



# COMPUTER INTEGRATED MANUFACTURING (CIM)

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## OVERVIEW

Participants design, fabricate, and use Computer Integrated Manufacturing (CIM) to create a promotional TSA product that will showcase the current conference city and/or state. The product may use additive and/or subtractive manufacturing of any traditional, Computer Numerical Control (CNC), 3D printing, or laser technology available. Documentation, one completed sample, and one set of manufactured parts are checked in and evaluated. Semifinalist teams assemble their entry and give a live promotional sales pitch to judges.

## ELIGIBILITY

Participants are limited to one (1) team of two (2) individuals per chapter, one (1) entry per team.

## TIME LIMITS

- A. Entries must be started and completed during the current school year.
- B. Semifinalist teams will be allowed five (5) minutes to assemble their promotional product.
- C. A sales pitch about the product will occur immediately after the product is assembled.
- D. The sales pitch may last up to two (2) minutes, during which time each team member will demonstrate the product. Exceeding the two (2)-minute time limit results in a deduction of five (5) points for every fifteen (15) seconds over the limit.
- E. The LEAP interview will be conducted as part of the semifinalist demonstration and will last a maximum of five (5) additional minutes.
- F. Pick-up occurs during the time and place stated in the conference program, or as designated by the event coordinator.

## LEAP LEADERSHIP RESUME/INTERVIEW

A Team LEAP Leadership Resume is required for this event and must be submitted at event check-in. Semifinalists will respond

to interview questions related to their submitted LEAP Resume for a maximum of five (5) minutes.

### ATTIRE

Competition attire, as described in the [National TSA Dress Code](#) section of this guide, is required for this event.

### PROCEDURE

- A. Participants check in their documentation, product, manufactured pieces of their entry, and a LEAP Leadership Resume for evaluation during check-in at the time and place stated in the conference program.
- B. Entries are evaluated and semifinalist teams are determined.
- C. Semifinalist teams report to the assembly session at the time and place stated in the conference program.
- D. Participants are required to provide their own tool box (with identification [school name, address, and advisor cell phone number]), which should not exceed 20 inches (508 mm) length x 10 inches (254 mm) width x 10 inches (254 mm) height. The box must contain all items needed to fabricate the solution/entry. The following is a suggested list:
  1. Cutting devices; NONE may be electric
  2. Adhesives
    - a. aerosol and electric applicators are not allowed
    - b. a bottle of Uncure or Debonder is recommended
  3. Temporary fastening devices
    - a. straight pins
    - b. clamps
    - c. tape
  4. A cutting surface that prevents table top marring (required)
  5. Rulers, straightedges, and/or measuring scales
  6. Abrasives sheets, sponges, boards
  7. Marking devices (pens, pencils, etc.) and sharpener
  8. Sheet of wax paper, as large as is needed for the competition
  9. Pliers, wrenches, nut drivers, as needed
  10. Safety glasses and side shields (required)
- E. Participants are required to provide and wear safety-approved eyewear for this event. Prescription eyewear will need to have side shields to be considered safety eyewear. Should a team member remove his/her eyewear, he/she will be reminded once to replace it. If there is a second infraction, the team will be asked to leave the competition. Sunglasses are not suitable eyewear.




- F. Using their tool kit, teams will assemble their promotional product from the manufactured parts that have been evaluated by the judges.
- G. Upon completion of the assembly, each team's promotional product will be submitted for evaluation.
- H. Following the evaluation, each team will make a sales pitch about their product to "potential buyers" (judges and the audience) in the room. The sales pitch should include information such as cost per unit, production time, materials used, etc.
- I. The sales pitch will begin on the timekeeper's signal. The time limit for the sales pitch is two (2) minutes.
- J. No electronic devices may be used in the sales pitch. A flyer or brochure may be given to judges as part of the sales pitch; the brochure size is limited to one double-sided page on 8 ½" x 11" paper.
- K. The assembled product must be accurate and within tolerances of + or - .001 of the dimensions provided in the documentation drawings and in the fabricated parts.
- L. The LEAP interview will be conducted as part of the semifinalist demonstration (sales pitch) and will last a maximum of five (5) additional minutes.

**It is essential that students and advisors routinely check the TSA website ([www.tsaweb.org](http://www.tsaweb.org)) for updated information about TSA general rules and competitive events. This information is found on the website under [Competitions/Updates](#). When students participate in any TSA competitive event, they are responsible for knowing of updates, changes, or clarification related to that event.**

## REGULATIONS

- A. Documentation materials (comprising "a portfolio") are required and should be secured in a [clear front report cover](#). The report cover must include the following single-sided, 8½" x 11" pages, in this order:
  - 1. Title page with the event title, the conference city and state, and the year; one (1) page
  - 2. Table of contents; one (1) page
  - 3. A working drawing of the parts manufactured; the parts must be clearly labeled and include dimensions, with an identifying leader and a label, as shown in a parts list. A bill of materials also must be included on the working drawing.

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

- The paper size is 11" x 17", folded, with the drawing facing out and placed in the portfolio; one(1) page
4. An isometric assembly drawing showing the promotional product and all its parts; the paper size is 11" x 17", folded, with the drawing facing out and placed in the portfolio; one(1) page
  5. Detail drawings of each part manufactured should be labeled to match the items in the parts list (from the working drawing). The paper size is 8 ½" x 11"; pages as needed (to show all machined parts)
  6. Photographic images (actual photographs, not renderings) of designs tested, with a three (3)-sentence descriptive caption per image of what was improved or proved by the testing of the design; two (2) pages maximum
  7. Plan of Work log that indicates preparation for the event, as noted by date, task, time involved, team member responsible, and comments (see Forms Appendix or TSA website); pages as needed
  8. Proof (receipts) that the material cost for fabricated parts is no more than \$5
- B. Materials
1. The sample work pieces will contain the subtractive and/or additive (CNC/3D printing) machined parts of the promotional product. The major and minor parts of the entry must fit into an 11" x 17" x 3" frame, with no stacking of parts. Parts may not be connected. One set of parts is turned in for evaluation; these will be the parts used for the assembly.
  2. Fabricated parts
    - a. The finished product must not exceed the dimensions 20" x 10" x 10".
    - b. A minimum of four (4) and a maximum of six (6) major parts; major parts are those with drawings that have been manufactured.
    - c. Plastic, wood, or metal may be used for any of the parts for the promotional product.
    - d. Machined parts submitted for judging must be removed from the waste stock.
    - e. Parts may be finished (i.e., painted or sanded), if necessary.
    - f. One (1) part must be subtractive manufactured and one (1) part must be additive manufactured.
  3. Stock fasteners may be used, provided they can be installed with the tools in the tool box; they may include, but are not limited to:
    - a. Nuts
    - b. Washers



- c. Screws
  - d. Wing nuts
  - e. Other fasteners that can be attached with the tools in the tool box
- C. Assembly session (semifinalists only)
- 1. Teams will check in at the time and place stated in the conference program.
  - 2. Each team will bring a tool kit.
  - 3. Teams will pick up their documentation and the unassembled work pieces.
  - 4. Teams will have up to five (5) minutes to assemble their product.
  - 5. The finished product must include the TSA logo or official TSA lettering.
  - 6. Upon completion of the assembly of the promotional product, or after five (5) minutes, whichever comes first, teams will submit their entry to the judges for evaluation.
  - 7. Following the evaluation, teams will demonstrate their entry and give a two (2)-minute sales pitch to the judges.
- D. Sales pitch session
- 1. Team members will present a two (2)-minute sales pitch about their promotional product.
  - 2. A promotional brochure or flyer may be given to the judges (one 8 ½" x 11" sheet of paper printed on both sides).
  - 3. The team will explain the production cost per unit, the materials to be used to make the product, and price breaks of units based on purchase.
  - 4. The team must pitch the product as one to be used as a gift for volunteers at a TSA event.
  - 5. Exceeding the two (2)-minute limit results in a deduction of five (5) points for every fifteen (15) seconds over the limit.
- E. Failure to meet the guidelines
- 1. A 20% deduction of the total possible points will be made for failure to meet one (1) qualification.
  - 2. If an entry fails to meet two (2) qualification regulations, it will be removed from competition.
  - 3. The coordinator may stop a demonstration if a safety issue becomes evident.
- F. LEAP Leadership Resume (see Forms Appendix or TSA website)/Interview — Teams document, in the LEAP leadership resume, the leadership skills that the team has developed and demonstrated while working on this event. Semifinalists will respond to questions about the content of their resume as part of their presentation and/or interview. The LEAP Leadership Resume/Interview guidelines and other resources can be found on the [TSA website](#).



## EVALUATION

Evaluation is based on the documentation, the component analysis, the LEAP requirements, and the sales pitch/demonstration (semifinalists only). Please refer to the official rating form for more information.



### STEM INTEGRATION

This event aligns with the STEM educational standards noted below. Please refer to the STEM Integration section of this guide for more information.

Science, Technology, Engineering, Mathematics

### TSA AND CAREERS

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

### CAREERS RELATED TO THIS EVENT

Commercial and industrial designer  
Engineer  
Mechanical engineer  
CNC programmer or operator

# COMPUTER INTEGRATED MANUFACTURING (CIM) EVENT COORDINATOR INSTRUCTIONS

## PERSONNEL

- A. Event coordinator
- B. Assistants at check-in, two (2) or more
- C. Evaluators, two (2) or more
- D. Timekeeper, one (1)
- E. Evaluators for semifinalist interviews; two (2) or more

## MATERIALS

- A. Coordinator's packet, containing
  1. Event guidelines, one (1) copy for the coordinator and for each evaluator
  2. TSA Event Coordinator Report
  3. List of evaluators/assistants
  4. Pre-populated flash drives for evaluators
  5. Stick-on labels for entries, as needed
  6. Results envelope
  7. Stopwatch
  8. Envelope for LEAP Leadership Resumes
  9. LEAP Interview Judging Protocol
- B. Tables and chairs for check-in assistants, the timer, evaluators, and the event coordinator
- C. Tables for teams to assemble their entry; chairs for each team member

## RESPONSIBILITIES

- A. Upon arrival at the conference, report to the CRC room and check the contents of the coordinator's packet. 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, chair and table set-up, electrical outlets, etc. Notify the event manager of any concerns.
- C. One (1) hour before the event is scheduled to begin, meet with evaluators/assistants to review procedures, time limits, and regulations. If questions arise, check with the event manager for clarification.





- D. Check in the entries and collect LEAP Leadership Resumes at the time and place stated in the conference program. Any participant who is not on the coordinator's report must report to the event manager for verification of entry.
- E. For participants who violate the rules, the decision either to deduct 20% of the total possible points or to disqualify the entry must be discussed and verified with the evaluators, event coordinator, and a CRC manager.
- F. Evaluators determine twenty (20) semifinalists.
- G. Submit semifinalist results to the CRC for posting.
- H. Inspect the area in which the semifinalist teams will meet to assemble their promotional product.
- I. Meet with the semifinalist evaluators to review time limits, procedures, and regulations.
- J. Allow five (5) minutes for the teams to assemble their product.
- K. Conduct the sales pitch demonstration sessions. The LEAP interview will be conducted as part of the semifinalist demonstration and will last a maximum of five (5) additional minutes.
- L. Evaluators determine the ranking of the ten (10) finalists and discuss and break any ties.
- M. Review and submit the finalist results and all items/forms in the results envelope to the CRC room.



Participant/Team ID# \_\_\_\_\_

# COMPUTER INTEGRATED MANUFACTURING (CIM)

2017 & 2018 OFFICIAL RATING FORM

HIGH SCHOOL

## Go/No Go Specifications

Before judging the entry, ensure that the items below are present; indicate presence with a check mark in the box. If an item is missing, leave the box blank and place a check mark in the box labeled ENTRY NOT EVALUATED. If a check mark is placed in the ENTRY NOT EVALUATED box, the entry is not to be judged.

- Sample product is present.
- Manufactured parts are present.
- Documentation is present.
- Completed LEAP Leadership Resume is present.
- ENTRY NOT EVALUATED

## Documentation (100 points)

CRITERIA	Minimal performance 1-4 points	Adequate performance 5-8 points	Exemplary performance 9-10 points
Evaluators: Using minimal (1-4 points), adequate (5-8 points), or exemplary (9-10 points) performance levels as a guideline, record the scores earned for the event criteria in the column spaces to the right. The X1 or X2 notation in the criteria column is a multiplier factor for determining the points earned. (Example: an "adequate" score of 7 for an X1 criterion = 7 points; an "adequate" score of 7 for an X2 criterion = 14 points.) A score of zero (0) is acceptable if the minimal performance for any criterion is not met.			
<b>Portfolio components</b> See Regulation A (X1)	The portfolio is unorganized and three or more components or sections are missing.	The portfolio is generally well organized and may be missing only one or two components or sections.	The portfolio is exceptionally well organized and contains all required components or sections.
<b>Work piece layout drawing</b> (X2)	The work piece layout drawing is poorly executed, with key elements missing.	The work piece layout drawing is included but missing some elements.	The work piece layout drawing is complete and correctly executed, with all elements included.
<b>Isometric assembly drawing</b> (X1)	The isometric assembly drawing is not complete, with many of the required elements missing.	The isometric assembly drawing is present, but it is missing several required key elements.	The isometric assembly drawing is complete and correct, with all required elements included.
<b>Detail drawings</b> (X1)	The detail drawings are not complete, with many of the required elements missing.	The detail drawings are present but may be missing several required key elements.	The detail drawings are complete and correct, with all required elements included.
<b>Design photographs</b> (X1)	Only one photograph of designs tested is included.	Two photographs of designs tested are included.	More than two photographs of designs tested are included.
<b>Descriptions/analysis</b> (X2)	There is little description of the design testing process and analysis.	One description of design testing and analysis is included.	Several descriptions of design testing and analysis are included.
<b>Plan of Work log</b> (X1)	The Plan of Work log is not complete.	The Plan of Work log is included and mostly complete.	The Plan of Work log is complete and fully documents project work.
<b>Theme</b> (X1)	The effort is basic, with only a loose association to the product theme.	The effort adequately addresses the product theme.	The effort to address the product theme exceeds expectations.
			<b>SUBTOTAL (100 points)</b>

Record scores in the column spaces below.



Component Analysis (40 points)			
CRITERIA	Minimal performance 1-4 points	Adequate performance 5-8 points	Exemplary performance 9-10 points
<b>Additive manufacturing piece</b> (X1)	The overall dimensions are .25(¼) inches greater or less than the size specified on the layout drawing.	The overall dimensions are .125(⅛) inches greater or less than the size specified on the layout drawing.	The overall dimensions are the correct size, as specified on the layout drawing.
<b>Subtractive manufacturing piece</b> (X1)	The overall dimensions are .25(¼) inches greater or less than the size specified on the layout drawing.	The overall dimensions are .125(⅛) inches greater or less than the size specified on the layout drawing.	The overall dimensions are the correct size, as specified on the layout drawing.
<b>Additive/subtractive manufacturing piece</b> (X1)	The overall dimensions are .25(¼) inches greater or less than the size specified on the layout drawing.	The overall dimensions are .125(⅛) inches greater or less than the size specified on the layout drawing.	The overall dimensions are the correct size, as specified on the layout drawing.
<b>Product cost sheet</b> (X1)	The product cost sheet has few parts of the finished product broken down individually; the cost is more than \$5 per product.	The product cost sheet has most parts of the finished product broken down individually; the cost is \$5 or less per product.	The product cost sheet has each part of the finished product broken down individually with material amount and the amount used; the cost is \$5 or less per product.
			<b>SUBTOTAL (40 points)</b>

Rules violations (a deduction of 20% of the total possible points in the sections above) must be initiated by the evaluator, coordinator, and manager of the event. Record the deduction in the space to the right.

Indicate the rule violated: \_\_\_\_\_

Semifinalist Qualification Regulations				
Place an x in the noncompliant or compliant box, as appropriate for each regulation. If one regulation is noncompliant, a deduction of 20% of the total possible points will apply (see rules violations box). If more than one regulation is noncompliant, the product will be removed from competition.				
REGULATION	NONCOMPLIANT		COMPLIANT	
<b>Team of two</b>	Only one team member is present.		Both team members are present.	
<b>Safety eyewear</b>	Warnings about eyewear are issued.		No warnings about eyewear are issued.	
<b>Tools and fabrication supplies</b>	Inappropriate tools or supplies are brought to the event.		Appropriate tools and supplies are brought to the event.	

Semifinalist Assembly and Sales Pitch/Demonstration (80 points)			
CRITERIA	Minimal performance 1-4 points	Adequate performance 5-8 points	Exemplary performance 9-10 points
<b>Tolerance</b> (X1)	The tolerance of the newly assembled product is within + or - of .250 (¼) inch of the drawing and the original prototype.	The tolerance of the newly assembled product is within + or - of .125 (⅛) inch of the drawing and the original prototype.	The tolerance of the newly assembled product is within + or - of .001 inch of the drawing and the original prototype.
<b>Organization</b> (X1)	Participants seem unorganized and unprepared for the sales pitch/demonstration; illogical explanation of the project is presented.	Participants are generally prepared for the sales pitch/demonstration; explanation of the project is communicated and generally organized.	The sales pitch/demonstration is logical, well organized, and easy to follow; the project concept is communicated in a concise manner.



Semifinalist Assembly and Sales Pitch/Demonstration (continued) (80 points)			
<b>Knowledge</b> (X1)	Participants seem to have little understanding of the concepts in their project; answers to questions may be vague.	Participants exhibit an understanding of the concepts in their project.	Participants show clear evidence of a thorough understanding of the concepts in their project.
<b>Articulation</b> (X1)	The sales pitch is full of illogical thoughts that lack clarity.	The sales pitch is somewhat logical and easy-to-understand and follow.	The sales pitch provides a clear, concise, and easy-to-follow description of the project.
<b>Delivery</b> (X1)	The sales pitch is full of illogical thoughts that lack clarity, and/or there is insufficient information provided describing the project.	The sales pitch is somewhat logical, easy-to-follow, and/or there is sufficient information provided describing the project.	The sales pitch is clear, concise, and there is ample information provided describing the project.
<b>Team participation</b> (X1)	The majority of the delivery is made by one member of the team; the partner may be disengaged from the sales pitch.	Team members generally are engaged in the process, though one member may take on more responsibility than the other.	Team members are actively involved in the sales pitch and responses to interview questions; there is shared responsibility on the part of team members.
<b>LEAP Leadership Resume/Interview</b> See Regulation F and instructions on TSA website (X2)	The team's efforts are not clearly communicated, lack detail, and/or are unconvincing; few, if any, attempts are made to identify and/or incorporate the LEAP Be. Know. Do. criteria.	The team's efforts are adequately communicated, include some detail, are clear, and/or are generally convincing; identification and/or incorporation of the LEAP Be. Know. Do. criteria is adequate.	The team's efforts are adequately communicated, include some detail, are clear, and/or are generally convincing; identification and/or incorporation of the LEAP Be. Know. Do. criteria is adequate.
			<b>SUBTOTAL (80 POINTS)</b>

Rules violations (a deduction of 20% of the total possible points in the semifinalist section) must be initialed by the evaluator, coordinator, and manager of the event. Record the deduction in the space to the right.

Indicate the rule violated: \_\_\_\_\_

(To arrive at the TOTAL score, add any subtotals and subtract rules violation points, as necessary.) **TOTAL (220 points)**

Comments:

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

Evaluator

Printed name: \_\_\_\_\_ Signature: \_\_\_\_\_