

From exploratory research to vehicle integration

IFP Energies nouvelles has been designing and developing powertrain technologies for more than 50 years. This work is carried out in partnership with the transport and energy industries, through bilateral research projects and consortia, within a framework of competitiveness clusters and of regional and international research programs.

IFP Energies nouvelles ranks among the top 12 patent applicants in France and is the sixth largest French patent applicant in the USA. Technology transfer and the development of innovations come first at IFP Energies nouvelles.

IFP Energies nouvelles' areas of excellence cover the whole powertrain design chain: improving engine/fuel pairs, developing innovative low-consumption technologies such as hybridization, and evaluating alternative fuels.

Thanks to a broad continuing training offer, IFP Energies nouvelles also meets the needs of professionals from the energy, chemical, and automotive industries, at IFP Training.

To fulfill its mission, two of IFP Energies nouvelles' strategic priorities are:

Developing fuel-efficient, environmentally-friendly transport

Drawing on its experience in the field of powertrains, acquired in partnership with the world's major automobile manufacturers, IFP Energies nouvelles designs and perfects technological solutions aimed at further reducing fuel consumption and minimizing the environmental impact of vehicles. It also works on the development of low CO₂-emitting engines for the aviation industry.

Producing fuels, chemical intermediates and energy from renewable sources

In order to tackle the greenhouse effect causing climate change and alleviate the transport sector's reliance on oil, IFP Energies nouvelles works on the production of biofuels, chemical intermediates and energy via the transformation of biomass. It also designs the technological solutions required to harness marine resources.

IFP Energies nouvelles is a public-sector research, industrial innovation and training center. Its mission is to develop efficient, economical, clean and sustainable technologies in the fields of energy, transport and the environment.



Technological solutions for fuel-efficient vehicles and diversified fuels

IFP Energies nouvelles uses its multidisciplinary skills and systems approach to deliver:

- innovative powertrain solutions, optimized for the intended vehicle application and use;
- families of technological solutions grouped around 2 main strategic thrusts-fuel-efficient vehicles (Euro 6 diesel, ultra-low CO₂ diesel and gasoline, hybrid/electric) and diversified fuels (NGV, biofuels);
- guidance and support for technological choices in order to optimize system performance and cost;
- advanced testing equipment.

High-efficiency clean engine technologies

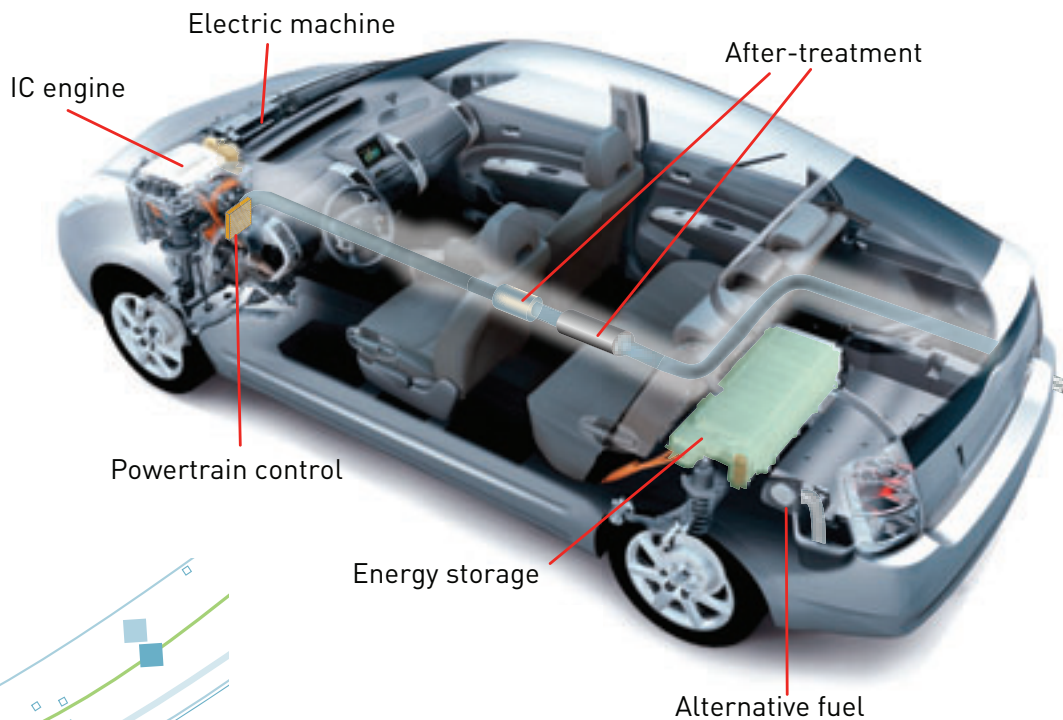
Complete systems expertise serving the development of cleaner and more fuel-efficient vehicles:

- design of new combustion processes;
- optimization of the air loop architecture;
- development of new after-treatment technologies;
- advanced calibration methodologies and tools.

Low-CO₂ alternative fuels

The evaluation of low-greenhouse-gas alternative fuels obtained through various production approaches is a priority theme at IFP Energies nouvelles:

- identification of the potential of alternative fuels and evaluation of their systems and environmental impact;
- formulation and specification of new fuels;
- development of engines suited to alternative fuels.



Smart Vehgan, developed by IFP Energies nouvelles in partnership with Ademe, GDF Suez, Inrets and Valeo, combining the benefits of hybridization with those associated with the use of a low-carbon fuel, natural gas.



Hybridization/Electrification

Hybridization, a major development thrust at IFP Energies nouvelles:

- design of dedicated internal combustion engines;
- system modeling and simulation;
- development of dedicated onboard electronics;
- evaluation and modeling of energy storage;
- control strategies and onboard energy optimization.

Modeling and simulation

In order to meet the growing needs of the automotive industry in the understanding and design of powertrains, IFP Energies nouvelles provides:

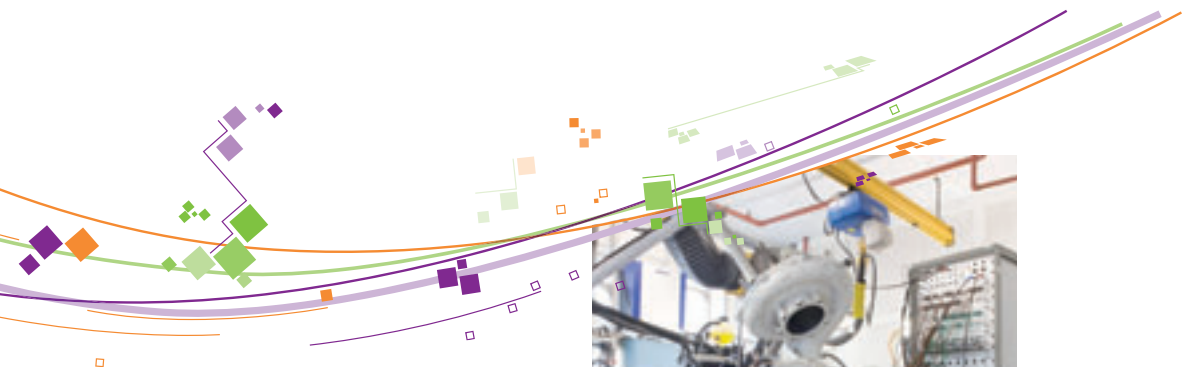
- powerful predictive software tools for engine and vehicle modeling and simulation;
- a system modeling approach in which 3D models are simplified to produce global models that run fast on PCs.

Powertrain control

A complete offer, from the development of control strategies to vehicle applications:

- design of control laws for conventional and hybrid powertrains;
- development of a comprehensive design environment, from co-simulation to the real-time simulator (HIL);
- development of control law calibration methodologies for engines and vehicles;
- fast prototyping systems for complete engine control integration and validation on a test bench or in a demonstration vehicle;
- supply of complete demonstration vehicle powertrain control.





Advanced test benches and specialized equipment

IFP Energies nouvelles provides high-quality solutions and diagnoses in a full line of services, ranging from standard tests to vehicle integration and specific bench tests.

Testing resources for LVs and HDVs:

- optical benches, engine test benches, HIL transient bench, chassis dynamometers, climatic bench, injection bench, aerodynamic bench, high-power bench for battery packs, X-ray scanner;
- materials and physical chemistry laboratory;
- after-treatment laboratories;
- metrology and instrumentation laboratory;
- engine design department; electronics, electrical engineering, and automation departments;
- computing resources for system simulation and 3D modeling.



Key figures

- 250 expert engineers, technicians, and scientists
- 2 development and test centers
- 18 fields of expertise

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