Large bore engines

Engineering services solutions

DUMAREY

Energineering your future

Global decarbonization policies are fundamentally reshaping the large-bore engine landscape, driving the need for new technological approaches and long-term strategic vision. Within this evolving scenario, large-bore engines remain a critical asset for propulsion and power generation, transitioning from conventional solutions to fuel-agnostic energy systems capable of operating on alternative fuels while meeting increasingly stringent emissions regulations.

Successfully addressing these challenges calls for system-level engineering, where combustion concepts, aftertreatment solutions, advanced ignition technologies, digital control systems, and energy storage are developed in an integrated manner to ensure regulatory compliance and robust performance. Dumarey supports this transformation with dedicated engineering and development services tailored to the alternative-fuel large-bore market, enabling customers to navigate complexity and accelerate their path toward sustainable, future-ready solutions.

TECHNOLOGY TRENDS

FUEL FLEXIBILITY AND DECARBONIZATION
The market is rapidly moving toward multi-fuel and alternative-fuel solutions to meet emissions regulations while preserving asset value.

GROWING DEMAND FOR RELIABLE BASELOAD AND BACK-UP POWER
Large bore gensets see renewed interest for data centers, industrial microgrids, and emerging markets, where grid instability favors high efficiency, long-life engines.

IMO TIER III AND GLOBAL EMISSIONS COMPLIANCE DRIVING REDESIGNS
Wider adoption of advanced combustion and aftertreatment control to meet NOx, PM, and methane slip requirements, especially for marine and stationary power applications.

SHIFT TOWARD HIGHER EFFICIENCY AND LIFECYCLE COST OPTIMIZATION
Customers prioritize fuel efficiency, maintenance intervals, digital monitoring, and total cost of ownership (TCO) over pure CAPEX, favoring premium engine platforms.

HYBRIDIZATION AND SYSTEM INTEGRATION
Increasing use of hybrid systems to optimize load profiles, reduce transient emissions, and improve partload efficiency.

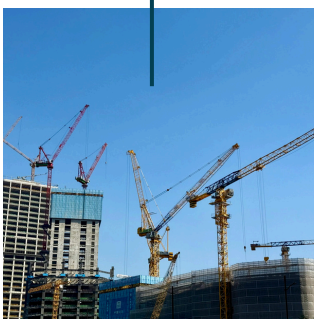
MONITORING AND PREDICTIVE MAINTENANCE AS STANDARD OFFERINGS
OEMs integrate connectivity, condition based monitoring, and AI-driven diagnostics to reduce downtime, enable service contracts, and differentiate products.




MARKETS WE SERVE

Maritime & Harbor

Construction



Agriculture & Off-road

Heavy-duty

Power Generation

Transportation

Oil & Gas

OUR SERVICES

System development and integration

Technological contents definition starting from customer and regulatory requirements, with particular focus on innovation, competitive landscape (OPEX/CAPEX):

- **Combustion modeling:** development and validation of conventional and alternative fuels combustion kinetics models
- **Combustion system design:** subsystem specification, including ignition and injection system and strategies, combustion bowl, charge motion optimization
- **Charging system definition**: TC architectures design, charging requirements, turbomatching
- **Aftertreatment system design and modeling:** architecture definition, system layout design, virtual performance assessment, system & sub-component specifications
- **Engine hardware and subsytem upgrades:** design, integration, virtual validation

Pre-chamber for alternative fuels

Proprietary active pre-chamber design optimized for performance and efficiency, sub-components specification and integration

Controls

Controller hardware and software development

Testing and calibration

On site testing activity and calibration support at customer site or external facilities, field test support

Project and supplier management

Management of complete activities from scouting to serial production and supplier quality

Regulation and certification

Regulatory requirements definition, translation into engineering specifications, and complete support for certification

SOME OF OUR PROJECTS

Diesel engine improvement

CLIENTS: Engine OEMs
APPLICATION: Marine, Rail, Power generation

Our expertise in Diesel combustion system development and optimization for engine performance upgrade and efficiency improvement

Engine conversion to dual fuel methanol DI

CLIENTS: Engine OEM
APPLICATION: Marine

We led engine conversion from Diesel to Dual Fuel Methanol-Diesel Direct Injection

Engine conversion to natural gas spark ignition*

CLIENTS: Engine OEM
APPLICATION: Marine

We led engine conversion from diesel to methane PFI spark ignited

Engine conversion to dual fuel diesel DI - methanol PFI*

CLIENTS: Engine OEM
APPLICATION: Marine

We led engine conversion from diesel to dual fuel diesel DI - methanol PFI

Diesel engine improvement to HVO and testing*

PROJECT: Engine OEM
APPLICATION: Marine, Propulsion, Power Generation

Combustion system optimization and testing for HVO

Natural gas engine and aftertreatment modeling

CLIENTS: Engine OEM
APPLICATION: Genset

Combustion and Aftertreatment System models with innovative simulation methods to reduce the development efforts of aftertreatment systems

NH3 dual fuels engine and aftertreatment modeling and testing

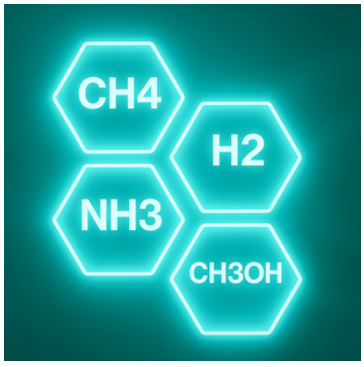
PROJECT: R&D project
APPLICATION: Propulsion, Power Generation

MeOH SI engine and aftertreatment modeling and testing

PROJECT: R&D project
APPLICATION: Propulsion, Power Generation

*Project: "Propulsione a combustibili alternativi per raggiungere la massima decarbonizzazione nel settore marino" funded by "Ministero delle Imprese e del Made in Italy" inside call "FCS Accordi per l'innovazione" and approved by "Decreto n. 326 del 29/04/2024".

SOME OF OUR PROJECTS



High Pressure fuel system upgrade

CLIENT: Oil & Gas
APPLICATION: Upgrade of mechanical fuel system to high pressure, retrofit kits compatible with diesel, HFO, and ammonia

Methane aftertreatment for natural gas engine - new catalyst formulation

CLIENT: US Department of Energy
APPLICATION: Natural gas-fired lean large bore engines in Oil & Gas, power generation, heavy duty on-road, marine

Advanced pre-chamber concept for zero methane slip

CLIENT: US Department of Energy
APPLICATION: Natural gas-fired lean large bore engines in Oil & Gas (2-stroke and 4-stroke), marine

Active pre-chamber for high specific output H2 ICE

CLIENT: Engine OEM
APPLICATION: Heavy duty on- and off-road

Advanced pre-chamber concept for high specific output, high efficiency, ultra-low emissions H2 ICE

CLIENT: US Department of Energy
APPLICATION: Heavy duty on- and off-road

Dual-fuel ammonia engine combustion system development

CLIENT: Industrial consortium
APPLICATION: Marine

Passive pre-chamber for high efficiency ethanol combustion

CLIENT: Engine OEM
APPLICATION: Heavy duty on- and off-road


Driving towards a future with
sustainable mobility for all.

COM_C04_14_Apr_2026_EN_REV1

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