Environmental Protection Activities of the Engine Division

Main Business Activities: Manufacturing of Engines

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Engine Division
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Environmental Approach

There are a host of environment-related needs in engines—the most important component of an automobile—such as the need for lower fuel consumption, cleaner exhaust emissions, and reduced noise. From development to manufacturing, all members of the Engine Division place high importance on people and the environment in the manufacturing of engines, and this division devotes its efforts to offering products that achieve a high level of basic and environmental functions.

Activities

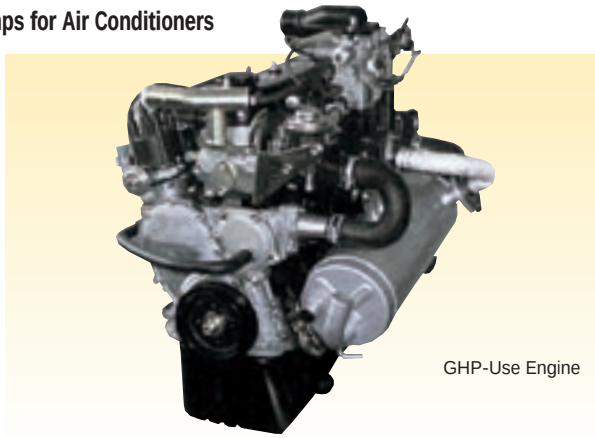
Development and Design

■Development of Engines that Raise the Efficiency of Gas Heat Pumps for Air Conditioners

A gas heat pump (GHP) for air conditioners is a cooling and heating system that integrates a compressor powered by a gas engine. Because GHPs offer excellent efficiency and can operate using natural gas—a clean fuel—they emit no SO_x or soot. Moreover, compared with electric heat pumps (EHPs), GHPs enable an approximately 22% reduction in CO_2 emissions, a principal cause of global warming. By utilizing engine exhaust heat, GHPs enable high heating temperatures and rapid heating, even when the outside air temperature is low. To further enhance these features of GHPs, we developed an engine that improves GHP efficiency.

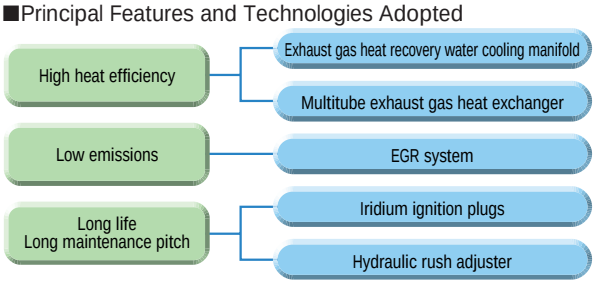
The Engine Division developed a GHP-use engine based on the 4Y-type automobile engine. In developing this engine, we adopted various methods to achieve characteristics required for GHP-use engines, including high heat efficiency, low emissions, and long life as well as long maintenance pitch. Specifically, in striving to optimize ignition timing and the shape of the combustion chamber, we incorporated an exhaust gas heat recovery water cooling manifold, a multitube exhaust gas heat exchanger, an exhaust gas recirculation (EGR) system, iridium ignition plugs, and a hydraulic rush adjuster.

At present, this GHP has a COP* of 1.2. In the future, however, we will strive to attain a COP of 1.5 for these GHPs and intend to make various improvements, including improvements to the engine (high-pressure compression ratio) as part of efforts to conserve energy and reduce CO_2 emissions, and thus contribute to the prevention of global warming.

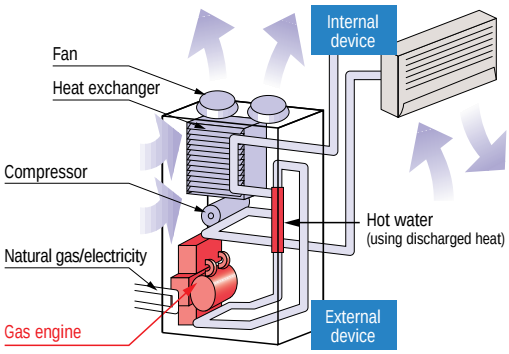


GHP-Use Engine

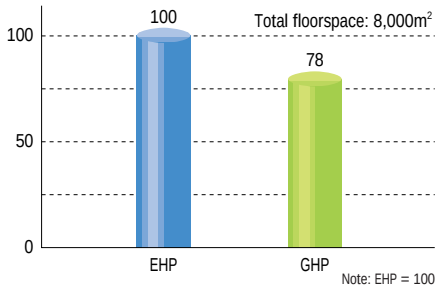
■Principal Features and Technologies Adopted



■Outline of GHP Air Conditioner



■Comparison of Volume of CO_2 Emissions
(Source: Japan Gas Association)



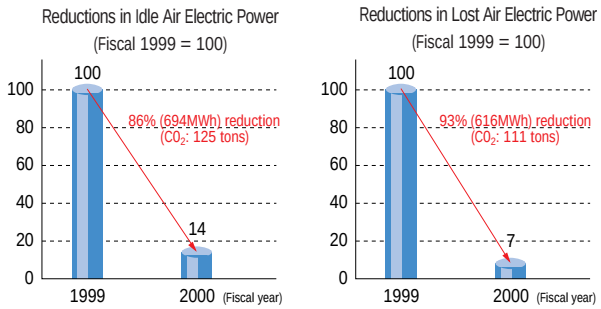
*COP: Coefficient of Performance. Ratio of heat to electricity supplied

Production

■Conserving Energy by Raising the Operational Efficiency of Air Compressors on Production Lines

By combining a single system for controlling the volume of air used by the numerous compressors with a supply pressure control system for individual areas in its plant, the Engine Division is able to supply air for its compressors in accordance with the actual volume of air required. This has allowed the Engine Division to achieve an 86% reduction in idle air electric power*1 compared with fiscal 1999. In addition, to the present we have used equipment in our plant to supply air to the development and other departments not directly linked to production lines and have operated air compressors even when production lines were not in operation, which resulted in lost air electric power*2. By introducing individual facilities, we reduced lost air electric power by 93% from fiscal 1999.

■Reductions in Idle Air Electric Power and Lost Air Electric Power

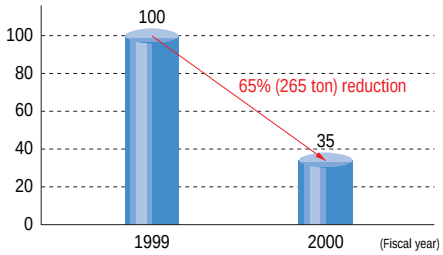


■Our Approach to Recycling Industrial Waste Materials


Engine Division's testing equipment

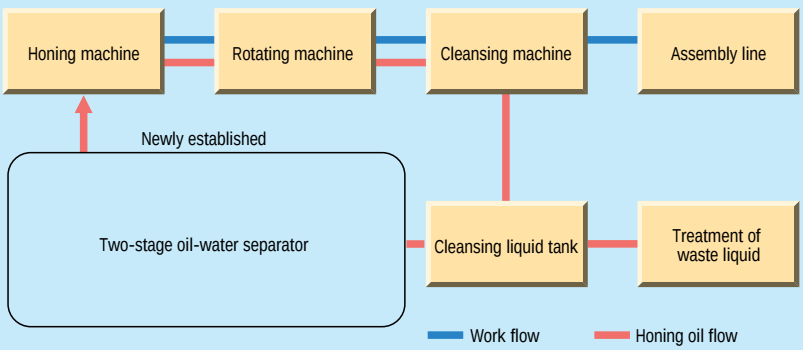
The Engine Division is reducing the volume of industrial waste material generated on its production lines by progressing with efforts to recycle and reuse such waste. These efforts include adopting measures inside the plant as well as cultivating recycling routes. Specific measures being taken include inspecting oil and air pressure components with the division's own testing equipment, which enables recycled parts to be used for component replacements, thereby eliminating waste of actual oil and air pressure components. Also, by adopting the two-phase oil-water separation method, honing oil, which is carried away by being attached to the work piece of the assembly line, can be sent directly to the grinder, thereby reducing emissions of waste cleansing liquids by 50%.

■Reduction in the Volume of Industrial Waste (Fiscal 1999 = 100)



■Work Flow and Honing Oil Flow


Two-stage oil-water separator



*1 Idle air electric power: Electric power consumed when compressors are in a waiting (standby) mode
*2 Lost air electric power: Electric power used to supply air in excess of actual amounts needed