SHELL ECO-MARATHON URBAN CONCEPT CAR

PROJECT OBJECTIVES

This project aims to build a functional, high-efficiency car powered by hydrogen fuel cell technology with the use of high-efficiency motors in a two-wheel-drive system. This prototype aims to provide an alternative to petrol-based vehicles to help Singapore cut down on pollution.

PROJECT SUMMARY

The Shell Eco-Marathon competition aims to create an ultra-energy-efficient electric vehicle that runs on cleaner energy sources, namely hydrogen fuel cells. The team participated in the Urban Concept category in 2021, where the cars need to have the same functionality as road-worthy cars while also being energy efficient.

The frame of the team's car is made of carbon fibre - a durable, flexible and lightweight material - that can withstand impacts caused by collisions while also minimising energy consumption due to its light weight. Additionally, high-efficiency motors (vs. standard motors used in normal vehicles) are used for the wheels of the car, further optimising energy use. The by-products of hydrogen fuel cells are water and heat as opposed to various pollutants produced by petrol-based vehicles, which is more environment-friendly. When mass-production becomes feasible, such carbon fibre frame cars with high-efficiency motors could cost much lower than regular road cars, providing more affordable private transport. A major impediment, however, is that while hydrogen is fairly common, the fuel cell requires pure hydrogen, which can be costly to produce with our current methods.

The team's fuel cell was developed from scratch in Temasek Polytechnic's Clean Energy Research Centre (CERC) to optimise the performance of the hydrogen fuel cell specially for the competition. Most competitors used commercially available fuel cells, which were not as efficient and optimised. The test results showed that the team's fuel cell was able to reach an efficiency rate of 55% or higher, as compared to commercial fuel cells which typically have an efficiency rate of 50% or higher.

PROJECT OUTCOMES

The team's Shell Eco-Marathon Urban Concept car managed to hit a top speed of 38km/h on flat terrain. In the virtual inspection category of the competition, the team managed to secure 4th place in the Asia Pacific region in 2021.

SHELL ECO-MARATHON URBAN CONCEPT CAR AND THE TEAM

Team Photo (from left to right): Ng Kai Hong (team leader), Ian Khoo, Danish Lai.

Team Photo (clockwise): Chng Tze Chen (steering the car), Ian Khoo, Vishanth Thuraisamy, Ng Kai Hong

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