

Energy and Powertrains



For [sustainable mobility](#) on land, air and sea, every form of transport is impacted by **environmental concerns**. Energy efficiency of engines is achieved through electrification and hybridization, important subjects addressed in our Energy and Powertrains program, developed in close partnership with companies within the sector to address their need for expertise. This training will transform you into **a versatile professional**, able to support technological innovations that are critical to the energy transition in the transport sector. Choose a graduate program **recognized by key players in the transport field!**

Typical class profile

Students in this program are almost all supported by companies through an apprenticeship contract or a scholarship to help finance their living expenses.

Main partners

Among these companies, the following have been IFP School partners in recent years (non-exhaustive list):

- Airbus Helicopters
- Alpine Cars
- Alpine Racing

- Alstom
- Arquus
- AVL
- Bertrandt
- Bosch
- Delphi
- EDF-PEI
- EMC-MTT
- FEV
- Groupe Renault
- HTI Automobile
- IFPEN
- Iveco
- Liebherr
- Man-ES
- Mann Hummel
- Marine nationale
- Safran Helicopter Engines
- Saft
- Stellantis
- Symbio
- TotalEnergies
- Valeo
- Vitesco
- Volvo Powertrain...

Les points clés du cursus

Alternating school/company

Electrification and hybridization

System approach

Les débouchés pour le programme

57%

Car and truck manufacturers

16%

Automotive equipment
suppliers

15%

Energy, aeronautics, marine, rail
transport

12%

Automotive engineering and R&D
companies

Programme & Calendrier

Program

The lectures are given in French

- Introduction to engines
- Energy conversion
- Combustion
- Engine technology
- Air and fuel supply
- Energy, economic and environmental challenges (regulations, pollutant formation, pollutant aftertreatment, lifecycle analysis and CO2 emissions)
- Innovative engine systems project
- Engine and vehicle testing
- Powertrain control and on-board energy management
- Vehicle integration and energy efficiency - Transmission, electrification, hybridization
- Aircraft engines
- Marine and off-road engines
- Experience Sharing Module

Planning

The two examples of schedules shown below correspond to the most frequently encountered cases for students in the program:

- a 16-month alternating school/company program for students with a 5-year engineering degree,
- a 22-month alternating school/company for an engineering student in the penultimate year of a major European school or university having signed a double-degree [agreement](#) with IFP School.

16 months



Alternating school/company program

22 months



Alternating school/company program

● IFP School ● Company

There are other possible cases, such as a continuous 16-month program for a student with a 4- or 5-year engineering degree.

Opportunités de carrières

Businesses

- Automobile and truck manufacturers
- Other manufacturers (aeronautics, marine, off-road, generators, etc.)
- Equipment suppliers
- Engineering and R&D centers

Jobs

Here are a few examples of themes on which an Energy and Powertrains engineer may work:

Functional design engineer

- Synthesis of longitudinal parameters (vehicle performance, consumption, emissions) to define an engine-gearbox pair and the related specifications;

- Dimensioning of the air loop and engine charging to achieve the required engine performance (functional specification of the turbocharger, intake divider, valve lift profile, EGR, etc.)

Mechanical design engineer

- Mechanical modeling and design using CAD (cylinder head, cylinder block, piston rod, exhaust gas recirculation / EGR valve, injector, transmissions, etc.)
- Supplier tracking for the development and standard production of components (piston, air filter, EGR valve, injection pump, turbocharger, actuators, clutch)

Engine control engineer

- Development of drive control strategies of a hybrid chain, simulation of strategies on a chain model, rapid prototyping on a test bench or HIL (Hardware In the Loop)
- Development of air loop control strategies (low- and high-pressure EGR, turbocharger, etc.)

Development engineer

- Driveability calibration (tip in and tip out, gear change, vehicle takeoff , etc.)
- Calibration and validation of engine starting in extreme climatic conditions
- Calibration of engine control operating strategies (regeneration of particulate filter, idle control, injection pressure, etc.