

Development of new 1.2L 3cylinder long stroke gasoline engine

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It is a globally common issue to reduce CO₂ and quickly realize a carbon neutral society against global warming. In the automobile industry, electrification of power train is urgently required. On the other hand, CO₂ reduction amount in each country is not uniform because of influence of energy circumstances and degree of economic progress. In addition, as of 2020, the internal combustion engine sales ratio is extremely high at 93% with 72,660,000 vehicles out of 77,970,000 vehicles sold in the world. Therefore, while reducing CO₂ emission by increasing internal combustion engine efficiency is extremely important. But it causes complex of power train and increases of cost. Demand for automobiles is expected to increase mainly in emerging countries in the future, so effective CO₂ reduction must be accompanied by economic together with high efficiency. Against this background, in accordance with the development of DNGA (Daihatsu New Global Architecture), the design has been reviewed, and a highly efficient, simple, slim, and compact new generation engine has been developed.

Purpose of development

1. In developing a new engine, the following points were aimed at environmental performance meeting future regulations.
 - High thermal efficiency.
 - Exhaust performance potential that can correspond to exhaust emission regulations.
2. Torque characteristics that overwhelm class.
 - High low-speed torque.
3. Design concept suitable for A-segment vehicles.
 - Simple, slim, and compact

Main engine specification

In order to achieve the target, with “1.2L, 3cylinder, and long stroke” as the key concepts, development was started from basic dimension to be suitable for A-segment. Major specification are shown below. While the stroke / bore ratio is set to 1.28, which is one of the top class gasoline engines on the market, the maximum output and maximum torque are higher than those of the conventional model.

Result of adopting technology

The engine adopts new combustion and injection technologies to expand the high thermal efficiency range and achieve high fuel consumption. The maximum thermal efficiency has reached 40%. In addition, the engine structure has been modified to be a package that can be mounted on small vehicles while maintaining the engine size as same as it of conventional 1.0L engine.

High thermal efficiency

Enlarged high efficiency area and operating in this area enables to achieve low fuel consumption. (CVT: 20.8km/L, HEV: 28km/L)

Dynamic performance

The improvement of combustion leads to the improvement of engine torque. In terms of specific torque in the low speed range (2000 rpm), this engine has achieved the top performance of small passenger cars.

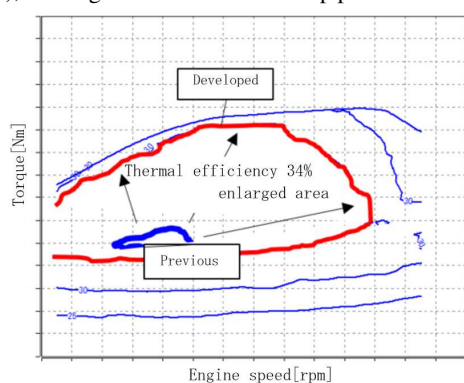


Fig.1 Thermal efficiency(34% area)

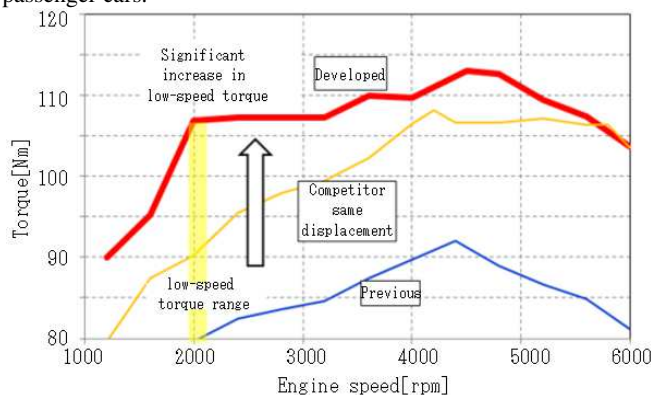


Fig.2 Torque curve