



Applied Engineering **in** Brussels

How the University Colleges of Brussels contribute to R&D



By InduTec



InduTec asbl - Technological Transfer Center

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INDUTEC, the Technology Transfer Centre for your Innovation (www.indutec.be)

InduTec is a dynamic Technology Transfer Centre whose mission is to enhance the exchange of technology and innovation between companies and industrial engineering faculties in the Brussels Region. By monitoring projects from concept to implementation, *InduTec* offers promotional opportunities and state-of-the-art experience to those faculties, and enables companies to reap the benefits of a quality science 'business incubator'.

A company's technological knowledge base is the foundation on which internal product and process innovations are generated. However, technological knowledge is not accumulated solely through internal learning processes. Increasingly, companies are turning to external sources in the technology supply chain to acquire the technological know-how they need to introduce product and process innovations. Thus, the successful structuring and executing of partnerships with external "technology source" organizations, such as the Technology Transfer Centre - *InduTec*, is often critical to competitive success in technologically dynamic environments.

The research activities of the industrial engineering faculties in the Brussels Region are future-oriented and innovative. The industrial engineering faculties collaborate with industrial and economic actors in Belgium and abroad through

- contract research (industrial research projects, technical feasibility studies, pre-competitive development, ...)
- economic valorisation (transferring R&D results through existing or new companies)
- protection of intellectual property, licencing agreements, spin-off guidance, ...

It all passes through *InduTec*, that knows how and where to find the appropriate competencies in the industrial engineering faculties to respond to the requests of industry.

If you are looking for new partnerships in managing your technological innovation, do not hesitate to contact our Technology Transfer Centre.

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TRANSPORT TECHNOLOGIES

Activities in the Transport Technologies field are motivated by the need to meet the challenges posed by sustainable development and the rational use of energy. The institutes have worked towards improving transport technologies from an environmental impact perspective.

In this context the institutes have developed an environmental friendly concept car (such as the vehicle used for the ECO Shell Marathon) and other hybrid and electric engine technology.

The following research units are involved in Rational Use of Energy activities:

Electromechanical Unit, EHB - IWT
Mechanical Engineering Unit, HEPHS - ISIB
Mechanical Conception Laboratories, HELDV - ECAM

RECENT RESEARCH PROJECTS

ECO Shell Marathon

Abstract: The Shell Eco Marathon is an educational project that integrates sustainable development values with the concept of driving as far as possible using the least amount of energy. This project comprises the study, design and machining of high-precision mechanical parts for the assembly of an energy efficient concept car.

Scientists: R. Itterbeek (ECAM).

Partners: Institut Von Karman.

Technological Domain and Keywords: mechanics, aerodynamics, CAD/CAM, rational use of energy, transport technologies.

Mass-production hybrid bus

Abstract: This project aims to develop a mass-production hybrid town bus (12 m) using a hydrogen engine coupled with a generator. Batteries and supercondensers will manage power peaks and braking energy. An existing prototype bus equipped with a natural-gas engine (CNG) will be used.

The objectives of this project can be summarised as follows:

- Recommissioning an existing mass-produced natural-gas powered electric bus
- Analysis of the current market for batteries and supercondensers for mass-produced hybrid buses
- The purchase and evaluation of these battery technologies and supercondensers
- Implementation of the selected battery pack and supercondensers in the bus
- Adaptations to power electronics (battery charger, drive converter and corresponding control circuits)
- Analysis of the combustion engine and identification of the necessary modifications in order to use a hydrogen/natural gas mixture instead of pure natural gas
- Implementation of modifications to the combustion engine
- Analysis of the current market for gas cylinders, including safety aspects
- Purchase and implementation of these cylinders in the bus
- Analysis of the new mass-produced hybrid hydrogen-fuelled electric bus: emissions and fuel consumption (on-road measurements)
- Comparative analysis of this bus with fuel-cell buses, hybrid diesel-electric buses, hybrid natural-gas/electric buses, diesel buses (with soot filter), diesel-electric buses without batteries (Cito type), on the basis of Well-to-Wheel energy consumption and Ecoscore (environmental impact indicator)
- Analysis of the current use of hybrid buses in various countries in order to position the product and examine its impact

Scientists: P. Van den Bossche (EhB).

Partners: VUB, EUB, UGent, Karel de Grote Hogeschool, Hydrothane n.v., CITELEC asbl.

Technological Domain & Keywords: transport technologies, Hybrid and Electric Vehicles.



Use of supercondensers with combined DC-converters in order to produce energy savings in drive systems

Abstract: In many cases, vehicle or machinery drive systems are designed according to dynamic load, which can result in the system's energy source (a generator or drive battery) being designed for maximum power. This implies overall high energy consumption when running under partial loads.

The current project involves the study of an additional component (supercondenser) to be added to the system to deal with peak loads. Supercondensers are electric condensers with a very high capacity (up to several thousand farads). The project aims to examine the practical opportunities of using such a component through theoretical simulations and practical tests. This analysis will enable the overall engine system requirements (drive structure, design of subcomponents and intelligent energy-management algorithms) to be determined for various applications. On this basis, corresponding investments will then be compared with energy savings.

Scientists: P. Van den Bossche (EhB).

Keywords: Transport Technologies, Hybrid and Electric Vehicles.