1. Aero-modeling competition

Description:

The students will be required to design, fabricate and fly aero models.

The concept

- Designing, fabricating and flying aero models

Alignment with curriculum

- Fabrication techniques
- Appreciation of materials and physical properties
- Concepts of flying and related dynamics

Expectations

Tier-1	Tier-2	Tier-3
Build an aero model using the supplied kit and fly it successfully How to make the model? Link Is available above	Calculate the proportions of RACER 520 AMELIA aero model from a wing span length of 25cm using given design guidelines to achieve different performance such as long distance, long duration, taking turns and twists etc. No kits will be provided for Tier II and aero model has to be made from card boards only	Team has to design and fabricate their own aero model for a wing span length of 25cm,fuse lag length of 18cm and height of the model should be of max 8cmto achieve different performance such as long distance, long duration, taking turns and twists etc. No kits will be provided for Tier III and aero model has to be made from coroplast material only.

Kits and aids

- Pre-printed boards for Tier-1

Competition rules

- Actual modeling done off line
- Model Demonstration ,PPT presentation and interview at the competition

Teams

- Team size: 5 students
- Number of teams for Tier-1 = number of members / 10
- 1 team from each college moves to tier 2(Flying rules to be changed)
- 4 teams from each division moves to tier 3(make it SAE international Standard)

Judging criteria

	Tier-2	Tier-3
• Craftsmanship – from display - 20% • Flying straight and long – from flight trials -30% • Smooth landing – from flight trials -20% • Understanding parts of aero model and their role in flight characteristics – from interview – 30%	• Craftsmanship – from display - 10% • Design calculations and drawings – from design records- 20% • Flying distance / time closeness to prediction – from flight trials- 20% • Smooth landing – from flight trials- 10% • Achieving non-linear flights – from flight trials-20% • adjusting flight characteristics – from interview- 20%	• Craftsmanship – from display - 20% • Design calculations and drawings – from design records- 20% ▪ Smooth take off and landing – from flight trials- 20% • Scientific explanation of Design and flight characteristics through PPT presentation –- 40%

2. Modeling and Animation Competition

The concept

- Modeling and animating an assembly or mechanism through a solid modeling software (Pro E, CATIA, Solid Works)

Alignment with curriculum

- Converting an idea into a shape
- Physical linkages
- Materials and their properties
- Function analysis of parts

SAEINDIA SOUTHERN SECTION

Expectations

Tier-1	Tier-2	Tier-3
Conceive solid models and their relative movements prediction of area, volume and mass	Explain the function through animation	Define and explain the math model behind the animation

S.No	Division Centre	Topic
1	Chennai Division	Engine and subsystems
2	Mahindra World City Division	Suspension system and components
3	Coimbatore Division	Transmission (gear box, clutch, rear axle etc)
4	Madurai Division	Seating and door systems
5	Hyderabad Division	Braking system and components
6	Cochin Division	Steering system and components

Kits and aids

- Pro – E, CATIA, Solid Works

Competition rules

- Actual modeling done off line
- 10 Min Presentation at the competition
- Models must be done using 'PRO E' software.
- Individual colleges will follow the topics allocated to their divisions.

Teams

- Team size: 2 students
- Number of teams for Tier-1: as many as possible
- One team from each college moves to Tier-2 (division level)
- Two teams from each division moves to Tier-3 (convention)

SAEINDIA SOUTHERN SECTION

STUDENT CONVENTION Challenge Ahead

Judging criteria

Tier-1	Tier-2	Tier-3
• Quality of solid models - 40% • Prediction of area, volume and mass-30% • Choice of materials and their properties-30%	• Quality of solid models 30% • Prediction of area, volume and mass-20% • Choice of materials and their properties-20% • Explanation relative motion and function-30%	• Quality of solid models-20% • Prediction of area, volume and mass-10% • Choice of materials and their properties-10% • Explanation relative motion and function-30% • Animation math model in relation to product function-30%

3. Analysis competition

The concept

- Understanding the function of the part and analyze the part for strength and endurance.

Alignment with curriculum

- Function analysis
- Engineering mechanics
- Theory of machines
- Finite element analysis
- Engineering materials and their properties

Expectations

Tier-1	Tier-2	Tier-3
Understand the function of the part and assessing the loads acting on the parts and fixations.	Convert create a FEM model and carry out static analysis using (ANSYS is Preferable)	Carry out dynamic analysis and endurance life prediction using (ANSYS is Preferable)

Kits and aids

- Colleges not having desired software can approach SAEINDIA for short term license.

SAEINDIA
SOUTHERN SECTION

Competition rules

- Actual analysis done offline.
- 10 minutes presentation should be done at the competition.
- Any structural (Static, Dynamic) problem can be taken by the students from automotive domain.
- The assembly should have minimum 3parts and maximum of 7 parts.
- Software should be ANSYS (For pre-processing, solution and post processing).

Teams

- Team size: 2 students
- Number of teams for Tier-1 as many as possible.
- One team from each college moves to Tier-2 (Divisional level).
- Two teams from each division moves to Tier- 3(Student Convention).

Judging criteria

Tier-1	Tier-2	Tier-3
Quality of function analysis Free body diagram Estimating loads Defining fixations	Quality of function analysis Free body diagram Estimating loads Defining fixations Choice of load conditions Choice of boundary conditions Element selection Mesh sizing Material allocation Interpretation of static analysis results	Quality of function analysis Free body diagram Estimating loads Defining fixations Choice of load conditions Choice of boundary conditions Element selection Mesh sizing Material allocation Interpretation of static analysis results Interpretation of dynamic analysis results Interpretation of endurance analysis results Suggestions for improvements

SAEINDIA SOUTHERN SECTION

STUDENT CONVENTION Challenge Ahead

4. Computer Aided Manufacturing Competition

The concept

- The students pick up an automotive part and design the manufacturing process using computer aided manufacturing where applicable

Alignment with curriculum

- Materials and manufacturing processes
- Production technology
- CAM

Expectations

Tier-1	Tier-2	Tier-3
identify material and appropriate manufacturing process	define various steps in manufacturing and identify scope for CAM	application of CAM for the identified step

Kits and aids

- Pro E, CATIA, Solid work is Preferable.

Competition rules

- Actual Work to be done off line
- 10 Min Presentation at the competition
- Models must be done using 'PRO-E' software

Teams

- Team size: 2 students
- Number of teams for Tier-1: as many as possible
- One team from each college moves to Tier-2 (division level)
- Two teams from each division moves to Tier-3 (convention)

Judging criteria

Tier-1	Tier-2	Tier-3
◆Quality of function analysis ◆Material properties required ◆Finish and precision required ◆Correctness of material ◆Correctness of manufacturing process for the material, finish and precision	◆Quality of function analysis ◆Material properties required ◆Finish and precision required ◆Correctness of material ◆Correctness of manufacturing ◆process for the material, finish and precision ◆Process flow for the chosen process ◆Appropriateness of CAM application ◆CAM program	◆Quality of function analysis ◆Material properties required ◆Finish and precision required ◆Correctness of material ◆Correctness of manufacturing process for the material, finish and precision ◆Process flow for the chosen process ◆Appropriateness of CAM application ◆CAM program ◆Tool path optimization ◆Simulation

5. Business Plan competition

1. Introduction

India, the largest democratic in the world is also going be the youngest country in the ageing world. This can become a boon if the human resource is properly utilised. Otherwise it becomes a bane to our country. We have a large number of young people or in other words large number of people falling under the working age population. Providing jobs to such a larger group is highly impossible until the number of employers gets increased. So there is a need to create more employers or in other way more number of entrepreneurs. To achieve this , we need a change in mind set where the young graduates understand the concepts of business through practical approach .SAEISS's Business plan competition is one such a platform provided for the students to unleash a entrepreneur sleeping within them.

The concept

Over the years the number of participant s for the business plan competition has drastically decreased as student's clarity about framing a business plan is very less. Students in general combine their pre-final year or final year projects with any sample business plan which is readily available on the internet. Thus the concentration of students eventually moved towards impressing the moderators with technical matters thereby fading away the actual colour of the business plan. In near future, students may consider business plan competition as an alternative to paper or project presentation. In this case, students do not really stress themselves in doing their homework needed to draft a new plan. Instead the students download and modify the business plan presented by their seniors or any resources available in the internet or textbooks. So the students really don't understand that this is a platform to learn what business is but take it the other way. So with the help of young budding entrepreneurs a new plan is proposed to SAEISS student convention 2014 champion to redesign the competition rules which is as follows

3. Competition Rules

3.1. Team Size

- Team size is reduced to 3 from 5, in order to make each individual contribute towards preparing & presenting a plan in a effective manner
- Any number of teams for Tier-1. The winner & Runners of Tier-1 shall be allowed to participate in Tier-2 and the winner & runners of tier-2 from each division shall be allowed to participate in Tier 3 levels.

3.2. Business plan reporting

- Written plan as per the format prescribed only(<2000 words)
- Presentation (<15 slides)
- 1 printed copy & electronic file of plan in pdf format

4. **Tier-1-Case Study of a real Business model**

4.1. Objective

- To allow participants to study about a company and its operational model
- To understand the basic concepts of doing a business
- To induce the participants to generate new ideas.

4.2. Company Choosing

- The teams are asked to choose a company which was started and currently existing in India for more than 3 years.
- The company should fall under any of the following sectors – Automobile Retail & E-Commerce, Agro-based, IT, FMCG, Food, Travel, Pharma, Environment
- The company should be active and doing business

4.3. Presentation Format

Team should

- mention the company name and its sector
- Brief about the founders and management team
- Consider them as one of the management team & mention about their contribution to the management team
- List the company's offering in terms of products and services
- Explain one key product/service in detail, speak about who are the customers for that product and what benefits it provides.
- Mention about the various marketing channels used by the company? How did the company get its initial customers to use the product?
- Brief why your potential customers would choose the product/service? Is there a need for the product?
- Mention about the competitors and how they are they different from their competitors
- If given a chance to start a company on their own, what product will they come up with? Brief about the solutions that they are going to provide for the problem identified from any sector

5. Tier -2:

The team selected for Tier-2 should draft a marketing plan with the idea that they have proposed at Tier-1 level and should use the knowledge gained from Tier-1 to frame a effective plan in the following format

- Market need/gap (team must be aware of its strengths and weakness through internal and external analysis and look for market opportunities).
- Company offerings (team must analyse its product and services from the viewpoint of the customer-outside in thinking. What is the customer looking for and what benefits does the customer want. The business must gain knowledge of the marketplace from its customer)
- Target market (team should analyse its target markets).
- Marketing strategies (the team should frame its marketing /sales tactics that will allow it to achieve or surpass its goals).
- Unique selling proposition (what is unique about your product and why should anybody try using it?)
- Competitive analysis (the team should know its competition, current and potential. By identifying the competitor's strengths and weaknesses the business can improve its position in the marketplace)
- Team, roles and responsibilities
- Road Map (How the company will grow in the next 3 years)
- Investment required initially and justification.

6. Tier-3

The format is similar to the Tier-2 presentation .But the contestants from Tier 2 who qualify for Tier-3 will be mentored by a team of young entrepreneurs.

7. Judging Criteria

Tier-1, Tier2 & Tier 3 (Common in all)
• Company overview • Product knowledge • Market understanding • Customers needs matching with products/services • Competitive analysis • Feasibility • Presentation • Q/A • Team work • Home work

6. Technical Paper Competition

The concept

- The student selects a topic, collects information and presents a synopsis or abstract

Alignment with curriculum

- Subject from the curriculum
- Self learning
- Paper format SAE International Forma

Expectations

Tier-1	Tier-2	Tier-3
Basic data collection Logical reporting	Good depth of data collection Correlation of data collected from different sources Some hint of an original idea or conclusion	Quantitative validation of original idea either through theoretical investigation or experimental investigation (note: the participant must submit 2-d, 3-d modeling and analysis in software, Depending upon the type paper presented)

Topics

- Alternate Propulsion Technologies
- Advanced Engine Technologies
- Fuel Injection Systems
- Hybrid and Electric vehicles
- Emerging Fuels and Fuel Cells
- Energy Storage Systems and Infrastructure
- Safety and Crash
- NVH and Cabin Comfort
- Automobile Emissions and After treatments
- 3R-reduse, reuse and recycle
- Automotive electronics
- Vehicle Communications Network
- Nano technology
- Advanced lightweight materials
- Aero structure and technologies
- Off highway vehicles
- Vehicle body structures and frames
- Vehicle dynamics and handling
- Fuel economy and Co2
- Dynamic modeling processes
- Automotive testing and instrumentation
- Vehicle architecture
- Product development tools and techniques
- Policies, regulations and standards
- Public, private and academic partnerships
- Mechanical science

Kits and aids

- None

Competition rules

- Paper should be submitted one week ahead of competition date.
- Presentation in the competition
  - 7 minutes presentation
  - 3 minutes question and answer

Teams

- Team size: 2 students
- Number of teams for Tier-1: as many as possible
- One team from each college moves to Tier-2 (division level)
- Two teams from each division moves to Tier-3 (convention)

JUDGING CRITERIA

Tier-1	Tier-2	Tier-3
70% for quality for paper Criteria: according to SAE international. 30% for presentation Criteria: quality of slides, clarity of presentation, confidence in answering queries Data collection.		40% for quality for paper Criteria: according to SAE international. 30% for design Criteria: based on drawing views objective and conformity of 2-D, 3-D and Analysis design. 30% for presentation Criteria: quality of slides, clarity of presentation, confidence in answering queries Data collection.

(NOTE: If in case the participant doesn't have any design related to the topic in which he presents his technical paper, then for that participant alone the judging criteria will be followed as per TIER-1 and TIER-2).

7. Auto Quiz competition

The concept

Testing the general automotive knowledge of students by asking questions related to technical and other related automotive subjects

- History
- Places
- Personalities
- Technologies
- Companies
- Vehicle types and specifications
- Statistics of vehicles and so on
- All Automotive related subjects(as part of curriculum)

Alignment with curriculum

- All automotive related subjects

Expectations

Tier-1	Tier-2	Tier-3
Generic answers with aids using clue and so on Less questions	Generic answers without aids Medium no of questions	Specific answers without aids More questions

Kits and aids

- Not applicable

Competition rules

- **Five rounds**
- General – pass allowed
- Audio visual – pass allowed
- Specialization round – no pass

  (Topic will be same as for the Technical paper presentation)
- Rapid fire – no pass
- Jackpot – no pass

Time per team for answers

- For rounds other than rapid fire
- 30 seconds on direct
- 15 seconds on pass
- For rapid fire round
- 120 seconds for 10 questions

Marks

- First time right 5 marks
- Bonus 1 mark
- Rapid fire 2 marks for right answer
- Negative mark -1 for wrong answer as per the following rules
- Tier-1 No negative marks
- Tier-2 Negative marks for rounds where pass is allowed
- Tier-3 Negative marks for all rounds

Teams

- Team size: 3 students
- Number of teams for Tier-1 = number of members / 10
- One team from each college moves to Tier-2 (division level)
- Two teams from each division moves to Tier-3 (convention)

Difficulty and number questions

- As per the expectations at different Tiers mentioned above

8. CFD Contest

The Concept

- **Using CFD Tool**
  - Build CFD analysis
  - Analyse the model for thermal distribution
  - CFD to demonstrate thermal conductivity of model

Alignment with curriculum

- Thermodynamic
- Thermal engineering
- Heat and mass transfer
- Validating design procedure.

SAEINDIA SOUTHERN SECTION

Expectations

Tier-1	Tier-2	Tier-3
Discretize the model with appropriate CFD techniques using CFD Tool. Then perform static analysis.	Carry out basic Optimization process through different techniques as per model	Modify the optimized model as per the thermal conductivity and then perform the static analysis to compare design performance

Competition Rules

- Actual analysis can be done off line.
- 10 Min presentation at the competition.
- Students can take any model for static analysis and optimization.
- Students have to use CFD tool to demonstrate.

Teams

- Team Size : 2 or 3 Students per team
- Number of Teams for Tier-1 : as many as possible
- Top 2 teams from each college will participate in Tier-2 (Division Level)
- Top 3 teams from each division will participate in Tier-3 (Convention Level)

Tier-1	Tier-2	Tier-3
• Model selection • Type of Meshing • Mesh Quality • Choice of loads and boundary condition • Material & property selection • Result interpretation	• Model selection • Type of Meshing • Mesh Quality • Choice of loads and boundary condition • Material & property selection • Result interpretation • Type of Optimization discipline • Selection of Objective for Optimization • Weight reduction • Selection of Optimization processes	• Model selection • Type of Meshing • Mesh Quality • Choice of loads and boundary condition • Material & property selection • Result interpretation • Type of Optimization discipline • Selection of Objective for Optimization • Weight reduction • Selection of Optimization processes • Modifying the geometry as per manufacturability • Result comparison • Suggestions for improvement of design

9. Plastic Die Engineering Challenge

Team Weightage:

- The team should can max 4 students.
- One student to work on the analysis and design of mould.
- Two students to work on CNC programming and Machining of components.

SKILL EXPLAINED:

Plastic Die Engineering is developing products of 2D and 3D new product models. A product is manufactured and assembled by first analyzing the product design and then designing the mould.

REQUIRED SKILLS:

- Must know 3D design software, CNC program coding, CNC operation.
- Must know the range of tools and their proper use in relation to Plastic Die Engineering.
- Must know the working materials and their characteristics.
- Must know the Properties of plastic materials, for example flow ability, moulding temperature, stability, percentage of shrinkage. Etc..
- Must know to apply principles that ensure mass production capability and maximize product life expectancy.

PROBLEM STATEMENT:

- To be provided by the organizing committee by consulting the industry experts on the event day.

COMPETITION DETAILS:

There are three rounds

- Product Analysis and Mould Design.
- Programming and Simulation.
- Machining and Assembly

1st round : The students must analyze the product and draw the mould design using 3D designing software.

2nd round: The students must generate CNC program for their design and simulate using CAM software.

3rd round: Using the Program Code, Machining operations must be done and the mould must be assembled.

10. Polymechanics and Automation

Objectives:

Polymechanics and automation is the modern generation competition to organized by SAE SOUTHERN SECTION in the upcoming convention, tier 3 events.

The competition is completely based on modern automotive industry requirements and provides unmatched exposure.

The events are open for all student and faculty members of SAE INDIA.

Team Weightage:

- A team can comprise of maximum of 4 members.

AIM:

The aim of this competition is to bridge the gap between the industry and the university by giving a chance to student for exploring a whole new area of automation and ploy mechanics which is the future demand of auto motive industry.

EVENT Description:

Step 1:

Technology Theatre

Awareness workshop/seminar on automation and its impacts in manufacturing.

Description

- The requirements of Poly mechanics /automation in modern industry.
- Presentation from leading industry expert with key note details on basics of automation.
- How different it is in terms of operation and versatility.
- Potential benefits of Poly mechanics /automation in manufacturing.
- Career in Poly mechanics and automation.

Step 2

Understanding and interpretation of engineering drawings

- Terminology and symbols used in engineering drawings and specifications
- Types and characters of materials used in the manufacturing industry for different automotive components.
- How part are manufactured using engineering machine tools such as milling, turning and grinding.
- Principles of pneumatics in automation projects.

Description:

As engineering drawing is the basics to understand design and the communication between engineers, it is important to evaluate the knowledge of machines and the product drafting.

Step 3

INDIVIDUAL SHOULD BE ABLE TO:

- Produce and initialize basic PLC programs for sequence replay.
- Produce basic components using the given geometry.

S.No	Process	Marks
1	Step 2	50
2	Step 3	50
Total		100

The problem statement will be provided by organizing committee on the day of the event.

REGISTRATION PROCEDURE:

THIS EVENT CAN BE INCLUDED IN TIER 2 ROUND ON A BASIC PEN PAPER QUIZ LEVEL, THIS WILL ENSURE NUMBER OF PARTICIPANTS FOR TIER 3.

- All participants should be SAE INDIA members
- All 2nd, 3rd and final year students can take part in the event.

RULES OF COMPITITION

- All registered participants must attend the workshop before participating in the main event
- Learning from the workshop will be evaluated in the competition.
- Engineering drawing will be provided by the organizer and will be from the field of automotive engineering.
- Evaluation by the judges will be final in all regards.

11. PROTOTYPE MODELING – Challenge

Team Size – Max 4

SKILL EXPLAINED:

Prototype Modeling engineers are developers or producers of 2D and 3D new product models. When a new industrial product is developed, a product is designed based on a concept and a prototype model is created, and the shape of the new product is next determined after thorough review and modification.

REQUIRED SKILLS:

2D Sketching, Clay Moulding, Creativity

PROBLEM STATEMENT:

- To be provided by the organizing committee by consulting the industry experts on the event day.

ON THE COMPETETION:

- Analyzing the problem statement, the team has to design the model through 2D sketches and dimensioning it clearly.
- After which the team has to make the prototype model of their design by using the clay and decorate it with given materials.
- The final prototype will be judged comparing the initial design.
- The required material for this round (Ex: Clay, Colors, Stickers) will be provided by the organizing committee.
- Preliminary rounds may be conducted based on the number of teams participating and questions will be given on spot.

12. Welding

"GLAUCUS CHALLENGE"

Concept:

Understanding the given concept and welding the material.

Expectation:

Tier-1	Tier-2	Tier-3
Each team should weld a Lap, Butt, Corner & T joint with the given rectangular plate (Mild Steel)	Each Team should weld a model using the supplied kit. Weld can be of any type (Lap, Butt, Corner & T joint). Models can be rectangular plates or roll bars (Mild Steel)	Each team should weld a model using Roll cage pipes (Mild Steel). Models can be a part of SAEINDIA Baja or Supra Rollcage.

KITS AND AIDS

MATERIALS SUPPLIED IN TOOLBOX

Non-consumable materials, equipment and tools to be supplied by the Competitor.

The following list as a minimum shall be supplied by the Competitor:

- Welding safety glasses;
- Grinding goggles;
- Welders helmet, speed lenses are permitted
- Ear protection;
- Hand angle grinder with guard, maximum 125mm (5inch);
- Wire brush wheels to suit grinder;
- Fire retardant clothing;
- Chipping hammer (slag hammer);
- Inter-weld run cleaning, blade scrapers;
- Chisels;
- Scriber;
- Files;
- Wire brushes;
- Hammer;
- Weld gauge (fillet gauge);
- Metric steel ruler (tape measure);
- Square;
- Chalk;
- Dividers;
- Power transformer (if required) and extension leads;
- Competitors may use their own TIG, MIG, ARC WELDING & GAS WELDING pieces/torches;

RULES :

- Contestants must be enrolled as a SAE member in his college
- Per team 2 members
- One team from each college moves to Tier II (Division Level)
- Two teams from each college moves to Tier III (Convention)

JUDGING CRITERIA :

CONTENT	MARKS ALLOTED
Dimension of weld	20
Quality of weld	20
Inspection	30
Testing	30
TOTAL	100

13. Mobile Robotics

MOBILE ROBOTICS Challenge - JUST DO IT

Engineers have to bring on solutions in accordance with constraints. This event concentrates on bringing in optimized solution with given parameters

REQUIRED SKILLS:

- Basic microcontroller programming
- Selection procedure of drives and sensors
- Problem analyser and quick solution providing capability

SCENERIO:

- Given sequence of factory shop floor where components with technical defects are placed in between the normal component Mobile robot has to sense the component and pick the component and place it in the rejected lot

COMPETETION:

- Analysing the situation and build the bot with required constraints and parameters to accomplish the given task

DURING THE COMPETETION:

- The team has to test the bot in the given layout
- The final bot will be judged comparing with respect to the initial design document
- Endurance and durability of the bot will be taken into concern

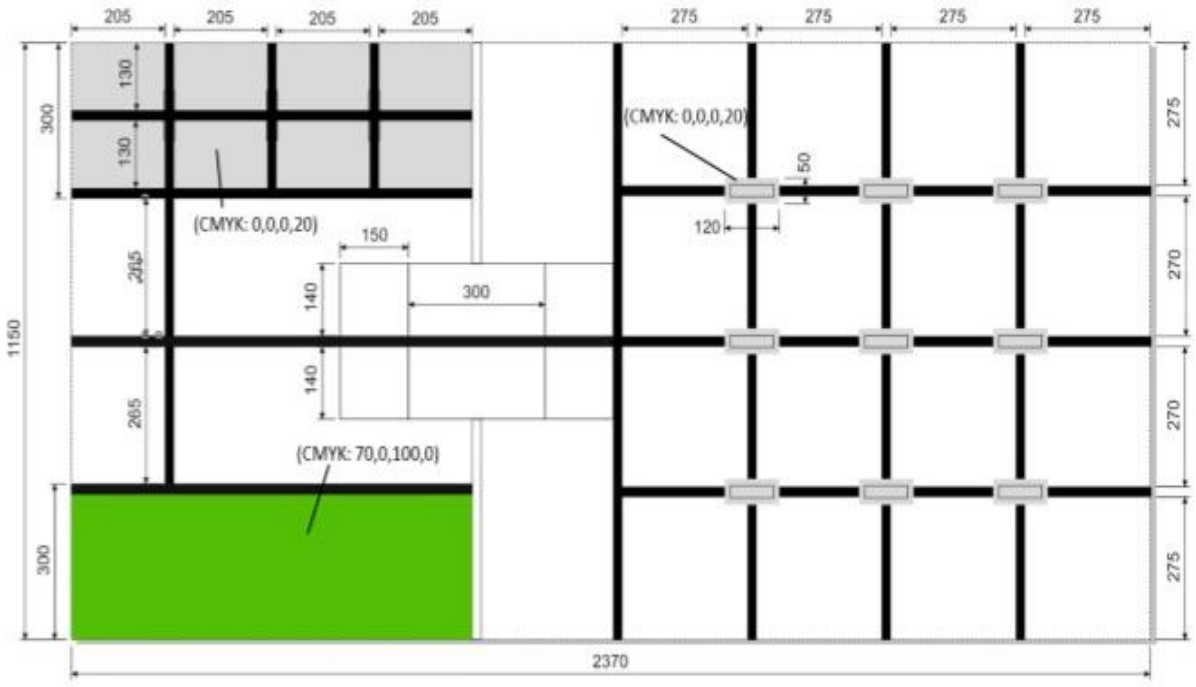
JUDGING CRITERIA:

- Documentation
- Robot specification
- Construction
- Rules compilation
- Time
- Task optimization
- Effectiveness of the robot work
- Logic
- Simplicity of bot

TEAM

S.NO	ENGINEER	TASK	MAXIMUM NO. OF MEMBERS
1	MECHANICAL	FORMULATION AND LOGIC	4
2	EEE/ECE/EI/CS/IT	PROGRAMMING	4

DRIVE AND SENSOR SELECTION



SAEINDIA SOUTHERN SECTION

STUDENT CONVENTION
Challenge Ahead
Enjoy Learn & align with Curriculum

Factory Layout

DIMENIONS OF THE MAT

- Horizontal Dimensions: 2370 mm × 1150 mm.
- A wall that is 16 mm in width surrounds the table. The height of the wall is 50 mm.
- The height of the barrier between the Storage Station area and the field area is 50mm
- The table base colour is white, except for the black line, Challenge Object Areas, Warehouse, and the Base area.
- There are 9 rectangles in the Outer Space area that are 120 mm x 50 mm.
- Three intersections of the black lines in the Warehouse are the places where the good components are set at the beginning of every attempt.

SCORING

- Score will only be calculated at the end of the challenge or when time stops
- Detection of good components without disturbing ' would help to gain 10 points
- Detection of bad components would gain 20 points
- Picking up the component would gain 25 points without disturbing
- Each disturbance would cost a penalty of 25 points
- Successful completion of the mission would lead to gaining of 100 points

KNOWLEDGE ACQUIRED

- Exposure to crisis and their management
- Serves as a platform to put their theoretical analytical and logical skills into action in accordance with hands on experience

14. Mechatronics

Team Size – 4

TECHNICAL DESCRIPTION:

Mechatronics is a branch of engineering that integrates mechanics, electronics, control systems and computer science engineering. Mechatronic system design deals with the integrated and optimal design of a physical system, including sensors, actuators, and electronic components, and its embedded digital control system.

PROBLEM STATEMENT:

Students are expected to design and execute a real time mechatronic system or a production line replica that can be used to partially automate the respective process. The task is complete when the system/production line has been mechanically assembled, correctly wired, connected and its correct operation is guaranteed and executed.

SKILLS REQUIRED:

- individual needs to know and understand principles and applications for:
- Designing, assembling and commissioning a mechatronic system.
- The components and functions of hydraulics, electrical and electronic systems, drives, industrial robotics and PLC systems (whichever may be used).
- The individual should be able to design pneumatic, electrical and hydraulic circuits.
- The individual needs to know and understand the criteria and methods for testing equipment and systems.

Competition Rules

- Actual working model has to be done off line.
- 10 Min PPT presentation at the competition.

JUDGING CRITERIA:

- Rating of the system/production line depending on industry standards.
- Judicious usage of components.
- Optimizing of the system/production line.
- Technical language associated with the skill.
- Quality of report and presentation.

KNOWLEDGE ACQUIRED:

- Exposure to the industry related problems for which they will prepare solutions through automation.
- Serves as a platform for the students to prepare themselves for the future world which

15. CNC Turning

INTRODUCTION

CNC Turning is an upcoming event in SAE INDIA SOUTHERN section. Engineers have to find mechanical solutions that can make complex designs possible. A CNC Lathe is a machine on which material turns around an axis at high speed, and where cutting tools driven by computer software are moved to cut away excessive material to get the expected part. The CNC Turning Machinist receives the blueprint. Then he/she uses the Lathe in many ways to find solutions in order to build the part.

OBJECTIVE

To facilitate an event where students can use their engineering drawing reading skills, programming skills and familiarity of CNC lathe machine to successfully fabricate a given engineering model.

EVENT DESCRIPTION

In the event the team has to understand the engineering drawing model given and program the G and M codes to obtain the profile of the given model and test the codes using the SIEMENS NX CAM software. After virtual validation, these codes will be applied to the CNC machine.

SKILLS TESTED

The team will have knowledge in reading the Engineering Drawing of the model given. They should know the basic symbols used in engineering drawing. The teams should understand the working of CAM software (usage, setting parameters, dialoguing) .The selection of Proper Feed and speed rates to get the required profile is also an important factor to be tested. When applied to the CNC machine the teams have to get the required surface finish and tolerance as specified in the figure.

BENEFITS TO STUDENTS

- As the use of CNC's is on the rise in industries, familiarization with these concepts will be helpful for the participant.
- Familiarization with CNC Lathe.
- Getting an opportunity to work on virtual software's as well as work on CNC machines.
- Students will get certification of their talents in CNC Turning fields.

SAEINDIA SOUTHERN SECTION

STUDENT CONVENTION
Challenge Ahead
Enjoy Learn & align with Curriculum

RULES

- All participants should be SAE members.
- Rules may change with/without prior notice.
- A team should be composed of a maximum of 4 members.
- Judges Decision will be final.
- Spot Registration is possible.
- The team will get an initial time of 15 min to initially understand the drawings.
- The teams should be able to program the G and M codes within the stipulated time of 3 hours.
- The teams can simulate the G and M codes using the Siemens NX CAM software.
- 3 teams will be selected from the simulation round.

PROGRAM SCHEDULE

Initial Round (Screening Process)

- The teams will initially undergo a viva on the topic of CNC Lathes and G and M codes.

Second Round

- The participants will get 15 minutes initially to understand the given drawing.
- Then within the stipulated time of 3 hrs the GNM coding will have to get programmed.
- The GNM codes will be tested virtually in a Siemens NX Software.

Final Round

- On the Second Day the selected teams will get the opportunity to test their codes in a CNC Lathe.
- Judges will decide the winner according to the judging criteria.

JUDGING CRITERIA

- Conformity to Drawing
- Surface Finish
- Main Dimensions
- Secondary Dimensions

MARKING SCHEME

Virtual Round (40)

Effectiveness of G and M codes	20
Number of steps	05
Implementation of all the operation	05
Time taken in the simulator	05
Dimensional Accuracy	05
	40

Final Round (CNC) [60]

Conformity to Drawing	20
Dimensional Accuracy	15
Surface Finish	15
Handling of the machine and work surroundings	05
Time taken to complete the work	05
	60

16. CNC Milling

Team Size – 4

About CNC milling machines

CNC milling machines are machine tools which are used for the shaping of metal and other solid materials. These machines exist in two basic forms: horizontal and vertical. This refers to the orientation of the cutting tool spindle. Early milling machines were manually or mechanically automated, but technological advances have led to the development of Computer Numerical Control, such as CNC machining centre. CNC refers to a computer ("control") that reads and stores instructions. This numerical information generally "G and M" codes (a programming language) is then used to control and drives a machine tool, a powered mechanical device ("machining centre"). A machining centre is used to fabricate components using cutting tools for removal of material.

CNC technology includes machining tools such as lathes, multi-axis spindles, wire electrical discharge machines and milling machines, where the functions formerly performed by human operators are now performed by a computer control module. The professionals associated with this skill use CNC machines (3-Axis, 4-5 Axis or Multi-Axis machines) to cut and shape precision products as mentioned.

The individual needs to know and understand:

- The extent and impact of CNC milling on modern life and industry
- Programming by hand or CAM system software
- Properties and behaviours of materials, especially steel and aluminium
- Must know software's and M, G Codes effectively

Eligibility Criteria

The individual shall be able to:

- Optimize the machining strategy
- Must have SAEINDIA membership
- Must have a knowledge of G&M Codes
- Identify and designate the different machining processes on a CNC Milling machine
- Optimize the process taking into account the production type; large quantities of one part, small batches or one-off items
- Define and adjust the cutting parameters as a function of the operation sequence, material type, type of operation and CNC machine tool

Steps to be followed

Start the cutting process:

1. Solid block 2. Pre-machined part 3. Casting

Perform the following machining operations:

- Facing
- Roughing and finishing
- External contours
- Milling channels
- Pocket(figurative)
- Pocket (circular and rectangular)
- Taper ribs
- Thread milling
- Internal
- External
- Through hole boring
- Blind hole boring
- Reaming
- Tapping
- Drilling
- 3D machining operations
- Roughing
- Finishing
- Control the surface quality
- Operate, inspect and maintain the accuracy of dimensions within the Tolerances

Rounds to be conducted

Round-1:

Viva for about 10min on Codes and about the milling machine to get a cream crowd for round-2

Round-2:

Participant will be asked to draw the required component on the day of the event, adjustment of the tools, spindle & machine and entering a program (G&M Codes) for a machine and further operations to be done.

SAEINDIA SOUTHERN SECTION

STUDENT CONVENTION Challenge Ahead

Enjoy Learn & align with Curriculum

Judging Criteria

S. No.	Criteria	Subjective	Objective	Total
1	Main Dimensions	0	54	54
2	Secondary Dimensions	0	21	21
3	Surface Quality	0	9	9
4	Conformity with the drawing	10	0	10
5	No additional elements used	0	6	6

SPECIFIC SAFETY REQUIREMENTS

- All Competitors must use safety glasses when using any hand, power or machine tools or equipment likely to cause or create chips or fragments that may injure the eyes
- Experts will use the appropriate personal safety equipment when inspecting, checking or working with a Competitor's project
- The documentation 'Safety and Fairness' will be prepared by the Experts
- The Competitor must comply with the machine manufacturer's safety instructions

SUSTAINABILITY

The following ideas may be considered:

- At the end of the Competition create several individual project sets (part, drawing and programs) from the parts machined by the Competitors and donate them to vocational schools as teaching materials. (The program is chosen from the highest scorer of each module);
- Demonstration parts;
- Each country/region is required to bring demonstration parts that the public can easily identify to be used during the demonstration time. (A geometric 3D file of the part is required as well).

BENEFITS

1. CNC machines are programmed with a design which can then be manufactured hundreds or even thousands of times. Each manufactured product will be exactly the same.
2. Less skilled/trained people can operate CNCs unlike manual lathes / milling machines etc.. which need skilled engineers.
3. CNC machines can be updated by improving the software used to drive the machines
4. Training in the use of CNCs is available through the use of 'virtual software'. This is software that allows the operator to practice using the CNC machine on the screen of a computer. The software is similar to a computer game.
5. CNC machines can be programmed by advanced design software such as SIEMENS®, enabling the manufacture of products that cannot be made by manual machines, even those used by skilled designers / engineers.
6. One person can supervise many CNC machines as once they are programmed they can usually be left to work by themselves. Sometimes only the cutting tools need replacing occasionally.
7. A skilled engineer can make the same component many times. However, if each component is carefully studied, each one will vary slightly. A CNC machine will manufacture each component as an exact match

NOTE:

1.SAE will provide Raw material on the day of event.

2.SAE will provide the facility of the milling machine on the day of event to operate the operations.

17. Sheet Metal

BACKGROUND:

The Sheet Metalwork competition reflects the range of traditional hand and emerging technical skills used across the fabrication sector in the manufacturing and engineering industries.

COMPETITORS:

The competition has been designed to reflect the skills of students who are interested in the field of fabrication. It is open to all streams of Engineering. SAEINDIA student members perusing any B.E/ B.Tech program can compete**.**

IDEOLOGY:

A problem statement (Relating to Automotive Technology) would be put out by the organizing committee. The student team is expected to come with a possible solution which can be prototyped with the help of sheet metal.

BENEFITS:

- Enables a student to get hands on experience in working real time.
- Makes the participant a complete engineer since it involves the following:

1) Manual drawing

2) 2D/3D Computer drafting

3) Fabrication & Assembly

4) Soft skills

EVENT STRUCTURE:

PRELIMS

1) PATTERN SEGMENT

- The student teams (3 Per Team) will have to initially submit the pattern (Drawing).
- Based on the effectiveness, top teams would be shortlisted for the Finals.
- The short listing will be done by Industrial experts

FINALS

The finals consisting of the shortlisted teams will have the following segment.

1) FABRICATION SEGMENT

- Selected students will have to convert their 2D model into a prototype model.
- Fabrication can be done using manual rolling, folding, bending and shaping equipment which will be provided.
- Check using gauges, Vernier callipers, rules, squares which will be provided.

NOTE:

SAEISS will provide the raw materials**.**

2) ASSEMBLY SEGMENT

- Construct assemblies by appropriate techniques.
- Riveting operation & Adhesives can be used to join the sheet metals to form the assembly.
- Proper polishing, finishing and painting should be ensured. There are separate points for appearance.

NOTE: SAEISS will provide the raw material.

ASSSESMENT CRITERIA:

MINIMUM MARKS TO PRELIMS	TOTAL MARKS
30	100

SEGMENT	CRITERION	MARKS
A	Pattern Drawing	30
B	Fabrication	20
C	Assembly and Fit up	40
D	Appearance, Finish &Explanation	10

NOTE :

- Judges will do the assessment and will be decided by the organizing committee (SAEISS)
- Paint brushes & other painting essentials must be brought by the participant

SAEINDIA

18. Manufacturing Tech Challenge

INTRODUCTION:

A new initiative to inculcate the basic team building activity which is very much required in Automation industry. Members will be put forth to express their talents in the field of manufacturing and problem solving techniques.

OBJECTIVE:

To provide an opportunity for college students to act effectively in a team and to practice interpersonal skills, communication, work management, cost reduction and to plan the process.

EVENT DESCRIPTION:

Event covers designing (CAD & CAM) and manufacturing (CNC milling & lathe) equipment assemblies with project documentation, implementation of cost reduction and sequence of process.

TEAM STRENGTH:

A team must consist of 4 members of complimentary specialist.

WHAT IS EXPECTED?

- To carry out CAD/CAM exercise for manufacturing task.
- To set up and machine all components required for the project.
- To work as a team in optimizing the manufacturing process so that the cycle
- time and cost can be reduced.

BENEFIT FOR STUDENTS:

- To learn and test their skills in design and manufacturing according to the
- industrial standards.
- To understand and explore the ways for cost reduction and
- process planning.

SKILLS REQUIRED:

DRAWING:

The individual shall be able to:

- To interpret drawings that conform to ISO standards
- Create and modify 2D and 3D models.
- Create CNC programs using CAM packages and appropriate postprocessors.
- Complete drawing activities within the planned timetable and to suit the project's overall requirements

MACHINING:

The individual shall be able to:

Machine components to drawings on conventional machine tools and from CAM generated tool paths. Safely operate a CNC machine. Manufacture components to industry finishes and tolerances, Measure and adjust manufacturing process to meet specifications.

RULES :

- All the participants must be SAE members.
- Rules may change with/without prior notice.
- Online registration is for advance slot booking.

EVENT STAGES:

- Finding solution for the given problem.
- Portfolio and PPT presentation.
- Generate tool path simulation using cam software.

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MARKING SCHEME:

Design & Modeling	20
Portfolio/documentation	10
Tool Path Generation	20
Evaluation/Presentation	20

19. Mechanical Engg Design CAD

TEAM Size Max 4

INTRODUCTION

Mechanical Engineering Design covers the use of Computer Aided Design (CAD) technology in the preparation of graphical models, drawings, paperwork and files containing all the information necessary for manufacture and documentation of parts and components typical of solutions to mechanical engineering problems facing workers in industry. Solutions will comply with appropriate industry and ISO standard, latest issue. It's a opportunity for young student designers to learn industry design skills who are willing to pursue their career in the field f designing.

SCOPE OF WORK

The following competencies and skills will be tested within one or more of the individual

The scope of work include Design, modelling and rendered images of a mechanical component as per industry standards and put a drawing on the sheet including GD&T and then present it.

3D modeling of part

Knowledge and understanding of 3D modeling of part:

Have sufficient knowledge of Autodesk Inventor /Nx CAD/Solid Works to be able to configure the parameters.

Have sufficient knowledge of computer operating systems to be able to use and manage computer files and software correctly

The competitor shall be able to:

Perform the modeling of the components, optimizing the constructive solid geometry

Ascribe colors and textures to the components

Create photo rendered images of components

Knowledge and understanding of technical drawings and dimensioning:

Understand working drawings in ISO standards together with any written instruction.

Knowledge of standards for conventional dimensioning and tolerance, and geometric dimensioning and tolerance appropriate to the ISO standards.

Thorough understanding of the rules of technical drawing and the prevailing latest ISO standards that govern those rules

Using the manuals, tables, lists of standards and product catalogues

DESCRIPTION OF PROJECT TO THE COMPETITORS

All Competitors must review the given question from industry experts access and understand it and model it.

Maintain ISO standards and understanding of GD&T.

INSTRUCTIONS TO THE COMPETITOR

The competition comprises of two rounds

ROUND 1

SKETCHING AND MODELING THE PART ACCORDING TO DIMENSIONS

1. If required, create sketches on paper.
2. Use the following information to assist with measurement process.

i. Measuring accuracy = ±0.2 mm when measuring across 2 machined surfaces.

ii. Measuring accuracy = ±0.5 mm when measuring across unfinished surfaces.

iii. Radii and chamfers 0.4 mm or less are not required.

iv. Neglect any surface irregularities.

v.Review the part, instructions and illustrations for features that are modified or do not have to be model

vi.Assume 1.5 degree draft angle where required.

vii.Review the attached sketches for dimensions.

3.Create the model of the part and save the part.

Appropriate model gets promoted to round 2

Rest get eliminated

CREATE DRAWING INCLUDING GD&T

1.Create required views to display the major features of the part.
2.Create a detailed drawing of the part.
3.To complete the drawing:
    i.All annotation styles must meet ISO standards.
    ii.Dimension as required for manufacturing.
    iii.All main parts
    iv.Dimensions should be placed using one decimal place.
4.Apply GDT
5.Add surface texture symbols.
6.Add a note listing the volume of the part in mm3.
7.Create a rendered image,
  i.The machined surfaces should be – Aluminium in appearance.
  ii.The cast surfaces should be – Cast in appearance.
8.Save the file.

Will get reviewed by the expert after the completion
Presenting the model to judges/experts

20. Electronics

Why the Electronics?

In olden days, the automobiles are maximum of mechanical parts assembly. But now-a-days thirty to forty percent of vehicle assembly consists of Electronic parts. The electronics industry is very diverse and has evolved into several specialisms. Due to the constant developments in technology, engineer needs to be proactive in ensuring that his/her skills are up-to meet industry standards and expectations. So, this event may stress the importance of electronics to the students of mechanical and automobile field and in the other way attract the students of electrical and electronics to the automotive sectors.

Competition Elegant Electronics:

The competition basically categorised into three as follows:

Circuit design: The student members have to bring their own electronic circuit for various working elements.

Programming module: The student members have to write an algorithm and program for their electronic circuit.

Assembling: The student members have to assemble the various components used in their design circuit and have to demonstrate it.

Event Details:

Round 1:

- Explaining the functioning of components used in their own circuit.
- Finding faults in the given basic circuit.
- It is an Elimination round.

Round 2:

- Writing an algorithm to the electronic circuit.
- Writing the program to the electronic circuit.
- It is an elimination round.

Round 3:

- Assembling the components.
- Demonstrating the working unit.

Rules of the competition:

1) Students have to bring the required components for their electronic circuits.

2) Only circuits for fault finding will be provided.

3) Programming could be done using MAT LAB/SCADA.

4) Evaluation by the judges will be final in all regards.

5) A Team should have maximum of 4 members.

Assessment details:

A. Finding faults -	30 marks
Finding faulty spots and evidence -	15 marks
Repairing –	15 marks
B. Embedded Systems Programming -	25 marks
Software functionality -	25 mark
C. Assembly module -	20 marks
Operating condition OK -	20 marks;
Assembled quality according -	25 marks

Note:

Economically feasible electronic circuits will be encouraged. So it could be taken to the next step of production.

21. Group discussion competition

The concept

- The students will be divided into groups on spot and will be given a situation to solve by discussing it with their fellow team mates

Expectation

- Technical knowledge
- Communication skills

Problem solving

Topic

- On spot topics

Kits and aids

- None

Competition rules

- Presentation in competition
  - 4-5 mins per person
  - Team time depends on size of team

Teams

- Team size : 5-7

Judging criteria

- Taking initiative
- Team player
- Observation
- Giving correct point

22. Design review competition

Topic: Vehicle weight management design

(It is anticipated that the vast majority of the work developing ideas and formulating presentations would have taken place prior to attending the conference.)

Format:

1. Design review teams will consist of four team members

2. Teams will be given 45 minutes to review and to test all equipment provided

3. Ten days prior to the competition, presentation time slot will be announced on website

4. Each team will be given 5 minute for setup, 15 minute for presentation and 10 minute for discussion period

5. Question may be asked by judges or audience members.

6. The chief judge responsible for moderating the question and answer period.

Equipment Provided

1. One laptop computer running on the latest version of Microsoft windows with Microsoft power point installed

2. One multimedia projector and sound system compactible with supplied computer

Judging

Each design presentation will be judged by three or five judges

Designs will be evaluated by judges as a group, with equal consideration to the following evaluation criteria

1. Design justification (social need, market analysis)

2. Technical merit

3. Value preposition (Economical &social)

4. Presentation delivery and effectiveness

Eligibility

1. Each member must be an U.G student

2. Each member must be a registered student of SAEINDIA

SAEINDIA

23. DIAGRAMMATIC REASONING

CONCEPT

Students should understand the terms in the diagram relating to engineering and to choose the answer appropriately. The students are advised to see the following links to know how to approach diagrammatic reasoning and questions based on Venn diagrams

http://www.savilleconsulting.co.za/wp-content/uploads/2012/08/preparation-guide-diagrammatic-reasoning.pdf

http://www.indiabix.com/verbal-reasoning/venn-diagrams/

NEEDS FOR THE EVENT

To get an exposure for attending aptitudes in the interviews and understand the engineering processes in simple way.

RULES

1. Team size: maximum of 3 students (cross college members are allowed)
2. All the questions will be related to engineering field
3. The event will take place in 3 levels and number of teams will be filtered depending upon total number of registrations we get.
4. The level of difficulty will increase in each level
5. Number of questions, question type and time limit will be announced during the event.
6. The students must be prepared in all curriculum subjects , their applications and should posses with logical thinking

24. HOW THINGS WORK

CONCEPT:

Understanding the given concept behind each and every component.

EXPECTATION:

To identify the mechanism behind the given component.

First round: Written test of basic mechanisms.

Second round (4 rounds):

- General round-pass allowed.
- Visual round-pass allowed.
- Specific round-no pass.
- Practical presentation round.(To explain the given components function and to make the component to perform the mechanism)

KITS AND AIDS:

- No kits or aids for the competition.

RULES:

- Contestants must be enrolled as a SAE member in his college.
- 2 members per team.

JUDGING CRITERIA:

CONTENT	MARKS ALLOTED
ROUND 1	3 x 10 =30
ROUND 2	2 x 10 =20
ROUND 3	2 x 10 =20
ROUND 4	3 x 10 =30
TOTAL	**100**

25. Process Planning

Objective:

To make a detailed plan to complete a manufacturing operation in the least amount of time while making it economically feasible.

Introduction:

- Process Planning is a necessary skill which is highly sought after in current industry where the main focus is to complete a job as quickly as possible while making sure cost is low. For that reason many computer aided process planning soft wares were made available to help improve efficiency.
- Process planning is also called: manufacturing planning, process planning, material processing, process engineering, and machine routing.
- Which machining processes and parameters are to be used (as well as those machines capable of performing these processes) to convert (machine) a piece part from its initial form to a final form predetermined (usually by a design engineer) from an engineering drawing.
- The act of preparing detailed work instructions to produce a part.
- How to realize a given product design.

Participation pre-requisite:

- Basic manufacturing technologies and operations Knowledge.
- Knowledge of computer aided process planning software.

Event Rules:

(A)The event is divided into two phases-

1) Qualification round

In qualification round, the contestants would be needed to answer a series of multiple choice questions related to manufacturing technology and basic manufacturing operations.

2) Process Planning round

For process planning round contestants would be provided with a product design and they would have to determine the fastest and most economical way for producing that product. For this round the participants would be provided with Part Planner software or NX Process Planning software from seimens.

(B) Team Strength: Maximum number of participants allowed per team is limited to four.

(C) In case of more number of participants clearing the process planning round, a third round of VIVA would be used for tie –breaker purposes.

26. MATERIAL IDENTIFICATION

CONCEPT

Identify the material of the given product or components in automobiles.

ALIGNMENT WITH CURRICULUM

- Identify the material of component.
- Description of material and their properties.
- Describe the use of that material.

EVENT BLUE PRINT

1. Preliminary
2. Final round

Preliminary	Final
Participants are questioned and analyzed based on their knowledge regarding basics of material properties and their composition.	Each team should identify the material of components which will be providing on clearing the prelims and write the description of material using tag. The team has to present their conclusion in front of the jury.

KITS AND AIDS

- Component will be provided for teams clearing the prelims.
- Tags also will be provided.

COMPETITION RULES

A maximum of two students are allowed per team.

- Teams clearing the prelims are promoted to final round.
- If more than one team registers, only one of them will be selected during prelims based on their performance.
- The teams should be able to find out material of given component within the given time. No extra time or material will be provided.
- Based on the presentation and identification, team to be evaluate and time is important.
- Judges decision will be the final.

BACKGROUND

- MI competition reflects a range of materials skills used across quality department in various automotive industries.

27. OIL SEAL DESIGN

WHY SHOULD WE DESIGN AN OIL SEAL?

An oil seal is a piece of rubber reinforced with a piece of metal used in order to prevent the leakage of oil. It also prevents dust, other fluids and foreign particles from jamming the shaft.

AIM:

To design an oil-seal for a rotating shaft of an automobile.

ELIGIBILITY CRITERIA:

Candidates who hold/ pursuing a degree in Mechanical/Automobile Engineering are eligible to take part in the event.

EVENT BLUEPRINT:

PRELIMS	FINAL ROUND
General questions (Written test) on oil-seal design and its applications in day-to-day life will be asked. The candidates are also asked to draft a 2D model. Top teams with maximum scores will enter the Final Round.	Each team will be given a computer system with the design software (Autocad/Pro-E) to present their design ideas. The candidates are required to perform analysis (FINITE ELEMENT ANALYSIS) of the design in addition to 3D modelling. The design must be clear enough to depict the various layers in the oil-seal.

RULES:

- ➢ A team with maximum of three persons is allowed.
- ➢ The candidates should bring their Identity cards on the day of the event.
- ➢ The candidates should mention his/her material for the design in the design page.
- ➢ The candidates who clear the Prelims are alone allowed to enter the Final Round.
- ➢ The candidates are given a time of NINETY MINUTES to present their design.
- ➢ The designs will be evaluated by the Judges and the results will be announced.
- ➢ JUDGES DECISION WILL BE FINAL.

EVENT OUTCOME:

- ✓ The designing talent of the candidates are enhanced.
- ✓ Knowledge about various types of oil-seal design is gained.
- ✓ The practical applications of the Oil-Seal are known.
- ✓ The Roles and responsibilities of a design engineer are understood.

28. Reverse engineering

Concept:

To analyse a duplicate model (Blueprint) of an object using reverse engineering

Expectation:

Round 1	Round 2	Round 3
Each team should write about the given object i.e. the materials involved in it, manufacturing process	Each team should prepare a 3D model of the object with the dimensions and materials using CAD softwares.	Each should prepare the basic duplicate of the object using alternative material like News papers , Thermocole sheets etc.

KITS AND AIDS:
Non Consumable materials , equipment and tools should be supplied by the competitor.
The following list as a minimum shall be supplies by the competitor

- News papers and thermocole.
- Adhesives such as tapes, glue sticks, pins etc.
- Cutting tools such as scissors , blades.

Rules :
Contestants must be enrolled as a SAE member in his college.

- Per team 2 members
- The team is independent of selecting the object .
- The team can use any software for preparing the 3D model

JUDGING CRITERIA:

CONTENT	MARKS ALLOTED
Write up	20
Accuracy of 3D model	20
Time taken for 3d model	10
Complexity of the object selected	20
Duplicate object	30
TOTAL MARKS	100

29. Threading and Taper turning

EVENT :

The main objective of the event is to make the students to understand the practical difficulties in basic screw threading and taper turning operations.

Participating students should able to clear the prelims within the specified time. Teams will be ranked according to their cumulative total.

To increase the difficulty level, students can be made to two dimensional sketch of given three dimensional model.

Difficulty level will be decided based on the performance of the students in the Preliminary level.

RESPONSIBILITIES OF PARTICIPATING TEAMS :

Students should not wear loose dresses to ensure their safety in the Lathe Workshop.

They should bring the necessary stationary items.

JUDGING CRETERIA :

Marks for each team will be awarded by an expert based on the accuracy and time taken to complete the event.

30. WORK HOLDING

EVENT

The main objective of the event is to make the students to understand the practical difficulties in basic work holding devices especially in Four Jaw Chuck.

Participating students should able to fix the given Rectangular work piece in the four jaw chuck in the axis within the specified time.

To increase the difficulty level, students can be made to face the sides of the Rectangular work piece or to drill the work piece at the specified point to the given depth.

RESPONSIBILITIES OF PARTICIPATING TEAMS

Students should not wear loose dresses to ensure their safety in the Lathe Workshop.

They should bring the necessary stationary items.

JUDGING CRETERIA

Marks for each team will be awarded by an expert based on the accuracy and time taken to complete the event.

31) CIRCUIT DESIGN

Aim:

To enhance the knowledge on basic circuit design with respect to the industrial application.

Expectations:

- Acquire basic knowledge about circuit designing.

Prelims (round 1)	Circuit analysis (round 2)	Designing of circuit (round 3)
• A set of 25 questions will be given to every team and 30 minutes is allotted for solving it. • Best of 10 teams will move to next round.	• A schematic circuit (including some questions) will be given to every team with specifications. • Teams should find what kind of circuit is that and they must write its application.	• Each team will be given a sheet, where source and output of the circuit will be given. • Teams should quickly design a circuit and they must obtain the output.

Competition Rules:

- Team size: 3 – 4 students.
- Kit shall be provided at the time of event.
- No electronic devices are allowed during the time of event.
- Contestants must be an SAE member.

Judging criteria:

S.NO	CONTENT	MARKS ALLOTED
1.	Knowledge about circuit	25
2.	Product size	10
3.	Accuracy of output	40
4.	Number of components used	25
	TOTAL	**100**

32) INTERNET OF THINGS

ABOUT:

Automotive Manufacturers are leveraging their interest in IoT and IoT connected automotives. There is a growing trend and huge business opportunity in connected cars. Currently, automakers are connecting their vehicles in two ways: embedded and tethered. Embedded cars use a built-in antenna and chipset, while tethered connections use hardware to allow drivers to connect to their cars via their smart phones.

Purpose of the Event:

The purpose of the event is to propose innovative ideas and develop prototype for an IoT based system that can make smart cars to a smart connected car.

THE CONCEPT:

The student selects a topic, collects information and presents a synopsis or abstract.

EXPECTATIONS:

Tier-1	Tier-2	Tier-3
Proposal submission and presentation.	Good Knowledge on the various functionalities of the system and present a prototype	Participant must give a detailed presentation along with the final demo of the system with a working prototype.

COMPETITION RULES:

- Paper should be submitted one week ahead of competition date.

Presentation in competition:

- 7 minutes presentation.
- 3 minutes question and answer.

The team must develop the application based on the proposal submitted.

Application can be developed on any platform compatible for either Android or IOS and the final Apk file must be submitted.

TEAMS:

Team size: 2- students

- Number teams for Tier-1: as much as possible
- One team from each college moves to Tier-2 (division level).
- Two teams from each division moves to Tier-3 (convention).

JUDGING CRITERIA:

Tier-1	Tier-2	Tier-3
70% for quality for paper Criteria: according to the SAE International and Novelty of the Proposal 30% for presentation Criteria: quality of slides, clarity of presentation and confidence in answering queries Data collection.	Evaluation of the prototype	80% for the completion and successful demo of the functionality in match with the proposal. 20% for the Presentation and scope for future enhancement

33) HUMAN POWERED VEHICLE

INTRODUCTION:

Human powered vehicle competition encourages and promotes the teams to design and fabricate energy efficient human powered three wheeled vehicle. The design should be attractive by its visual appearance, performance, reliability and ease of operation.

PURPOSE:

The main purpose of this competition is to provide an opportunity for SAE student members to design and fabricate eco-friendly vehicle and come up with many innovative designs. To provide direct hands-on experience to the student about the real time manufacturing of a vehicle.

COMPETITION SUMMARY:

The competition includes designing, fabricating and validating a three wheeled vehicle driven by single driver. The vehicle must run only in human power. The vehicle would be evaluated for its design, fabrication quality, and performance.

TEAM STRUCTURE:

Each team participating in this competition can have maximum of 4 team members. All the participants must be member of SAE at the time of event.

VEHICLE CONFIGURATION:

The vehicle must have three wheels that should not be in a straight line. The team must design a vehicle only in **delta (1F2R)** configuration. The vehicle must be capable of carrying one rider of maximum weight 100kg. The vehicle can be fabricated in any alloy material. Safety of the riders is very important in designing the vehicle.

EVENT STRUCTURE:

PRELIMS:

- The student teams (4 members) will have to initially present the design of their vehicle.
- Vehicle design must be done in CAD software and complete design must be presented in the prelims.
- Presentation can contain pictures, simulation, animation for better explanation but it should **not exceed 15 slides.**
- Presentation must contain all the specification of the vehicle like steering system, braking system, power train, material used, ergonomics and safety of the vehicle, etc.
- Based on the effectiveness of the presentation best team would be shortlisted for the finals.
- The short listing will be done by industrial experts.

PRELIMS ASSESMENT CRITERIA:

S.NO	CRITERION	MARKS
1	Vehicle design	30
2	Technical specification	40
3	Explanation	30
Total marks		**100**

FINALS:

- Short listed teams must do a prototype of their design.
- Teams will be provided with tool equipment's and steel tubes by SAEISS for fabrication, paint brushes and other painting essentials must be brought by participants.
- Riveting and adhesives can be used to join the steel tubes to form the assembly.
- Proper polishing, finishing and painting should be ensured for an attractive appearance.

FINALS ASSESMENT CRITERIA:

S.NO	CRITERION	MARKS
1	Vehicle design	25
2	Technical explanation	20
3	Fabrication techniques	20
4	Finish & appearance	20
5	Marketing	15
Total marks		100

NOTE: Judges will do the assessment and will be decided by the SAEISS organizing committee.

34) ADDITIVE MANUFACTURING

Additive Manufacturing refers to a process by which digital 3D design data is used to build up a component in layers by depositing material. The term "3D printing" is increasingly used as a synonym for Additive Manufacturing.

PURPOSE OF THE EVENT

Additive manufacturing is an emerging technique and it is considered to be the future of manufacturing in all fields of engineering. So it is important for an Engineer to be completely aware of the developing technology.

THE CONCEPT

Any component to be 3D printed is scanned and morphed in the computer with 3D modelling softwares like autodesk etc., and then printed in the 3D printer which uses thermoplastic filaments as raw materials and a heater melts the thermoplastic and pours it in the programmed area and finishes the component, this technology is also known as FDM (Fused Deposition Modelling) or FFF (Fused Filament Fabrication). There are other methods like laser sintering, DLP etc.

EXPECTATIONS

Good knowledge about the process involved in additive manufacturing such as creating a CAD model, Slicing the CAD model, generating the .gcodes, 3D printing the same in a FDM based 3D printer and post processing the 3D printed part such as removing the supports.

RULES OF THE EVENT

- It is an emerging field and since students do not have much knowledge about this area "A **WORKSHOP**" will be conducted on the previous day of the event.
- On the next day after the workshop based on the training a preliminary round will be held (prelims might be a written test) and the shortlisted participants will face the **innovative challenge round** .

- All the participants will be shown a 3D component which has to be modelled by the participants in any CAD modelling software such as Solidworks, Delmia, Sketchup etc (Which the students are comfortable with and ensure that .stl file can be exported from the CAD software)
- The 3D model thus created should be sliced in "Cura" (slicing software).
- Slicing should be done in an efficient way with minimal supports, minimal printing time, and maximum print quality and the .gcode should be created for the 3D printer.
- 3D printing the .gcode file with out flaws.
- Post process the printed part like removing the supports and finishing the part.
- Team size : 4 students.
- Laptops with the required CAD software can be brought by the students, for students who can not bring laptop desktops will be provided with sketches software
- 3D printers and filaments will be provided at the event
- All other kits and aids will be provided.
- Slicing software Cura installation file will also be provided at the event.
- Participants should submit a report on the model they developed and they will go through a viva with the judge.

JUDGING CRITERIA

All participants will be given the same component to design and 3D print and the judgement will be based on the following criteria.

- Participants who achieve maximum efficiency in 3D printing (i.e) with minimal support generation, minimum time for printing at the same time with maximum accuracy and stability of the product.
- Good Surface finish of the model will also have added points.
- Content in the report
- Viva-Voice.

Based on the above mentioned criteria the first three places will be selected.

35) BRIDGE BUILDING

The concept

To understand the basic concepts of bridges and to execute through fabrication

Alignment with curriculum

- Fabrication techniques
- Knowledge about the construction materials and physical properties
- Concepts of strength of materials to test the specimen

Expectations

ROUND 1	ROUND 2	ROUND 3
• A set of 25 questions will be given to every team and 30 minutes is allotted for solving it. • Best of 10 teams will move to next round.	Construction of a bridge By using soft tool(West Point Bridge Design)	Construction of a bridge Prototype model using given materials Testing to check its viability

KITS AND AIDS:

All the necessary materials to create a model of a bridge will be given

Competition rules:

Contestants must be enrolled as SAE members in college

Team size: 4 students

Judging criteria:

ROUND 1	ROUND 2	ROUND 3
Best 10 team will shortlist to next round	• Structure and stability • Cost	• Proper usage of materials and their innovation • Testing through hangers

Judges decision will be final

36) Big Data

ABOUT:

Automakers are ramping up their connected car efforts for several reasons. Internet connectivity in vehicles allows car companies to release software updates in real time. Automotive companies can use data from the car to analyze its performance and obtain valuable data on how drivers use their cars. Real-world vehicle performance will both influence and benefit from Big Data. Information gathered from the field — from vehicle systems, driver inputs and external conditions — will exert a major influence over the design of components and the characteristics of future vehicles.

Purpose of the Event:

The purpose of the event is to propose and create innovative system that can gather data throughout the life cycle of the vehicle so that a auto manufacturers will use these data to shape future vehicle designs. Every part of the vehicle can be tweaked and tuned. Real-world data collected from billions of miles driven will undoubtedly influence safety, aerodynamics, performance, power algorithms and other fundamental elements of the vehicle.

EXPECTATIONS:

Tier-1	Tier-2	Tier-3
Proposal submission and presentation.	Good Knowledge on the varius functionalities of the system and possibily execute few of them	Participant must give a detailed presentation along with the final demo of the system along with documentation.

COMPETITION RULES:

- Paper should be submitted one week ahead of competition date.

Presentation in competition:

- 7 minutes presentation.
- 3 minutes question and answer.

The team must develop the application based on the proposal submitted.

TEAMS:

Team size: 2- students

- Number teams for Tier-1: as much as possible
- One team from each college moves to Tier-2 (division level).
- Two teams from each division moves to Tier-3 (convention).

JUDGING CRITERIA:

Tier-1	Tier-2	Tier-3
70% for quality for paper Criteria: according to the SAE International and Novelty of the Proposal 30% for presentation Criteria: quality of slides, clarity of presentation and confidence in answering queries Data collection.	Functionality Test	80% for the completion and successful demo of the functionality in match with the proposal. 20% for the Presentation and scope for future enhancement

37) On-Board Diagnostics

INTRODUCTION

On-Board Diagnostics (OBD) is an automotive term referring to a vehicle's self-diagnostic and reporting capability which monitors component that affect the emission performance of a vehicle and alerts the vehicle operator when a malfunction is detected via a malfunction indicator light. It stores information, including a diagnostic trouble code (DTC), about the detected malfunction to aid a repair technician in accurately finding and fixing the problem.

ELIGIBILITY CRITERIA

Candidates who hold/ pursuing a degree in Mechanical/Automobile Engineering are eligible to take part in the event.

RULES

- Contestants must be enrolled as a SAE member in the college.
- Only 2 members per team will be permitted.

EXPECTATIONS

The team should have good knowledge on On-Board Diagnostics followed by errors that are usually detected by a OBD reader before attending the competition.

PRELIMINARY ROUND

General questions (Written test) based on automobile will be asked. Top teams with maximum scores will enter the Final Round.

KITS

- Car having the facility for OBD will be provided.
- OBD reader.
- Diagnostic trouble code sheet.

PROCEDURE

- A car with some sort of malfunction in the Engine will be provided to you.
- Plug the OBD reader in computer which is present in the car.
- Note down the error code which is displaced in the OBD reader.
- Find out the error for the code using Diagnostic trouble code sheet and rectify the same.
- And finally reset the OBD reader and explain the error that occurred in engine to the judges.

NOTE: Make sure after you rectify and reset the OBD reader the Malfunction Indicator Light should turn off.

JUDGING CRITERIA

The team that quickly spots out the error using OBD reader, fixes it and explains the error to the judges will be considered as the winner.

38) Light Weight Mobility Vehicle

The concept

- Designing, prototyping, fabricating a light weight portable mobility vehicle.

Alignment with curriculum

- Design sketching.
- Fabrication techniques.
- Appreciation of materials and their properties.
- Concepts of automotives and transmission systems.

Event blueprint

1. Prelims
2. Presentation
3. Fabrication

Prelims	Presentation	Fabrication
Participants are questioned and analyzed based on their knowledge regarding basics of automotives especially mobility vehicles.	Each team have to make a prototype of their design using PVC pipes and fittings which will be provide on clearing the prelims. The team has to present their design, prototype and related calculations in front of the jury.	Teams that clear the virtual round should fabricate their mobility vehicle that will be compared to the vehicles fabricated by other teams.

Kits and Aids

- PVC pipes and fittings for prototyping will be provided for teams clearing the prelims.

Competition rules

- A maximum of five students are allowed per team.
- Teams clearing the prelims are promoted to prototyping segment.
- If more than one team registers, only one of them will be selected during prelims based on their performance.
- The teams should be able to fabricate the prototype as well as the vehicle within the given time. No extra time or material will be provided in case of wastage.
- The fabricated vehicle should not vary in any aspects from the models presented by the teams in the preceding rounds.
- Judges decision will be the final.

39)Ethical Hacking

ABOUT:

As cars become more connected to the Internet and cellular networks, auto manufacturers are quickly learning the need to engage ethical hackers to better understand the vulnerabilities of their cars. Ethical Hacking for Vehicles includes a range of tests targeted at the “attack surfaces” of the vehicle along with the vulnerabilities of the security attack through the cyber world.

Purpose of the Event:

The purpose of the event is to propose and create innovative system/solution that leverage the various possibilities of security attack and hacking of the auto system from the outside world .

EXPECTATIONS:

Tier-1	Tier-2	Tier-3
Proposal submission and presentation.	Good Knowledge on the various functionalities of the system and possibly execute few of them	Participant must give a detailed presentation along with the final demo of the system along with documentation.

COMPETITION RULES:

- Paper should be submitted one week ahead of competition date.

Presentation in competition:

- 7 minutes presentation.
- 3 minutes question and answer.

The team must develop the application based on the proposal submitted.

TEAMS:

Team size: 2- students

- Number teams for Tier-1: as much as possible
- One team from each college moves to Tier-2 (division level).
- Two teams from each division moves to Tier-3 (convention).

JUDGING CRITERIA:

Tier-1	Tier-2	Tier-3
70% for quality for paper Criteria: according to the SAE International and Novelty of the Proposal 30% for presentation Criteria: quality of slides, clarity of presentation and confidence in answering queries Data collection.	Functionality Test	80% for the completion and successful demo of the functionality in match with the proposal. 20% for the Presentation and scope for future enhancement

40) BIOMIMICRY

The concept

Students pick up any natural organism and modify an existing technology or introduce a new technology by in taking any property of the selected organism.

Expectations

Identify the peculiarity of the organism and explain how it can reduce human effort or how it can modify an existing technology.

Prepare a mini prototype of the newly designed or modified structure.

Teams

Team size: 2-5 students.

Judging criteria

Clarity and correctness in the explanations - 40%

Prototype - 30%

Presentation - 20%

Surface finish - 10%

41) DIGITAL MANUFACTURING

The event will comprise of three phases

- A Workshop on direct digital manufacturing (to be arranged by SAE)
- A preliminary round (technical quiz written test) to shortlist teams, the test will be a MCQ testing the knowledge of the participants in the field of direct digital manufacturing.
- A Final round, where the shortlisted teams will perform presentation on “Advances in Direct Digital Manufacturing” and the judging criteria will be:
    - Content
    - Innovativeness in your ideas
    - Way of presentation
- Around 50 teams are expected to participate in the event.
- If the number of teams is more a prelim might be conducted earlier if necessary and the workshop time will be reduced and divided into number of quick sessions.

Arrangements to be made by College:

- A place to conduct the written test (prelims).
- A presentation hall with laptop (installed with MS-power point) and projector.

The budget for this event might be anywhere from 10,000 to 20,000 Indian rupees.

The responsibility of the participating teams is to have some knowledge over the field of direct digital manufacturing.

42) Mobile App Development

ABOUT:

Uses of mobile enterprise solutions in the automotive industry are numerous. The capability of smart phones and the cost effectiveness of the mobile apps available in the automotive sector have made the automobile industry look for better options that would provide users with hands free experience while driving.

Purpose of the Event:

The purpose of the event is to propose and create innovative mobile app for automotive sector according to the latest automotive market standards, but also can customize the mobile apps according to the specific needs of your company. Apart from the design, there are several areas, such as security and distribution that need to be addressed during the development of the android automobile apps.

EXPECTATIONS:

Tier-1	Tier-2	Tier-3
Proposal submission and presentation.	Good Knowledge on the varius functionalities in the App and execute few of them	Participant must give a detailed presentation along with the final demo of the app along with documentation.

COMPETITION RULES:

- Paper should be submitted one week ahead of competition date.

Presentation in competition:

- 7 minutes presentation.
- 3 minutes question and answer.

The team must develop the application based on the proposal submitted.

Application can be developed on any platform compatible for either Android or IOS and the final Apk file must be submitted.

TEAMS:

Team size: 2- students

- Number teams for Tier-1: as much as possible
- One team from each college moves to Tier-2 (division level).
- Two teams from each division moves to Tier-3 (convention).

JUDGING CRITERIA:

Tier-1	Tier-2	Tier-3
70% for quality for paper Criteria: according to the SAE International and Novelty of the Proposal 30% for presentation Criteria: quality of slides, clarity of presentation and confidence in answering queries Data collection.	**30% for UI design, 40% for basic functaionality test and 30% for presentation.**	80% for the completion and successful demo of the functionality in match with the proposal. 20% for the Presentation and scope for future enhancement

43) DESIGN FOR ASSEMBLY

AIM:

This event tests the ability of the students to assemble different mechanical components and parts.

DESCRIPTION:

Each student has to assemble the parts of the given Automotive component and the kinematic simulation has to be done.

PERQUISITES:

Students participating in this event should have good knowledge of general mechanical components and should be aware of designing software like NX SIEMENS, SOLID WORKS, CATIA etc.,

REQUIREMENTS:

Around 20 to 30 computers having designing software (NX SIEMENS preferably).

Expectations

ROUND 1	ROUND 2	ROUND 3
• A set of 25 questions will be given to every team and 30 minutes is allotted for solving it. • Best of 10 teams will move to next round.	• Design calculation for the given Automotive component like shaft, Drives etc., has to be done.	• Model the Component as per the Designed calculation in previous Round. • Assemble the Component. • Kinematic simulation has to be done

PARTICIPANTS EXPECTED:

Around 75 to 100 participants can be expected. If the numbers of registrations are more we would make it a team event with 2 members per team.

JUDGEMENT CRITERIA:

Whoever finishes the assembly in the least time would be considered the winner and simulation is also useful to test the perfection of the assembly.

ROUND 1	**ROUND 2**	**ROUND 3**
Best 10 team will shortlist to next round	• Formula used • Design procedure • Result	• Dimensions • Assembly constraints • Duration