of the entries is completed.

N. The evaluators review the entries independently and submit their signed official rating forms to the event coordinator.

O. For participants who violate the rules, the decision either to deduct twenty percent (20%) of the total possible points or to disqualify a participant must be discussed and verified with the evaluators, event coordinator, and a CRC manager. Secure the initials of the event coordinator and manager on the rating form.

P. Breakdown of equipment is permitted only after the work of ALL participants has been evaluated.

Q. Complete and submit the finalist report, which includes a ranking of the ten (10) finalists, and all related forms in the results envelope to the CRC room.

R. If necessary, manage security and the removal of materials from the event area.
# Computer-Aided Design (CAD) 3D, Engineering

## 2011 & 2012 Official Rating Form

### Participant/Team ID#

### Evaluative Criteria

**Modeling technique (25 pts.)**
- Correct geometry ................................................15 pts.
- Appropriate procedures ......................................10 pts.

**Dimensioning** (correct size and proportion) ........10 pts.

**Design, originality, and creativity (25 pts.)**
- Design .................................................................10 pts.
- Functionality ........................................................10 pts.
- Originality ..............................................................5 pts.

**Orientation of the model** .......................................15 pts.

**Use of engineering (15 pts.)**
- Practices .................................................................9 pts.
- Conventions ...........................................................6 pts.

**Scale** .........................................................................5 pts.

**Aesthetics** ..................................................................5 pts.

**subtotal** ...........................................................100 pts.

Rules violation (must be initialed by coordinator and manager) ..........minus 20% of the total possible pts.

**Total** ...........................................................100 pts.

Comments:

I certify these results to be true and accurate to the best of my knowledge.

**Evaluator**

Printed name: __________________________________________ Signature: __________________________________________