

# MIT/Industry Consortium on Advanced Automotive Electrical/Electronic Components and Systems

## Goals and Objectives

- **Conduct new research on advanced automotive electrical/electronic components, subsystems, and architectures**

A major objective of the Consortium is to sponsor studies and research projects at M.I.T. to explore promising new concepts for advanced automotive electrical equipment and systems of all types. Candidate topic areas with work either under way or under active consideration include:

- Impact of alternative architectures involving higher system voltages (e.g., 42 V) on key electrical components, including power semiconductors, motors, wiring, etc.
- New machine concepts for electrical power generation and engine starting to meet the increasing requirements of future automobiles
- Alternative energy storage technologies for potential application in future automotive electrical systems
- Evaluation of promising advanced electrical system concepts, such as electromechanical valves, active suspension, and active damping

- Impact of electric and hybrid-electric propulsion configurations on all key electrical subsystems, accessories, and components

An important collateral benefit of this research program is expected to be the development of a flexible vehicle electrical system test bed at M.I.T. for the performance evaluation of new electrical system components and subsystems.

- **Create effective forums for Consortium members to discuss technical topics of common interest**

The university setting at M.I.T. is nearly ideal for hosting special workshops and forums addressing automotive electrical system topics that are of particular interest to Consortium members. Past workshop sessions that have been held on topics such as advanced battery technology, ultrasonic motors, and achieving global consensus on future automotive electrical system standards have been well received. A continuing series of these special forums are planned for future Consortium meetings.

## **MIT/Industry Consortium on Advanced Automotive Electrical/Electronic Components and Systems**

- **Provide educational opportunities for Consortium staff members and students in a variety of formats including seminars, short courses, workshops, etc.**
- **Develop flexible software tools for the systematic assessment and dynamic simulation of advanced automotive electrical systems**

The Consortium is also well suited to creating special educational opportunities for both employees of member companies and for M.I.T. students on a wide variety of automotive-related topics in the fields of power electronics, electric machines, controls, etc. The format for such sessions can be tailored in content, duration, and location to meet the particular needs of either small groups of specialists or broad audiences within the Consortium. Furthermore, these venues offer unique opportunities to attract the attention of promising students to the special challenges of automotive electrical technology.

There is a major need among automobile manufacturers and suppliers for new software tools to evaluate alternative advanced electrical system architectures and the components and subsystems that will go into them. The first version of the software program MAESTrO has already been developed to compare the major attributes of candidate architectures. Additional work is planned to expand the capabilities of MAESTrO and to customize it for use by individual Consortium members. Future work is expected to focus on development of software tools for electrical system analysis, including dynamic simulation. Copies of all resulting software tools will be made available to the Consortium members.