# TAIST Tokyo Tech

[Thailand Advanced Institute of Science and Technology and Tokyo Institute of Technology]

Master's Degree Program in Automobile Engineering (AE)

In order to achieve an environmentally friendly transportation of the next generation, a sophisticated automobile has to be developed and widely used throughout the entire world. All automotive industries require trained engineers who have global perspective, international exposure and knowledge of diverse topics. Taking the requirements of automotive industries in mind and considering the expansion that is taking place, the Master of Engineering Program in Automotive Engineering has been developed to create industry-ready engineers who have   essential required qualities and more advanced concepts. The Automotive Engineering courses which are lectured mostly by the professors from Tokyo Tech, consist of wide ranging engineering aspects from fundamentals of automotive engineering, such as electric controls, aerodynamics, combustion and production, to practice of automotive design. It is a unique opportunity for Thai students (and students from abroad) to establish an international career and profit from the outsourcing wave that is benefiting all sectors of the economy.
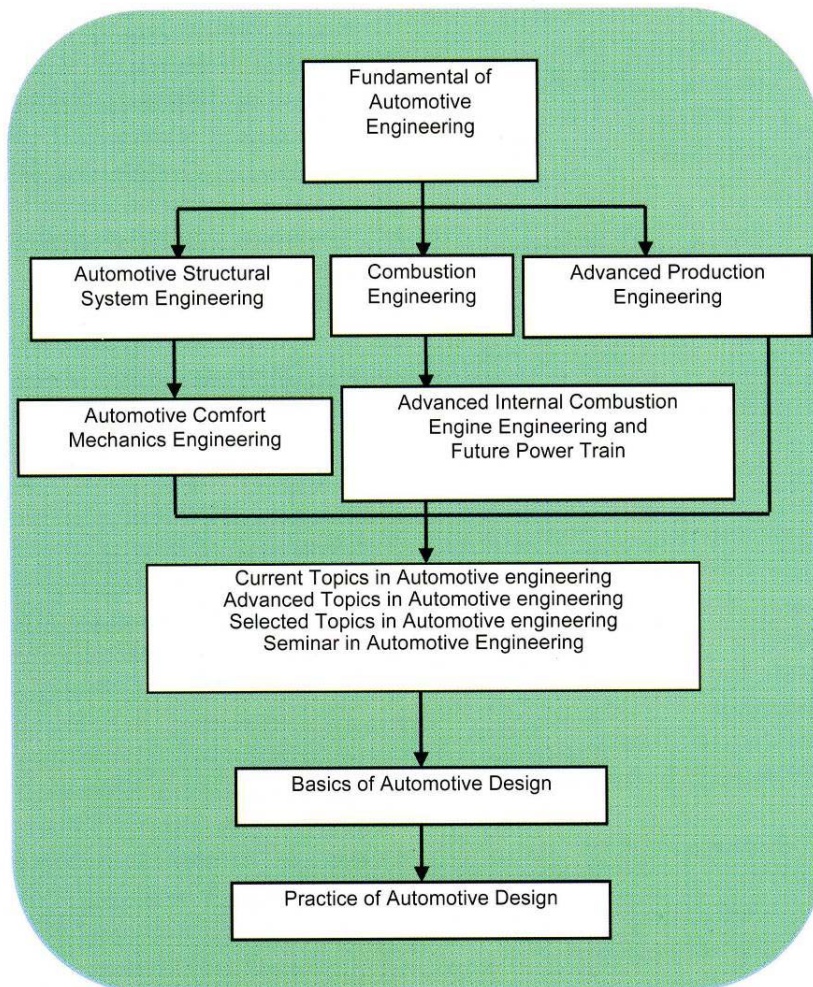
Curriculum-flow of Automotive Engineering Courses

Required Courses

Fundamentals of Automotive Engineering

Introduction to automotive engineering systems and ground vehicle design:

Components:

Engine, Power train, Body and Chassis, Automotive electrical system, Transmission systems, Suspension systems, Steering systems, Tire and wheel and Alternative fuel engine.

Vehicle design on vehicle characteristics and qualities:

The latest standard software to examine the various design parameters influencing vehicle performance such as Dynamics, Comfort, Ride and Handling..

Basics of Automotive Design

Basics of CAD:

Overview of CAD,
Theory of curved lines and curved surfaces,
Theory of mesh generation,
Theory of reverse engineering.

Basic of CAE:

Overview of CAE,
Technology for analysis (Finite Element Method, Boundary Element Method, Optimization Analysis, Control Engineering)

Application examples:

CAE model:

Generating CAE model from CAD,
Generating CAE Model from measured data,
Generating CAE Model from Experiments,
Identification of CAE Model

Practice of Automotive Design

Practice of Design (1) / Design of SAE-Formula Car

Planning of vehicle,
Harmonization of Performance and Components,
Concept of Frame Structures,
Analysis of strength and stiffness with CAD/CAE.

Practice of Design (2) / Analysis of SAE-Formula Car

Tuning of engine performance and gear ratio,
Braking effort and brake-lock, performance of cornering
Maneuverability.

Assembly and disassembly of engine and beam Model

Disassembly of engine and measurement of components,
Assembly of engine,
Assembly of miniature beam model for frame structure
Measurement of beam model

AE Elective Courses

Automotive Structural System Engineering

Overview on vehicle research and development

Vehicle planning and design:
    From advanced research to marketing,
    The past and the future prospect.
Vehicle components:
    Propulsion, Engine,
    Body and suspension.
Vehicle characteristics:
    Performance of man-machine-environment system,
    Active safety and passive safety.

Suspension and drive-train systems

Suspension system,
Steering system ,
Tire and its interaction with road surface,
Braking system,
Friction and tribology,
Drive-train,
Stability and maneuverability analysis
Advanced Control system.

Mechanics of thin-walled Structures for automobile

Concept of stiffness and strength for automotive structures,
Fundamentals of solid mechanics deformations of tension, compression and torsion,
Measurement of structural deformation,
Theory of thin plates,
Theory of monocoque structures,
Theory of structural collision
concept of impact energy absorption

Automotive Comfort Mechanics Engineering

Electronics and control engineering

Introduction of electronics and control in automobiles,
Electric control of engines and transmission,
Electronics in operation monitoring,
Control in braking systems
Control systems for automotive mobility and safety.

Aerodynamics and air conditioning

Fundamentals of fluid-dynamics,
Computational Fluid Dynamics (CFD),
Aerodynamics in vehicles,
Thermodynamics in air-conditioners
Air-conditioning systems in vehicles.

Vibration and noise engineering

Introduction of automotive vibration and noise problems
Measurement and data processing for vibration and noise,
Modeling for vibration and noise analysis, comfort,
Numerical simulation of vibration & noise
Structural design and technology for vibration & noise reduction

Combustion Engineering

Fundamentals of combustion

Reactive gas dynamics (laminar and turbulent flames),

Ignition and extinction

Reaction kinetics and simulation.

Thermodynamics in internal combustion engines

First and second laws of thermodynamics in internal combustion engines,

Gas cycles of internal combustion engines

Thermodynamic analysis of heat release rate in internal combustion engines.

Combustion technologies in internal combustion engines

Combustion technologies in spark ignition engine,

Combustion technologies in compression ignition engine

Combustion technologies for high efficiency & clean exhaust gas

Advanced Internal Combustion Engine Engineering and Future Power Train

Flow and combustion diagnostics in IC engines

Flow diagnostics in IC engines

Combustion diagnostics in IC engines.

Zero emission technology

Production and control of NOx,

Production and control of particulate matters

Advanced zero emission technologies.

Future power train for sustainable community

Energy consumption and environmental protection (Present status in South-East Asia and World),

Future energy systems for sustainability

Present status and future prospect of sustainable mobility,

Battery electrical vehicle, hybrid vehicle and fuel cell vehicle.

Advanced Production Engineering

Fundamentals of production technology

Production processes for automotive engineering,

Integrated and intelligent manufacturing system,

Structure and function of machine tools,

Computer numerical control of machine tools

Practical training of CAD/CAM and CNC machine tools.

Welding and joining technologies

Physics and basic engineering in welding and joining,

Welding and joining processes,

Equipments for welding and joining,

Behavior of materials in welding and joining,

Design and construction of joints,

Analyses of joints

Examples of welding and joining process.

Quality management and production planning

Problem solving using SQC tools,

Process control,

Quality design by experimental study,

Reliability engineering,

Scheduling methods and

Inventory control

Mechatronic Systems in Automotive

Mechatronics is an artificially built synonym for the combination of the three disciplines mechanics, electronics and computer science. A typical mechatronic system differs to classical built up systems by a higher number of elements (complexity) which are realized by the teamwork of different engineering disciplines (heterogeneous). Inside modern vehicles there are a lot of new systems appearing up to now. Such systems like ABS, Airbag and the other mechatronic devices are more powerful than ordinary systems.

The main chapters:

    Introduction in the new area of mechatronic systems
    The peculiarity of its design process,
    Basics of system and controls,
    Capturing and processing of signals, sensors and actuators, principle
    Use in vehicle engineering,
    Simulation and modeling,
    Mechatronic systems on rail and road.

Current Topics in Automotive Engineering

Topics of current interest for the field of automotive engineering which changes rapidly.

Advanced Topics in Automotive Engineering

Advanced topics which may be continuation to topic offered in other lower-level courses.

Selected Topics in Automotive Engineering

Topic selected by the instructor to prepare students to continue their research.

Seminar in Automotive Engineering

A seminar in which the students must study some specific topics, make a presentation and discussion.

Thesis

The students must carry out experimental researches to solve problems and make progresses in the topics related to the field of automotive engineering under the supervision of the advisors. The final exam will include an oral defense of a thesis.

The number of enrolled students

    30 students

How to Apply

The applicant can download an application form from this website. The application form can be submitted electronically to the Program Director no later than February 8, 2008. Please see the application form for details.

[Note]
1. Please note that we will not accept any documents after the deadlines, and that incomplete applications will not be accepted.
2. Original documents written in another language than English must be accompanied by English or Thai translations certified by the public institution or the university issuing the original documents.
3. The submitted documents will not be returned under any conditions.

Selection Method

Successful applicants will be selected based on their application, related documents screening and interview, which will be held on:

 Date: February 13, 2008, 9:00-17:00
 Place: NSTDA
 Entrance examination: Free of charge

The result of admission announcements will be posted to all applicants on February 20, 2008.

Admission and Tuition Fees

Those admitted to the AE Program will receive scholarship for tuitions and fees from NSTDA and participating universities. The second year tuition and fee and possibly allowance are expected to be paid by research projects of the supervisors.

Further information

For more detailed information, please contact

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> ### Tokyo Tech Office (Thailand)
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The websites of the Thai Universities for AE Program are as follows

> KMITL: King Monkut's Institute of Technology Ladkrabang
> http://www.kmitl.ac.th/en/
>
> SIIT: Sirindhorn International Institute of Technology
> http://www.siit.ac.th

AE Program Director:

> Dr. Chinda Charoenphonphanich

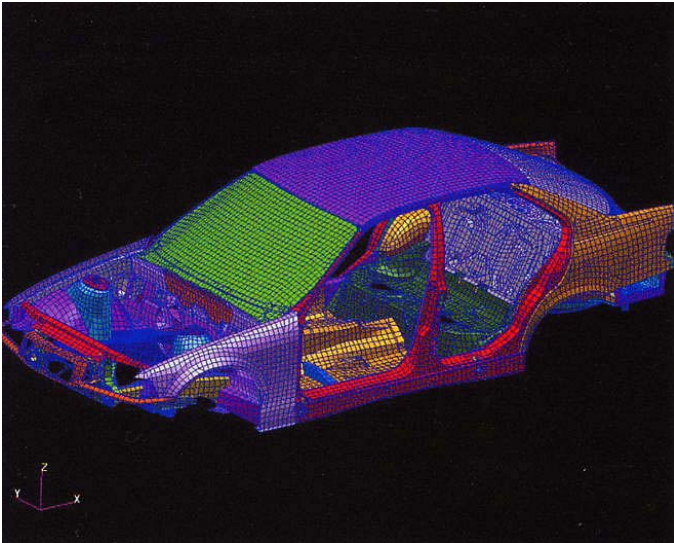Email: kchchind@kmitl.ac.th

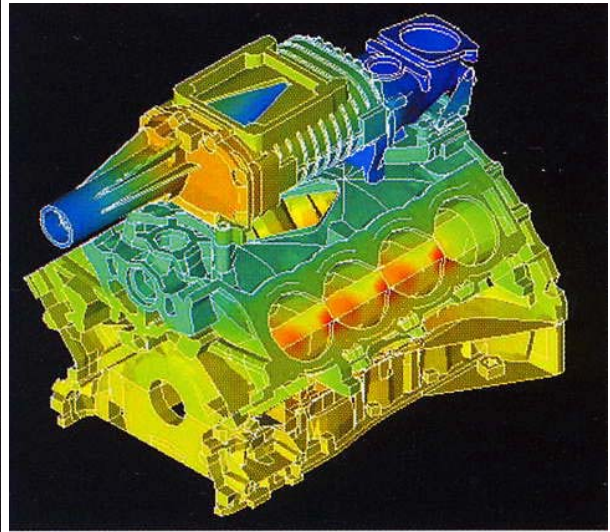2007 year's students in front of the MTEC   Lecture scene of Prof. Kamimoto

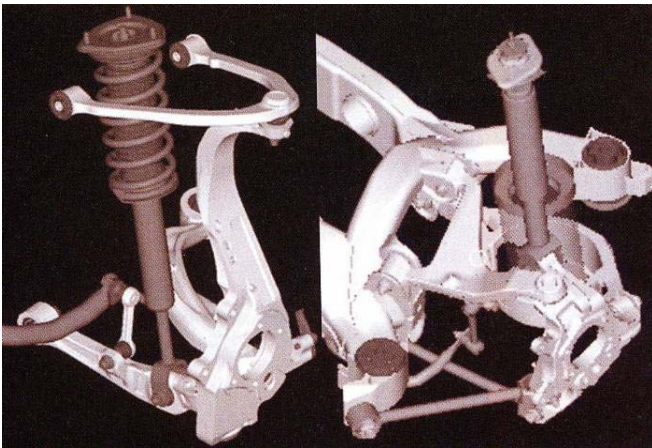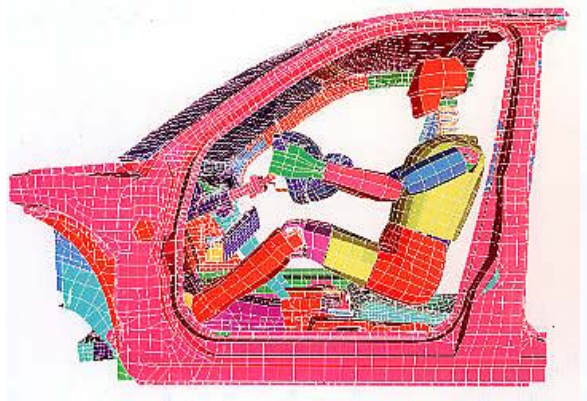AE course students in the class room

NASTRAN model for body structure analysis

Engine model for heat distribution analysis

CAD model

Crash simulation model

Fuel cell vehicle components and structure