VIRTUAL OFF-TRACK AWARDS

Applications for the Virtual Off-Track Awards must be related to the Team's Shell Eco-marathon project. Previous award winners and second places cannot re-apply using the same project. Submission must be clearly different from previous winning applications. Applications must include only the Team identification number (ID) and the Team name on the cover. Do not include any personal information within the applications, for example, please do not include personal names or contact details.

Applications for all Virtual Off-Track Awards must be made in the English language.

For the Shell Eco-marathon Virtual Off-Track Awards, the required documents must be uploaded to the Shell Eco-marathon registration website. Please refer to the Shell Eco-marathon website for the applicable submission deadline.

By submitting a Virtual Off-Track Award entry, the Team agrees for the Organisers to publish their entry as deemed necessary to recognise the achievement and provide coaching to other Teams.

The following four categories of the Off-Track Awards, described in Articles 96, 97, 98 and 99 of Chapter I, will be part of the Virtual League. The points and prizes for these awards are detailed in Articles 91 and 104, respectively.

1. Communications
2. Simulate to Innovate supported by Altair
3. Data and Telemetry supported by Schmid Elektronik
4. Carbon Footprint Reduction

COMMUNICATIONS AWARD

a) Overview

Communications and promotional activity are crucial in driving interest in Shell Eco-marathon Teams and their project; and potentially in driving sponsorship opportunities. The winner of this award will be the Team that demonstrates the most impactful and successful integrated communications campaign - showing the efforts to promote their journey in Shell Eco-marathon in the 2022 season.

a) Objective

An integrated communications campaign, using different media channels and engagement activities, is integral for students to promote their Teams during a Shell Eco-marathon season. Participating Teams are required to create, run and evaluate a communications plan with various activities to show the Team's trajectory throughout the season.

When planning and implementing their communications, Teams are encouraged to use a wide range of media channels within their campaign from traditional media (press, radio and TV), to online (web sites, blogs) or social media (Facebook, Twitter, Instagram, TikTok, YouTube, Tumblr, Vimeo, Weibo, WeChat, Youku, Zhihu, Bilibili, BBS etc.).

The winner will be judged on the quality and creativity of the content, the volume of activity as well as the impact (potential reach) of the campaign (e.g. impressions; unique visits to their web pages; video views; social media likes and shares; event attendance, etc.).

As we evaluate the Team's trajectory in Shell Eco-marathon, the application should indicate when the campaign is launched and run and should include planned activities after the submission deadline.

Remember that engaging with Shell Eco-marathon online and on social media channels can also be an important part of the campaign. Teams applying to the Communications Award are invited to join the regional Shell Eco-marathon Facebook groups, follow the Shell Eco-marathon accounts on Twitter and Instagram, tag/mention these accounts and use the #ShellEcoMarathon hashtag whenever possible.

Teams must note that the effectiveness of the communications campaign will be judged on activities related to Shell Eco-marathon only. This includes, for instance, the unveiling of your vehicle, press conferences, photos or videos of the Team and the car, behind-the-scenes and promotion of participation in virtual competitions, or any social media activity related to Shell Eco-marathon. Participation in other competitions without a clear reference to Shell Eco-marathon will not be taken into consideration.

b) How to participate

Participation in this competition is voluntary. Teams interested in applying to the Communications Off-Track Award must apply via the Shell Eco-marathon registration website. This application must consist of one document (.pdf format) with a maximum of 5 pages in total; images, screenshots, graphs, tables and drawings do not count towards the word count but must still respect the maximum number of pages. It should be a simple and straightforward report containing:

i. Communications Plan: A short summary (no more than 500 words, using a minimum font size of 10 points) indicating the main idea, objectives, strategy and timeline of the communications campaign.

ii. Impact Analysis: A summary report (no more than 500 words, using a minimum font size of 10 points) evaluating the success of the communications campaign compared with its objectives. Teams should also submit the main results (numbers) gathered throughout the campaign (e.g. event attendees, media impressions; video views; social media likes and shares; re-Tweets; etc.).

iii. Campaign portfolio: Teams should collate and share all (or the best) examples of their campaign. This includes, for instance: press clips; event photos and footage; posters and brochures; creative infographics; websites links; social media channels (Facebook, Twitter, Instagram, TikTok, YouTube, Tumblr, Vimeo, Weibo, WeChat, Youku, Zhihu, Bilibili, BBS etc.); blog posts; screen shots of social media posts; links to video sharing platform, etc.

SIMULATE TO INNOVATE AWARD SUPPORTED BY ALTAIR

a) Overview

This award recognises the use of system simulation and optimisation (as part of computer aided engineering - CAE) in vehicle design and is presented to Teams which demonstrate outstanding improvement in the design of any vehicle system or component that was achieved by using system simulation.

b) Objective

Teams will be required to explain their virtual approaches, the methods they applied and the benefits they targeted and finally achieved.

c) How to participate

Application for this award is voluntary. Teams interested in winning the Simulate to Innovate Award by Altair must submit a report in .pdf format which is not to exceed 2,000 words using a minimum font size of 10 points, and 10 pages; images, screenshots, graphs, tables shend drawings do not count towards the word count but must still respect the maximum number of pages. Teams can also optionally submit a 1-minute video with animations of the 3D renderings to further support and illustrate the submission.

i.   The report must describe a system model of the overall vehicle main energy flow – from the source (fuel tank or battery) to kinetic energy including major losses (drag, component efficiencies, etc.). The report should show the steps followed and results obtained from the software that was used.

ii. The report must describe at least one closed loop control system – including the control strategy. The control loop can include either an ancillary unit (e.g. cooling), the main drive train (e.g. traction control) or any other system.

iii. Information and details must be provided in the report on how the simulation helped to improve the initial design. This includes the description of the initial as well as the improved design. Images or screenshots of 3D renderings should be used where beneficial to demonstrate how system simulation was used to verify performance in virtual tests.

iv. The considered physical disciplines and the benefits they provided must be clearly described. If the Team decides on doing the optional task of parameter optimisation, then bonus points will be provided based on the benefit derived.

The award is neutral to any state-of-the-art software used for the virtual development.

> *Note: Altair will support Teams by providing free access to Altair software, virtual learning sessions and a dedicated active support forum. Teams can request sponsorship by filling out the sponsorship form on www.altairuniversity.com/sponsorship-competitions and for any questions please contact altairuniversity@altair.com.*

> *Throughout the year, Teams will be invited to a number of learning courses hosted by Altair providing further information and guidance on how to use Altair software and how to apply it on typical design challenges during a vehicle development process as well as Virtual Learning Sessions held in conjunction with Shell Eco-marathon. Further details for which will be shared in due course.*

> *Shell International Limited (SIL) does not endorse the products offered by any other company. Students and other readers should be aware that if they contact another company directly, they will be subject to the data privacy policies and processes of that company and that their information is not protected by Shell's privacy policies.*

DATA AND TELEMETRY AWARD SUPPORTED BY SCHMID ELEKTRONIK

a) Overview

This prize recognises the conceptual or actual design of intelligent information and knowledge processes from real-time or close to real-time vehicle and race data. This will lead to a competition that:

▪   follows a data-driven and digitised approach,

▪   innovates your race strategy and driving tactics, and

▪   improves your energy efficiency and track performance in the Mileage Challenge.

The award is open to both Prototype and Urban Concept Teams. The referenced vehicle data can be from the existing Shell telemetry system (as described in Section 5 of Chapter I), from a Team's existing telemetry system or data from a fully conceptual telemetry system. Answers to the following five questions will be used in judging the submissions:

1. **Data Points:**
   How does your data strategy look like and what vehicle sensor data (e.g. vehicle speed, energy usage) and context data (e.g. track map) do you identify as relevant to support the above three goals?

2. **Information Processes:**
   What race related patterns, coefficients and control parameters do you extract from the data (1) and which information/knowledge processing (analysis, modelling, simulation, machine learning) do you use to achieve the appropriate control strategy that keeps the vehicle close to the optimum in the context of the given driving situation and subject to the abovementioned contest goals?

3. **Strategy Development:**
   What is your overall race strategy and how to you use the understanding, knowledge and insights from (2) to make it data-driven, smart and adaptive?

4. **Driver's Performance:**
   Which clues and/or previews will emerge from (3) and how to they support the driver's decision making, intelligent manoeuvres, specific driving situations and/or edge cases?

5. **Results Improvement:**
   Does your data-driven approach (1 - 4) reduce your energy consumption, increase your speed or even both? What will be the outcome, how much of an improvement in [%] do you expect and why? Please provide supporting analysis.

b) Objective

Teams must answer the five listed questions and explain how expected outcomes relate to an improvement of their energy efficiency, track and Team performance and benefit Shell Eco-marathon. Participants are encouraged to think outside the box and pursue also unconventional and disruptive ideas.

c) How to participate

Application for this award is voluntary. Teams wishing to participate must submit design documentation in pdf format. The report should consist of an executive summary and a technical description covering item 1-5. The design documentation must not exceed 1,500 words, using a minimum font size of 10 points, and 10 pages; images, screenshots, graphs, tables and drawings do not count towards the word count but must still respect the maximum number of pages.

CARBON FOOTPRINT REDUCTION AWARD

a) Overview

Being aware of the carbon footprint concept and developing strategies to reduce this footprint are important components that will become increasingly crucial in the path towards low-carbon transportation. The migration to low-carbon or carbon-neutral transportation will impact all aspects of how we develop the vehicles of the future. This award is presented to the Team which best describes the process to design the next generation Shell Eco-marathon vehicle to reduce vehicle carbon footprint while maintaining or improving mileage challenge performance.

b) Objective

Teams are required to research, understand, and develop design processes and strategies that result in carbon footprint reductions. A key part of the design strategy is associated with establishing the strategies for trade-off analysis between carbon footprint reduction and mileage challenge vehicle performance. Comparative analysis using reference data is encouraged.

Teams are not required to determine an absolute numerical value (kg CO_2) of their vehicle carbon footprint reduction that would result from the new design process. Depending on the available data, Teams may compare possible carbon footprint savings based on one or more sample trade-off analyses. Teams are encouraged to base the sample trade-off analysis on the carbon footprint of their existing vehicle or component.

c) How to participate

i. Teams applying for this award must submit a document in pdf format, not to exceed 1,500 words, using a minimum font size of 10 points, and 8 pages. Any charts and tables or other supporting non-text material will not count in the overall word count but must still respect the maximum number of pages.

ii. The document should include a summary of the proposed carbon footprint reduction design process. Process flow graphics are encouraged. Examples of how trade-off analysis could be implemented as part of the process are encouraged but not required. Predictions of the total vehicle carbon footprint savings based on the new design approach are not required.

iii. Questions to consider while developing the award response:

■ What are the changes in design procedures that result in carbon reduction for next generation vehicle designs?

■ What methodologies would you use for tracking and keeping the carbon footprint at the lowest level in the new design?

■ What are the highest carbon footprint components of your vehicle that the new design process would need to focus on?

■ How would you design trade-off analysis activities as part of your process to achieve both better mileage challenge results and carbon footprint reduction?

iv. The application will not be evaluated on the absolute carbon footprint savings resulting from the design process. Instead, the Team's completeness of thought and characterisation of the innovative design process in achieving carbon footprint reduction and optimising vehicle performance will be considered.