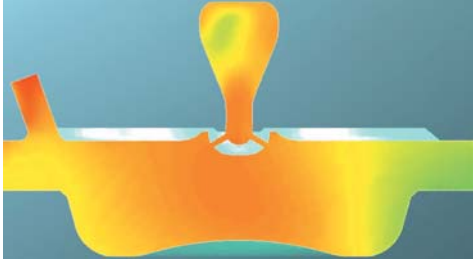


Efficiency Enhancement

—The state of the art technology for combustion optimization ※

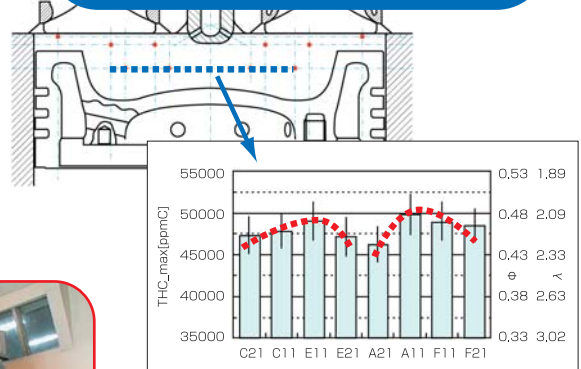
Prediction of fuel-air mixture formation by CFD

Prediction of fuel-air mixture formation by CFD



Planning of design principle and selecting of test condition

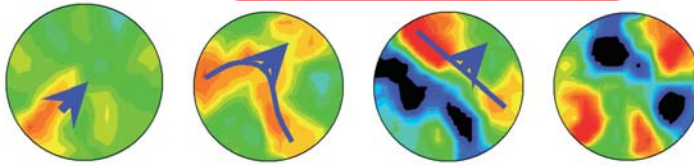
Analyzing of air-fuel mixture formation by FFID



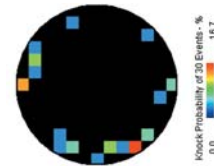
Measuring of fuel-air mixture formation



Evaluation for performance on test engine



Location of knocking



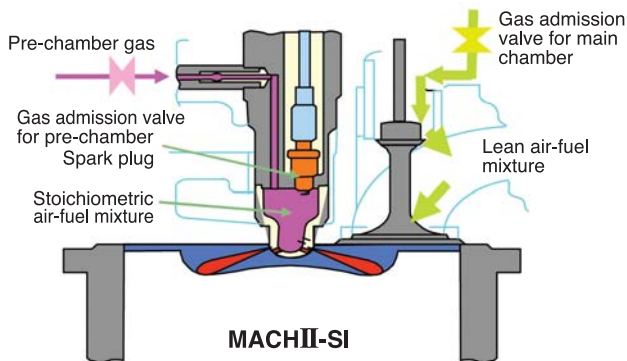
Visualization of knocking intensity by CT Method

Observation for knocking to optimize the combustion chamber

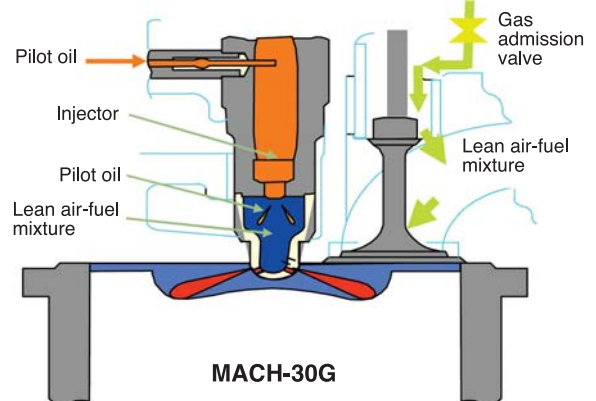
※ In developing this technology, we applied results gained from "Development of Technology for Ultra High-efficiency Natural Gas Engine Combined System" a joint development project under way since 2005 together with the New Energy and Industrial Technology Development Organization (NEDO) and the Japan Gas Association.

Comparison between spark ignition and micro pilot injection.

MACHII-SI combustion system



MACH-30G combustion system



Based on KU30G(*1), the technology of MACH-30G is applied, so high power is achieved.

Feature

- High efficiency and high exhaust gas temperature by optimizing combustion
- Long life time of spark plug = 2,000 Hours
- Shorter start time compared with MACH-30G

*1: Spark Ignition gas engine developed in 1990

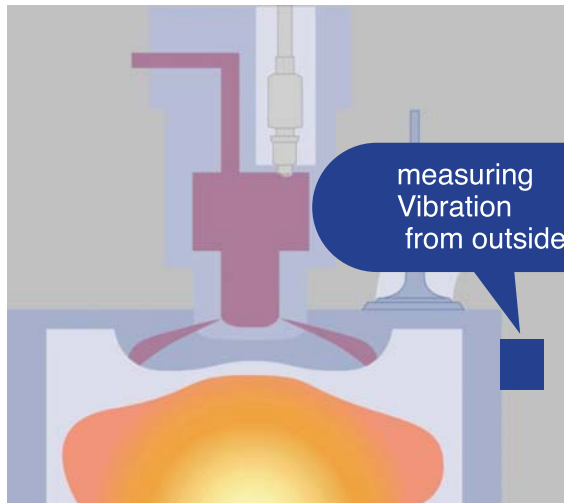
Feature

- Strong ignition energy by pilot oil compared with spark plug
- Various composition of fuel gas can be applied
- Long continuous running time by injector compared with spark plug
- Low NOx emission by lean air-fuel mixture in pre-chamber

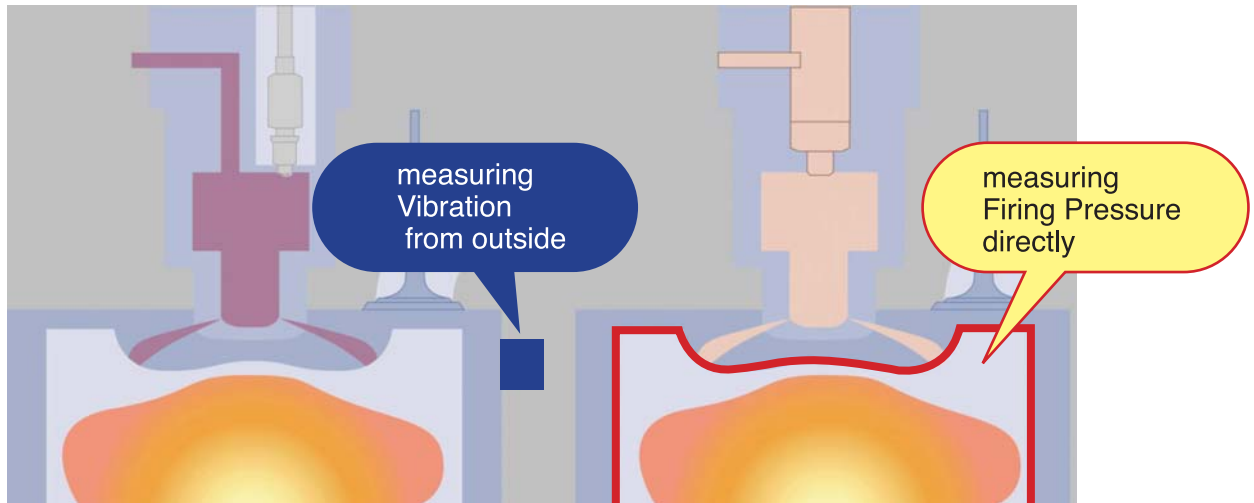
Combustion control technology of Mitsubishi

M-RICS Mitsubishi Real-time Intelligent Control System

Conventional



M-RICS



What is **M-RICS**?

The technology to achieve high efficiency by detecting firing pressures directly with cylinder pressure sensors and optimizing combustions in real time.

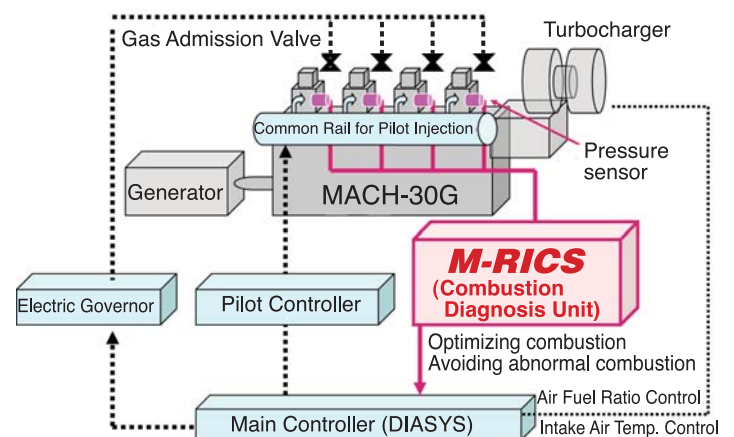
MACH gas engine is the pioneer to achieve this advanced technology in production.

Conventional engines use vibration sensors which detect only knocking.

Advantages of **M-RICS**

1. Equalizing firing pressures in all cylinders
→ **High Efficiency**
2. Optimizing firing pressures corresponding to variation of fuel calorific value, aged deterioration of components and so on.
→ **Keep performance against any changes of condition**
3. Detecting abnormal combustion immediately and avoiding them automatically by controlling load or fuel supply.
→ **Keep engine running even in abnormal combustion**
4. Indicating aged deterioration of components with the data record
→ **Predict life time of components**

M-RICS & Total Control System



※ In case of MACH-30G

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