

# Engine engineering

Having capabilities to support OEM and TIER 1 suppliers in the development of their engines and systems, Applus IDIADA as engine engineering expertise focuses on engine calibration for performances and emissions of both light-duty applications as passenger cars, light-duty trucks and motorbikes as well as heavy duty and off-road engines such as trucks, buses, marine and power generation engines.



## DESCRIPTION

The engine engineering department has a comprehensive human resources team trained for the development of the activities at Applus IDIADA as main facilities, utilizing the 4 engine test cells with automated systems with DOE and emissions analyzers (2 engine test cells equipped for light-duty engines and 2 engine test cells for heavy-duty and off-road) as well as working on client's facilities.

The main activities performed, valid for spark ignition, diesel and dual engines, naturally aspirated and turbocharged, are described below:

### Engine performances calibration

- Base maps
- Optimization of full load maps
- Partial load, low and high idle maps
- Stationary and transient optimization
- Wastegated and VGT turbochargers
- Open and closed lambda control
- Main injection, advance, phasing
- Use of advanced tools such as in-cylinder pressure
- Automatization of calibration with INCA and CAMEO

### **Engine emissions calibration**

- Calibration for CO, THC, CH<sub>4</sub>, NMHC, NO<sub>x</sub>, PM and smoke
- Optimization of NO<sub>x</sub> rates for DOC and DPF systems
- High and low pressure EGR calibration
- Optimization of catalyst light-off
- Optimization of catalyst, 2 or 3-way operation
- Emissions cycle and not to exceed calibration
- Pre, main and post injections
- Use of advanced tools such as in-cylinder pressure
- Automatization of calibration with INCA and CAMEO

### **Engine aftertreatment calibration**

- Optimization of NO<sub>2</sub>-NO<sub>x</sub> rates for passive DPF systems with DOC
- Optimization of active regeneration of active DPF system
- AdBlue injection calibration for SCR systems
- Optimization of catalyst light-off
- Validation of catalysts with high sulfur fuel content
- Emissions cycle and not to exceed calibration of 3-WAY, SCR and DPF systems
- Backpressure minimization, including DPF systems
- Emissions deterioration factor
- Minimization of NH<sub>3</sub> slip of SCR systems
- Automatization of calibration with INCA and CAMEO.

### **Engine durability**

- Durability cycle design
- Test at 24h / 7 days per week
- Functional durability to validate engine design
- Aftertreatment durability, ageing
- Thermal shock
- Engine wear inspection
- Consultancy on engine wear