

# COMPUTER INTEGRATED MANUFACTURING (CIM)



## OVERVIEW

Participants design, fabricate, and use Computer Integrated Manufacturing (CIM) to create a product that will showcase the current year's theme found on the national TSA website under Competitions/Themes and Problems. The product may use additive and/or subtractive manufacturing of any traditional, Computer Numerical Control (CNC), 3D printing, or laser technology available. Documentation, one (1) completed sample, and one (1) set of manufactured parts are checked in and evaluated. Semifinalist teams assemble their entry and give a live promotional sales pitch to judges.

## ELIGIBILITY

One (1) team of two to six (2-6) individuals per chapter may participate, one (1) entry per team.

## TIME LIMITS

1. Semifinalists will deliver a sales pitch lasting up to two (2) minutes, during which time each team member will demonstrate the product.

Note: Exceeding the two (2)-minute time limit results in a deduction of five (5) points for every fifteen (15) seconds over the limit.

2. The LEAP interview will be conducted as part of the semifinalist demonstration and will last a maximum of five (5) additional minutes.

## LEAP

A team LEAP Report is required for this event and must be submitted at event check-in (see LEAP Program).

## ATTIRE

TSA competition attire is required for this event.

## PROCEDURE

### PRELIMINARY ROUND

1. Teams check in their documentation, product, manufactured pieces of their entry, and a LEAP Report for evaluation during check-in at the time and place stated in the conference program.
2. Entries are evaluated and semifinalist teams are determined.
3. A list of twelve (12) semifinalists, in random order, will be posted.

### SEMIFINAL ROUND

1. Semifinalist teams report at the time and place stated in the conference program.
2. Each team will make a sales pitch about their product to "potential buyers" (judges and the audience) in the room.
3. The sales pitch will begin on the timekeeper's signal.
4. The LEAP interview will be conducted as part of the semifinalist demonstration (sales pitch).
5. The top ten (10) finalists will be announced at the awards ceremony.

## REGULATIONS

### PRELIMINARY ROUND

- 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. LEAP Report
  2. Title page with the event title, the conference city and state, and the year; one (1) page
  3. Table of contents; one (1) page

4. A working drawing of the parts manufactured.
    - a. The parts must be clearly labeled and include dimensions, with an identifying leader and a label, as shown in a parts list.
    - b. A bill of materials also must be included on the working drawing.
    - c. The paper size is 11" x 17", folded, with the drawing facing out and placed in the portfolio; one(1) page
  5. 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
  6. 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 8½" x 11"; pages as needed (to show all machined parts)
  7. 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
  8. 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
  9. Proof (receipts) that the material cost for fabricated parts is no more than five dollars (\$5.00)
- B. Materials**
1. The sample work pieces will contain the subtractive and/or additive (CNC/3D printing) machined parts of the promotional product.
  2. 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.
  3. The assembled product must be accurate and within tolerances + or - .0625 or ¼" of the dimensions provided in the documentation drawings and in the fabricated parts.
4. Fabricated parts
    - a. The finished product must not exceed the dimensions 7" x 7" x 7".
    - b. Three (3) major parts are required; 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.
  5. 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

### SEMIFINAL ROUND

- A. Sales pitch session**
1. Team members will present a two (2)-minute sales pitch about their promotional product.
  2. The team will explain the production cost per unit, the materials used to make the product, and price breaks of units based on purchase.
  3. No electronic devices may be used in the sales pitch.
  4. A promotional 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 8½" x 11" paper.
  5. Exceeding the two (2)-minute limit results in a deduction of five (5) points for every fifteen (15) seconds over the limit.

**B. 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.

**C. The LEAP Report**

1. Teams document the leadership skills they have developed and demonstrated while working on this event, and on a non-competitive event leadership experience.
2. Teams will respond to questions about the content of the LEAP Report as part of the LEAP interview, which will be conducted as part of the semifinalist presentation/interview and will last a maximum of five (5) additional minutes.
3. Specific LEAP Report regulations can be found in the LEAP Program section of this guide and on the TSA website.

**EVALUATION**

1. The documentation
2. The component analysis
3. The LEAP requirements
4. The sales pitch/demonstration (semifinalists only)

Refer to the official rating form for more information.

**STEM INTEGRATION**

This event aligns with the STEM educational standards of Science, Technology, Engineering, and Mathematics.

**CAREERS RELATED TO THIS EVENT**

- Commercial and industrial designer
- Engineer
- Mechanical engineer
- CNC programmer or operator

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## 2019 & 2020 OFFICIAL RATING FORM

### HIGH SCHOOL

Judges: Using minimal (1-4 points), adequate (5-8 points), or exemplary (9-10 points) performance levels as a guideline in the rating form, 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.

#### 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 next to the item 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.

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

DOCUMENTATION (100 points)				Record scores in the column spaces below.
CRITERIA	Minimal performance	Adequate performance	Exemplary performance	
	1-4 points	5-8 points	9-10 points	
<b>Portfolio components</b> (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>DOCUMENTATION SUBTOTAL (100 points)</b>				

COMPONENT ANALYSIS (40 points)			
CRITERIA	Minimal performance	Adequate performance	Exemplary performance
	1-4 points	5-8 points	9-10 points
<b>Additive or subtractive manufacturing piece</b> (X3)	The overall dimensions are .25(¼) inches greater or less than the size specified on the layout drawing.	The overall dimensions are .125(½) 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>COMPONENT ANALYSIS SUBTOTAL (40 points)</b>			

Record scores in the column spaces below.


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

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

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**PRELIMINARY SUBTOTAL (140 points)**

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SEMIFINAL 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).			
Regulation	Noncompliant	Compliant	
<b>Team of two</b>	Only one (1) team member is present.		At least two (2) team members are present.

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SEMIFINAL PRESENTATION/INTERVIEW (69 points)			
CRITERIA	Minimal performance	Adequate performance	Exemplary performance
	1-4 points	5-8 points	9-10 points
<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.
<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.

Record scores in the column spaces below.


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<b>SEMIFINAL PRESENTATION/INTERVIEW (69 points) – continued</b>				
<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 partners 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 others.	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 Report/ Interview</b> (19 points; 10% of total event points)	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 SLC Practices and Behaviors.	The team's efforts are adequately communicated, include some detail, are clear, and/or are generally convincing; identification and/or incorporation of SLC Practices and Behaviors is adequate.	The team's efforts are clearly communicated, fully-detailed, and convincing; identification and/or incorporation of the SLC Practices and Behaviors is excellent.	
<b>SEMIFINAL PRESENTATION/INTERVIEW SUBTOTAL (69 points)</b>				
Rules violations (a deduction of 20% of the total possible points for the above sections) must be initialed by the judge, coordinator, and manager of the event. Record the deduction in the space to the right.  Indicate the rule violated: _____				
<b>SEMIFINAL SUBTOTAL (69 points)</b>				
<b>To arrive at the TOTAL score, add any subtotals and subtract rules violation points, as necessary.</b>				<b>TOTAL (209 points)</b>

**Comments:**

  
  
  
  
  
  
  
  
  
  


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

**JUDGE**

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

# COMPUTER INTEGRATED MANUFACTURING (CIM)

## EVENT COORDINATOR INSTRUCTIONS

### PERSONNEL

- A. Event coordinator
- B. Judges:
  1. Preliminary round, two (2) or more
  2. Semifinal round, two (2) or more
- C. Timekeeper, one (1)
- D. Assistants at check-in, two (2) or more

### MATERIALS

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

### RESPONSIBILITIES

#### AT THE CONFERENCE

1. Attend the mandatory coordinator's meeting at the designated time and location.
2. Report to the CRC room and obtain the coordinator's packet; check the contents.
3. Review the event guidelines and check to see that enough judges and assistants have been scheduled.
4. Inspect the area in which the portfolios are being placed for appropriate set-up including sufficient number and size of tables.
5. At least one (1) hour before the event is scheduled to begin, meet with judges/assistants to review time limits, procedures, and regulations. If questions arise that cannot be answered, speak to the event manager before the event begins.

#### EVENT CHECK-IN

1. Check in the entries at the time stated in the conference program.
2. Anyone reporting who is not on the entry list may check in only after official notification is received from the CRC.
3. Late entries are considered on a case-by-case basis and only when the delay is caused by events beyond participant control.
4. Each entry must include the team's identification number in the upper right-hand corner of the entry.
5. Position the entries for evaluation and viewing.
6. Secure the entries in the designated area.

#### PRELIMINARY ROUND

1. Judges independently assess the entries.
2. Decisions about rules violations must be discussed and verified with the judges, event coordinator, and CRC manager to determine either:
  - a. To deduct twenty percent (20%) of the total possible points in this round or
  - b. To disqualify the entry
  - c. The event coordinator, judges and CRC manager must initial either of these actions on the rating form
3. Judges determine the twelve (12) semifinalists.
4. Review and submit the semifinalist results and all related items/forms in the results envelope to the CRC room for posting.
5. Create semifinalist sign-up sheet for each team's final presentation.

### SEMIFINAL ROUND

1. Inspect the area in which the sales pitches/ interviews are to take place. Ensure that there is a table and seating for the interviews.
2. At least one (1) hour before the event is to begin, meet with semifinalist judges to review time limits, procedures, and regulations. If questions arise that cannot be answered, speak to the event manager before the event begins.
3. 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.
4. Decisions about rules violations must be discussed and verified with the judges, event coordinator, and CRC manager to determine either:
  - a. To deduct twenty percent (20%) of the total possible points in this round or
  - b. To disqualify the entry
  - c. The event coordinator, judges and CRC manager must initial either of these actions on the rating form.
5. Judges determine the ten (10) finalists and discuss and break any ties. (Determine the procedure for breaking ties before the onsite competition begins.)
6. Review and submit the finalist results and all related forms in the results envelope to the CRC room.
7. If necessary, manage security and the removal of materials from the event area.