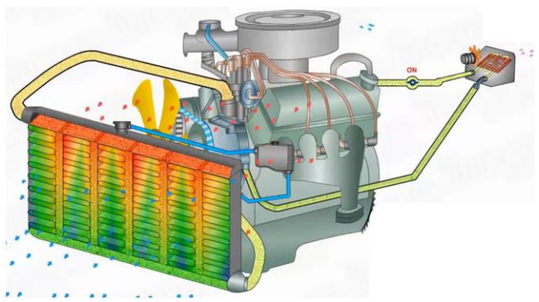
8 Hours **ADVANCED** Training on

Engine Cooling System Design

Design Calculation



Component Selection

Brief 1D GT-Suite simulation

Your Simulation Partner

IST

IST Pvt Ltd

EV, HEV & Engine Development
Staff Augmentation
Corporate Training

Training Fees

Category	Training Fees per participant (Rs.)
Company Sponsored	6,500.00
Individual Sponsored	5,000.00

For registration, please contact us:

- E-Mail ID: subir.mandal@integratedsimtech.com
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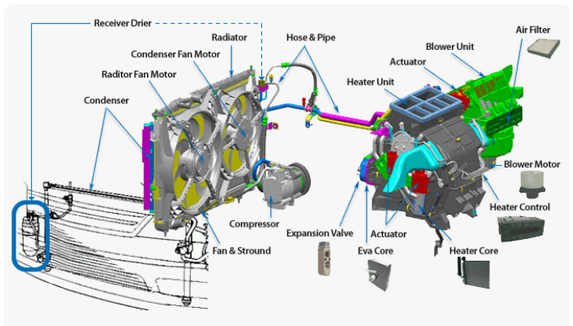
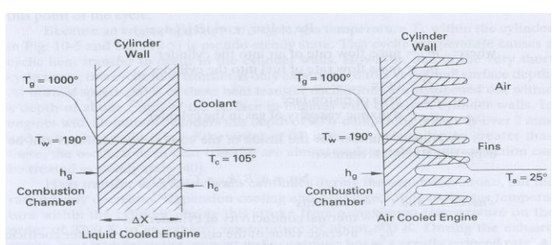
Agenda Overview

This is an advanced level training and will cover detailed discussion about cooling system components; function, working principle, and performance of cooling system components; design, sizing & selection of cooling system components; complete cooling system design procedure; and cooling system architecture selection for specific applications.

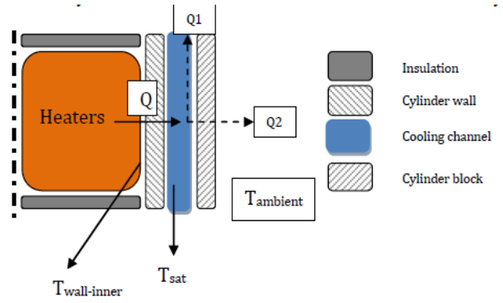
- **Cooling system purpose & working principle**



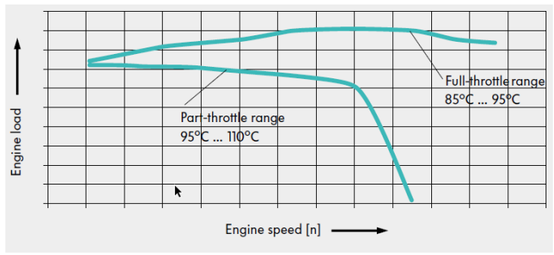
- **Automotive heat transfer mechanisms**



- **Energy balance**



- **Cooling system, engine performance, and emissions**



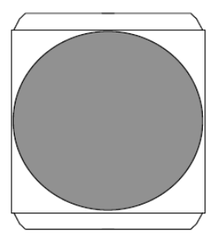
Coolant temperature level as a function of engine load with mapped cooling

Who Should Attend?

- Working professionals/ individuals who want advanced knowledge and understanding of engine cooling system design, sizing, and selection
- Professionals from OEMs/ Consulting Companies/ Start-ups
- Engineering Students/ Professors/ Scholars

- **Cooling system design parameters and limitations**

- **Cooling system components design consideration, sizing, and selection including for coolant jacket, pump, fan, HEX (e.g., radiator, CAC, EGR cooler), fan shroud, thermostat, etc**



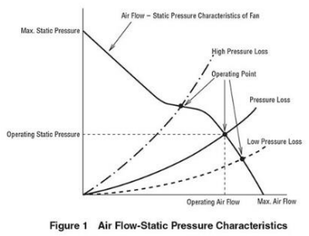


Figure 1 Air Flow-Static Pressure Characteristics

- **Complete procedure of cooling system design**

Cooling module design

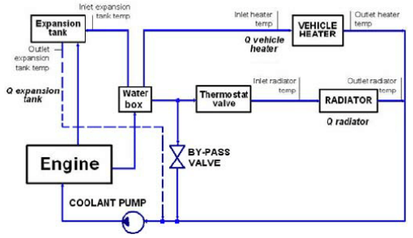
In theory, being knowed:

$K_r\,[Kw/m^2{\cdot}°K]$	Radiator performance characteristic
$Q_w[Kw]$	Heat to be rejected at the high speed severe driving mode
$\Delta T_l[°K]$	$(T_w - T_a)$ with T_w calculated from the temperature drop through the radiator by $\dot{m} = \frac{Q_w}{c_w\,(T_{wi} - T_{wo})}$
ATB	Design target

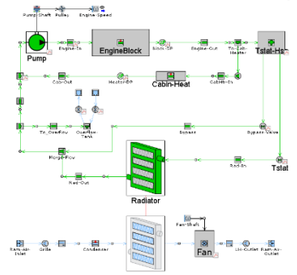
The radiator frontal area can be calculated by:

$$A_r = \frac{Q_w}{K_r\left(T_{eb} - \frac{1}{2}\Delta T_r - ATB\right)}$$

- **Cooling system architecture consideration & issues**



- **Brief exposure to 1D GT-SUITE simulation**
  - ✓ Brief discussion on engine & UHC system modeling, simulation and result interpretation



Trainer

- Over 19 years of industrial experience in diesel, gasoline, gas engines; HEV & EV; and aircraft engines
- 1D simulation domain – engine performance, cooling, HVAC, HEV & EV drivetrain, battery, lubrication, acoustics, hydraulics, cranktrain, and valvetrain
- Worked with GE, Cummins, ESI, MTU (Rolls-Royce), IST
- Conducting training for 10 years
- GT-SUITE user for 14 years
- M.Tech. from IIT Kharagpur