



The future vision of sustainable mobility

Shell Eco-marathon 2013

The Shell Eco-marathon is a unique global competition that challenges students to design, build and drive the most energy-efficient car. maxon motor uk have been working with the University of Oxford on this year's entry.

For 70 years the Eco-marathon Challenge has been an ultimate meeting of futuristic vehicles that aims for the best performance on one gallon of fuel. The 2013 European race will take place in the Ahoy Arena in Rotterdam from May 15-19th May. For the second time, it will be held in a street track guaranteeing a more realistic stage for the vehicles to perform. Competition to enter the race is fierce, with the number of participants limited to just 200.

The Energy & Power Group (EPG), in the Department of Engineering Science, at the University of Oxford, have earned their place in the contest with their vehicle, nicknamed 'Peggie'. The EPG undertake computational and experimental energy research with particular focus on electrical machines and energy systems. Peggie made an excellent debut performance in 2012, finishing in 12th place with an efficiency of 366 km/kWh in the battery electric class. This is equivalent to approximately 6000 miles on one gallon. For 2013, EPG has mapped the route, converting every gradient into a power requirement. With the help of the experts at maxon motor the requirement was tested on some of maxon's most efficient off-the-shelf brushed and brushless DC motors, the RE50 and the EC60, powered by the latest ESCON 50/5 drive amplifier. maxon's senior sales engineer, Ian Bell, has been on hand to give advice on how to get the best performance from maxon products.

Author: Karen Whittaker, maxon motor uk ltd

1/4

maxon motor

driven by precision

Ian said 'Working with students is stimulating; they have great projects that are ideal for maxon motors. I am still working with engineers I first met when they were students designing projects 20 years ago!

The decision was which motor / drive combination would be the most efficient over the course. By mapping all the gradients and assuming a fixed speed it was possible to calculate power requirements for every metre. With this information a load motor connected to a torque transducer was powered by the potential drive motors. The resultant measured power consumption showed that the RE50 brushed motor was best choice. However, I really didn't think we'd get over 30km/hr from one small motor!

The competition is split into two classes: UrbanConcept and Prototype. UrbanConcept cars are 4 wheeled fuel economy vehicles that look similar to the cars we see on the road today. Peggie is entered into the Prototype category. This category looks at the overall design concept to reduce drag and maximise efficiency. Vehicles in this class are one-seated, built with three or four wheels and have an opened- or closed-top driver compartment. Cars enter one of seven categories to run on conventional petrol and diesel, biofuels, fuel made from natural gas (GTL), hydrogen, solar or electricity.

Over several days, teams make up to 4 attempts to travel the furthest on the equivalent of one litre of fuel. Cars drive 10 laps around the circuit at an average speed of 25 km/h. Organisers calculate their energy efficiency based on a joulemeter installed in each vehicle and name a winner in each class and for each energy source.

Off-track awards are given for other achievements including safety, teamwork, design, and technical innovation.

Peter Armstrong, Head of the Technical Team at EPG, commented 'maxon's advice has been invaluable to us in selecting the right driveline components for our application. The team benefited from two visits from application engineers, Ian Bell and Mark Gibbons. Ian and Mark helped us to sift through their extensive range of motors, enabling us to down-select the RE 50 brushed and EC 60 brushless machines. We have undertaken extensive testing on both motors to map out their efficiency over the corresponding torque and speed demands which the vehicle will subject them to. During testing, we found that maxon's products surpassed the performance of all of the previous machines we tested. In addition to the high efficiency of the machines, the Escon-50/5 controllers used throughout our test program have been flexible, robust and intuitive to use.

There have been a number of project highlights. Whenever a company gets behind us in the way that maxon motor uk has, dedicating time and expertise to the project, team morale is boosted. One particular highlight was when our motor test rig became operational. This allowed us to both select the most appropriate machine and develop the optimum driving strategy based on the efficiency data.

We expect to improve considerably on last year's performance which amounted to driving from Oxford to Athens on the equivalent of 10 pints of petrol. Transitioning to a maxon drive, will make an efficiency improvement in the order of 10%. This is very significant when operating so close to the margins in such a vehicle. We have a number of driveline and control ideas which we hope will give us a chance in the innovation and design award categories. By competing we also hope and expect to raise the profile of our sponsors who we feel very much indebted to.'

If you would like to sponsor the team for 2014 please contact Robert Camilleri (Team Manager) at robert.camilleri@eng.ox.ac.uk.

Further information can be found here:

Twitter @EPG_PEGGIE

<http://www.shell.com/global/environment-society/ecomarathon/events/europe.html>

<http://www.youtube.com/watch?v=m9aPtQGVKW8>



Peggie in motion



The 2012 Peggie team

Author: Karen Whittaker, maxon motor uk ltd

3/4

About maxon motor

maxon motor is the world's leading supplier of DC motors, brushless motors, gearheads and controllers. We offer high quality, innovation, competitive pricing and highly specialised solutions.

Where are maxon motors used today?

Aerospace
Robotics
Medical science
Industrial automation
Instrumentation & inspection
Communication
Surveillance cameras
Automotive
Consumer applications

Maxon's motors, gearheads, encoders, brakes and controllers are all perfectly compatible and offer an almost unending number of possible combinations. The maxon modular system gives the ideal combination for the required application.

For additional information, contact:

Karen Whittaker
Marketing
maxon motor uk
Maxon House
Hogwood Lane
Finchampstead
Berkshire RG40 4QW

Telephone +44 (0)118 973 3337
Fax +44 (0)118 973 7472
Email karen.whittaker@maxonmotor.com
Web www.maxonmotor.co.uk