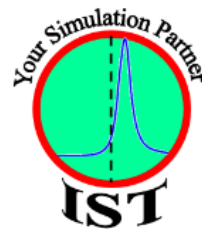**24 Hours BASIC Training on**

Engine Performance Simulation in GT-POWER

Case Study

Practice

Access to Live Videos

IST Pvt Ltd

EV, HEV & Engine Development
Staff Augmentation
Corporate Training

Training Fees

| Category	Training Fees per participant (Rs.)
Company Sponsored	17,000.00
Individual Sponsored	14,000.00

For registration, please contact us:

- E-Mail ID: subir.mandal@integratedsimtech.com
- Contact No.: +91-9763909935

Agenda Overview

This training module is designed for the new users from corporate and individual engineers who are interested to model internal combustion engine (ICE) using GT-POWER. The module includes theory, construction of engine models, and use of GT-POWER, GEM-3D & GT-POST software. Participants will get good amount of time for practice of software. It will cover the following topics:

❑ **Why system level modeling and simulation**
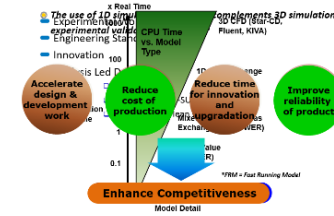
❑ **Introduction to GT-POWER**
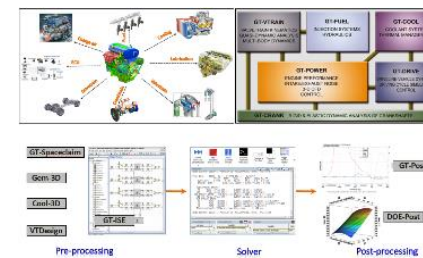
❑ **Bridging real engine with GT-POWER model**

❑ **Engine model building**
  - ✓ Data required to build and calibrate engine model
  - ✓ Modeling of each component of an ICE including flow circuit, airfilter, turbocharger, heat exchanger, EGR system, manifold, port, valve, fuel injection system, cylinder, cranktrain, controller, and exhaust system devices from CAD and/or drawing in GEM-3D & GT-POWER
  - ✓ Subassemblies - Internal, external, and encryption
  - ✓ Model setup - Initialization, parameter sweeps, convergence, run setup, case setup
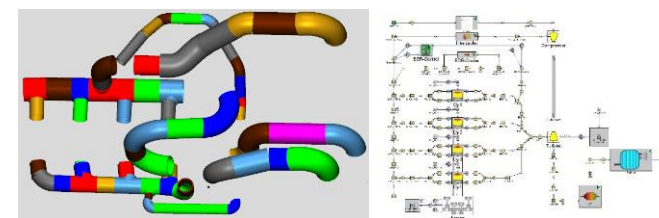
❑ **Burn rate calculation from cylinder pressure**
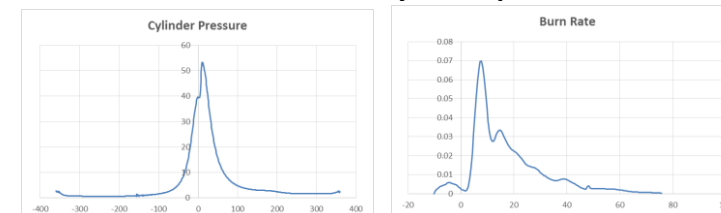
Who Should Attend?

- ❑ Working professionals/ individuals who want to develop basic level of competency and skill in engine performance simulation using 1D GT-POWER software
- ❑ Professionals from OEMs/ Consulting Companies/ Start-ups
- ❑ Engineering Students/ Professors/ Scholars

❑ **Solution method**
  - ✓ How closely the engine physical phenomenon are captured in GT-POWER
  - ✓ Discretization, implicit vs. explicit
  - ✓ Flow pressure loss, heat transfer, combustion & emissions
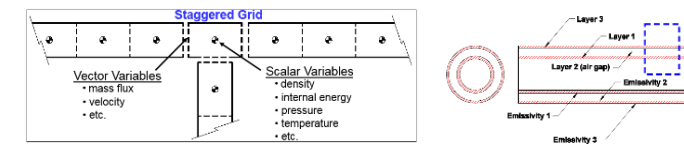
❑ **Engine model calibration**
  - ✓ Detailed about calibration parameters
  - ✓ Matching engine performance parameters
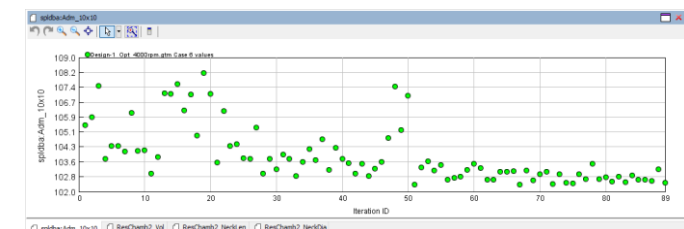 - ✓ Matching engine performance plots
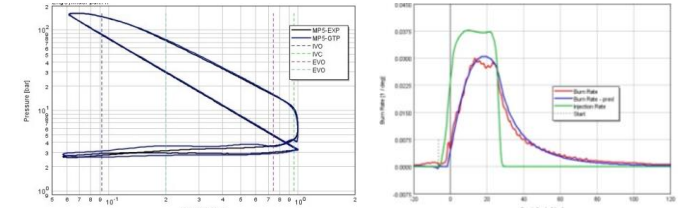
❑ **Post processing of simulation results in GT-POST**
  - ✓ RLT variables, plots, comparison, table, contour, animation, math operation, data extraction, etc
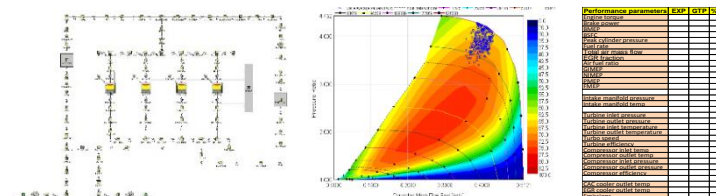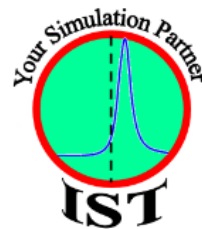
❑ **Direct optimization techniques**
  - ✓ Optimization of engine performance parameters with multiple independent variables & constraints

❑ **Case study of industrial project**
  - ✓ Model build of a turbocharged multi-cylinder engine in GEM-3D & GT-POWER, model setup, simulation, calibration procedure, results in GT-POST, interpretation of results, sensitivity study of few engine design and operating variables

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

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Agenda Overview

This is an advanced level training module and designed for the users from corporate and individual engineers who are already using GT-POWER or have basic level of exposure to it and are interested to acquire advanced level skill and understanding of GT-POWER.

Each of the below advanced topics includes in-depth understanding of fundamental concept, approach, and execution. Participants will be able to implement these topics directly in their projects using GT-POWER.

❑ **Measured data quality check**
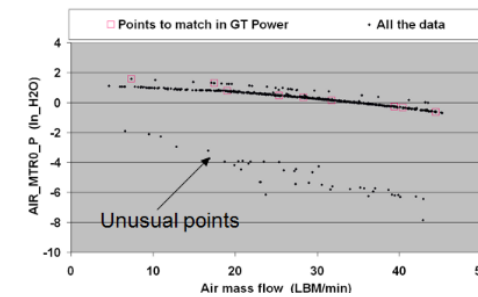
❑ **Predictive diesel engine calibration (DI-Pulse)**

$$O + N_2 \leftrightarrow NO + N$$
$$N + O_2 \leftrightarrow NO + O$$
$$N + OH \leftrightarrow NO + H$$

❑ **Predictive SI engine calibration (SITurb)**

Entrainment

$$\frac{dM_e}{dt} = \rho_u A_f (S_L + S_T) \qquad S_T = C_s u' \left(1 - \frac{1}{1 + C_k (R_f/L_t)^2}\right)$$

Burn-up

$$\frac{dM_b}{dt} = \frac{M_e - M_b}{\tau} \qquad \tau = \frac{C_t \lambda}{S_L}$$

❑ **Semi-predictive combustion model**

❑ **DOE optimization for engine performance parameter**

❑ **Use of PID and model based controller**

$$P \quad K_c e(t)$$
$$I \quad K_i \int e(\tau)d\tau$$
$$D \quad K_d \frac{de(t)}{dt}$$
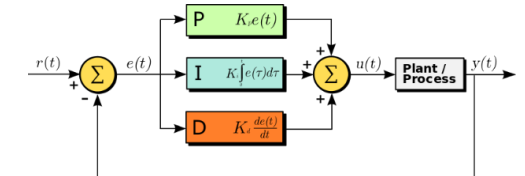
❑ **Transient simulation**
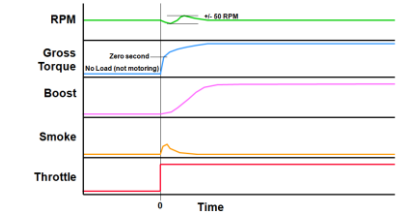
❑ **Neural network method**

❑ **Case study of industrial projects**
  ✓ Turbocharger selection
  ✓ Camshaft optimization
  ✓ Power upgrade
  ✓ Power deration
  ✓ Engine emissions prediction

Training Fees

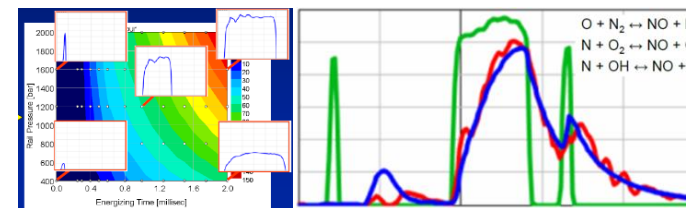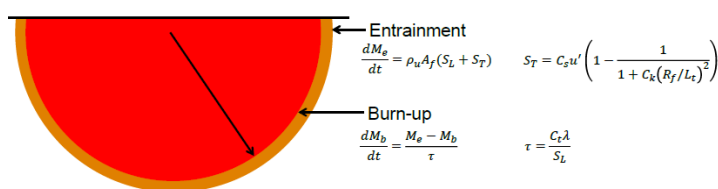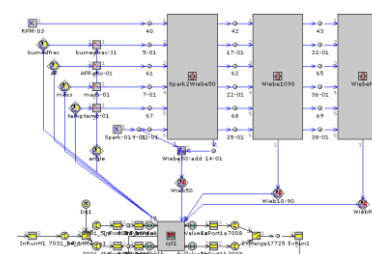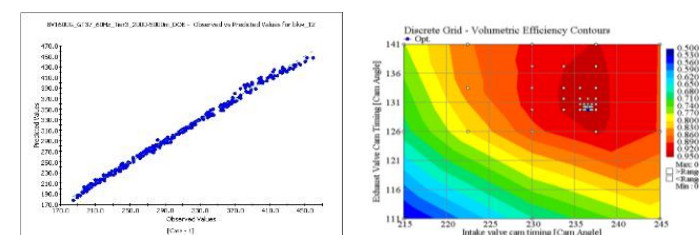| Category	Training Fees per participant (Rs.)
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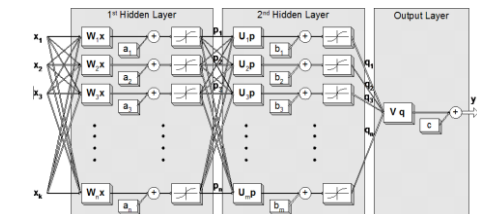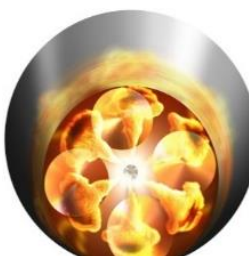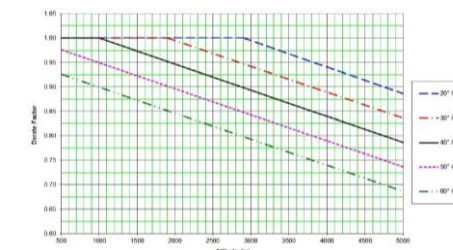❑ Engineering Students/ Professors/ Scholars

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