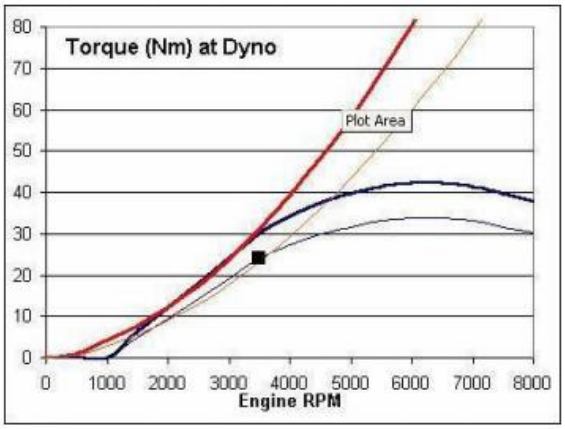
ENGINE DYNAMOMETER

a) <u>Dynamometry and Engine Testing (2 days)</u>
Price RM 1300 per pax (minimum 10 pax)

An engine dyno calculates power output directly by measuring the force (torque) required to hold a spinning engine at a set speed (rpm). The dyno software then calculates horsepower based on the torque figure and engine rpm (horsepower equals torque times engine speed, divided by 5,252).
The dyno has a control board that shows readouts of torque, rpm, water temperature, oil temperature and pressure, exhaust temperature, and air/fuel ratio (from an O2 sensor) via sensors connected to the engine

- Vehicle Dynamics: What do we need to measure?
- What is a Dynamometer? - The Basics
- Various Dynamometer Designs
- Mechanical Details
- Measurements: Cycle Averaged vs. Crank Angle Resolved
- Instrumentation Issues
- Testing: Steady State vs. Transient
- Controllers
- Dynamometer Dynamics
- Drive Cycles: steady state vs. transient
- Dynamometry Case Studies
- Dynamometer applications from around the world



b) Combustion Analysis

This seminar serves as a comprehensive overview of combustion analysis of 4- stroke engines. Thermodynamics of the internal combustion Engine (ICE) are covered as related to the thermodynamic combustion cycle of both spark ignited and compression ignited engines. Combustion heat release is discussed including special attention to spark and flame kernel formation and cycle-to-cycle variation, ignition delay, required ignition energy, flame propagation, "Fast burn" heat release, and flame quenching. The resulting combustion chamber pressure is modeled as a result of thermal processes plus heat addition from combustion. Actual pressure traces are analyzed for heat release rate and mass fraction burned curves. Engine acceleration compensation in data analysis is covered in detail. Finally mention is made to the effect of combustion rate on engine efficiency and knock.

Topics cover:

- Combustion Basics
- Geometry
- Combustion Chemistry
- Combustion Chamber Pressure
- Theoretical Thermodynamic Cycle
- Variations from Theory
- Heat Transfer
- Blow by Losses
- Incomplete Combustion
- Pressure Data from Engines
- Calculation of Mass Fraction Burned
- Cyclictic Variation
- Other Factors affecting Burn Rate

Model: Fuel Burned to Pressure