The WMG Hybrid Vehicles Project Team is based at the University of Warwick. Our collaborative partners in the project range from OEMs and suppliers, through national government, to local government and end-user representatives.

The mission of the Team is to provide support and technical expertise on eco-friendly vehicle and sustainable transportation solutions as well as providing mechanisms to disseminate the results of the research, always respecting the confidentiality of our partners.

**IMDS**

**Background**
The Integrated Manager Development Scheme (IMDS) has been in operation at WMG for almost 20 years. Its aim is to enhance the capabilities and performance of employees within technology-based companies. It has been targeted at a “post-experience” audience with a lighter academic treatment.

Each module consists of 20 hours of intensive tuition that includes syndicate and practical exercises to reinforce the learning process. The module lasts three days. On completion of the taught section, candidates are required to complete a Post-Module Assignment (PMA). The PMA demonstrates the application of the learning, generally within their workplace. The PMA requires in the region of 30 hours to complete.

Candidates who achieve a pass grade are credited with five CATS (Credit Accumulation and Transfer Scheme) points at H (Honours) level, which can contribute to the following University of Warwick qualifications:

- CPD Award (the Premium Automotive Practitioner Award) – for candidates studying PARD IMDS modules only: 3 modules/15 CATS points
- Post-Experience Certificate: 9 modules/45 CATS points, plus an industrial project (20 CATS points)
- Post-Experience Diploma: 16 modules/80 CATS points, plus two industrial projects (40 CATS points).

Holders of the Post-Experience Diploma are able to transfer onto the part-time MSc programme at the University of Warwick.

For further information on these programmes, please refer to the following website:
http://www2.warwick.ac.uk/fac/sci/wmg/industrial/imds/

**Hybrid Vehicles Modules**

Three IMDS modules have been developed, covering a broad range of subject matter, both technically and commercially-orientated for hybrid vehicles.

**Hybrid System Technologies**

The objective of this module is to provide an introduction to the range of hybrid vehicle powertrain architectures that have been developed, and the new or enhanced systems and components (compared to a conventional vehicle) which are an integral part of their makeup. These include energy storage technologies, battery management systems and electric machine technologies.

The key area of supervisory control is discussed. The importance of a ‘whole vehicle’ control strategy is highlighted and methods described. Integration of the hybrid system is also covered including electromagnetic compatibility (EMC) and noise vibration and harshness (NVH).

The first running of this module was successfully undertaken in March 2007, made up of candidates from OEMs, suppliers and engineering consultants.
Simulation and Alternative Technologies
This module describes key elements of a simulation model and defines the types of modelling process that can be undertaken. It details legislative and real-world drive cycles and their use within the simulation. Simulation is then undertaken using the Hybrid Vehicle Team’s WARPSTAR simulation tool developed in the industry-standard MATLAB/Simulink® modelling environment.

The module then moves on to cover alternative methods of hybridisation and alternative fuels. Complementary technologies that can also be adopted into a hybrid vehicle are also discussed. It touches upon future technologies including fuel cells.

Hybrid Vehicle Exhibition
This event was first held in June 2006 at the Prodrive test facility in Warwickshire. The Hybrid Vehicle Exhibition is a unique event covering technology and business aspects of hybrid vehicles, and it provided hands on access to vehicles, expert knowledge and an opportunity to network with key stakeholder organisations.

The ride and drive gave access to the latest technologies, both hybrid and alternatives allowing direct comparison of vehicles and their technologies.

A series of seminars ran throughout the day covering both technical and non-technical aspects of hybrid vehicles and an exhibition space provided the opportunity for manufacturers, suppliers and research and development organisations to demonstrate their latest developments.

The event is run on an annual basis and plans are well underway for the 2007 event.

University of Warwick Hybrid Vehicle Conference
The first conference was held in December 2006 over two days. The purpose of this event was to bring together Academia, Industry and Government to consider all of the issues associated with Hybrid Vehicles that will have to be addressed to ensure their future success. This was successfully achieved with more than 140 delegates with a broad spectrum of perspectives.

This conference enabled political, economic, social, technological and legislative considerations to be discussed to ensure that the impact of the technology was fully understood.

This event promoted the sharing of knowledge from a wide range of stakeholders through dissemination and networking to better understand each other’s perspective. It dealt with passenger, commercial, motorsport and military vehicle applications, both hybrid and fuel cell.

The event also provided an opportunity for companies to exhibit their products and services.

It is intended to run this conference on a bi-annual basis, with the emphasis expanding to encompass all aspects of eco-friendly vehicles as well as hybrids.

Contact Details:
The WMG Hybrid Vehicle Team, International Automotive Research Centre, The University of Warwick, Coventry CV4 7AL, United Kingdom Tel: +44 (0)24 76574612 Email: hybrids@warwick.ac.uk