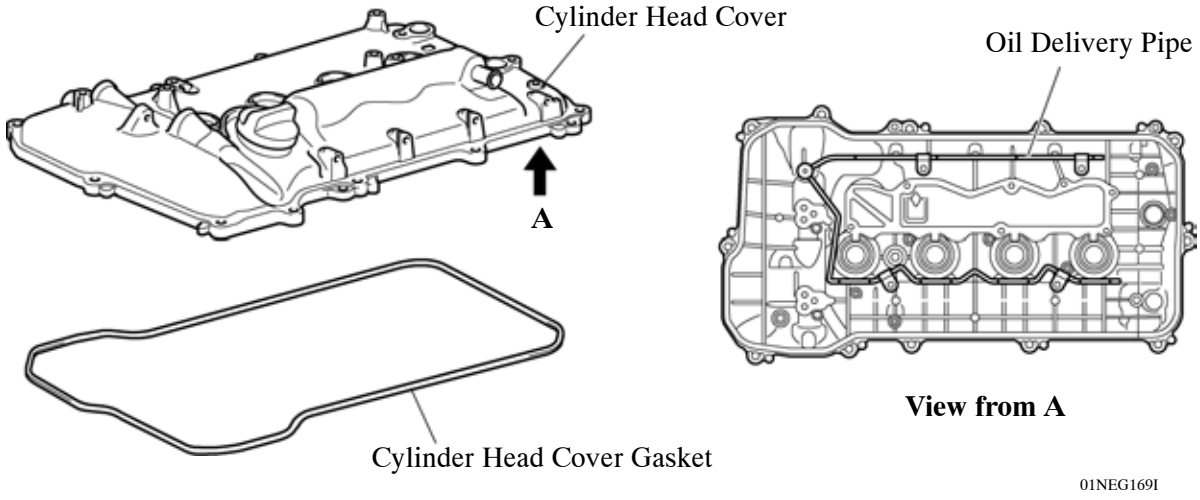
■ENGINE PROPER

1. Cylinder Head Cover

- A lightweight and high-strength aluminum die-cast cylinder head cover is used.
- An oil delivery pipe is installed inside the cylinder head cover. This ensures lubrication to the sliding parts, improving reliability.

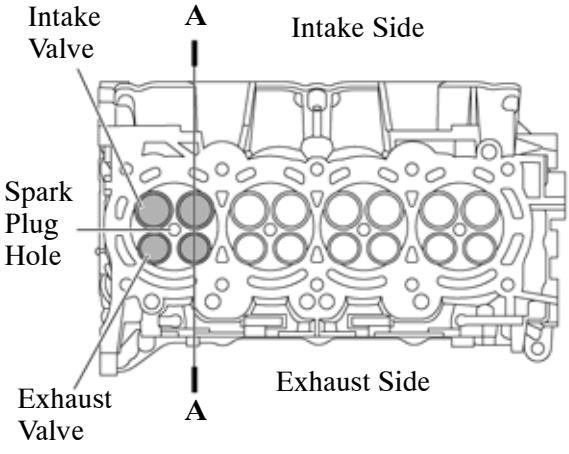


2. Cylinder Head Gasket

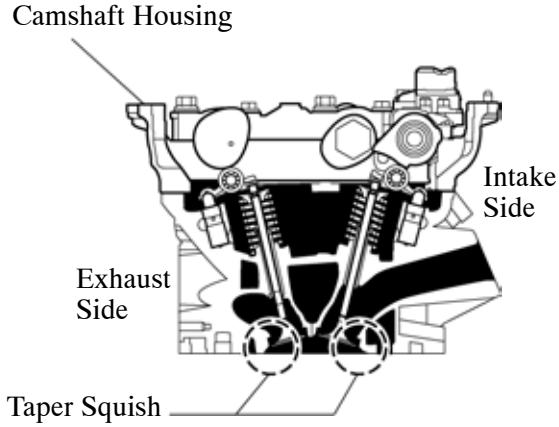
A triple-layer metal type cylinder head gasket is used.

3. Cylinder Head and Camshaft Housing

- The cylinder head structure has been simplified by separating the camshaft housing (cam journal portion) from the cylinder head.
- The cylinder head, which is made of aluminum, contains a pentroof-type combustion chamber. The spark plug is located in the center of the combustion chamber in order to improve the engine's anti-knocking performance.
- The angle of the intake and exhaust valves is narrowed and set at 29° to permit a compact cylinder head.
- Spark plugs with an M12 thread size are used in order to increase the diameter of the intake and exhaust valves. As a result, improved intake and exhaust efficiency has been achieved.
- A taper squish combustion chamber is used to improve anti-knocking performance and intake efficiency. In addition, engine performance and fuel economy have been improved.
- Long nozzle type fuel injectors are installed in the cylinder head to reduce the distance from the fuel injector to the intake valve, thus preventing the fuel from adhering to the intake port walls, and reducing HC exhaust emissions.



View from Bottom Side



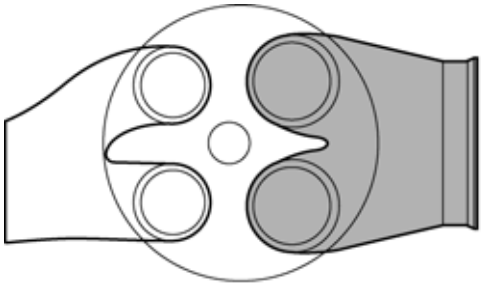
A – A Cross Section

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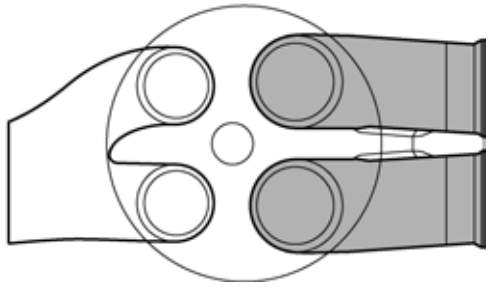
- A siamese type intake port is used to reduce the overall surface area of the intake port walls. This prevents the fuel from adhering to the intake port walls, thus reducing HC exhaust emissions.

— REFERENCE —

Siamese Type



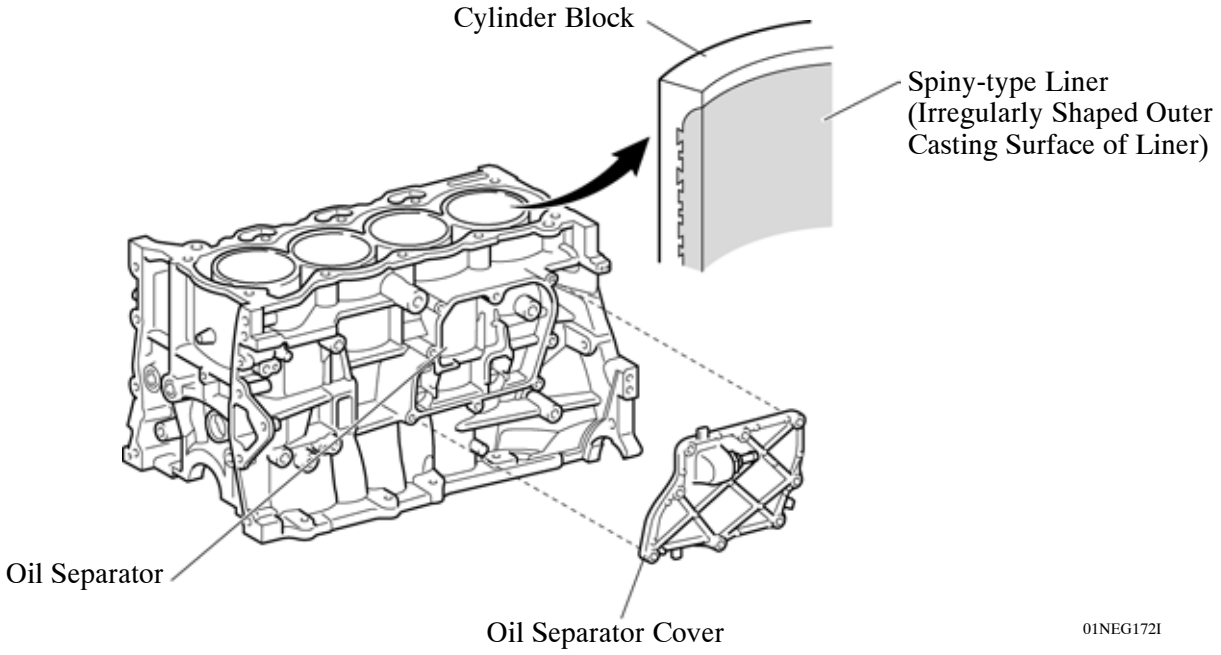
Independent Type



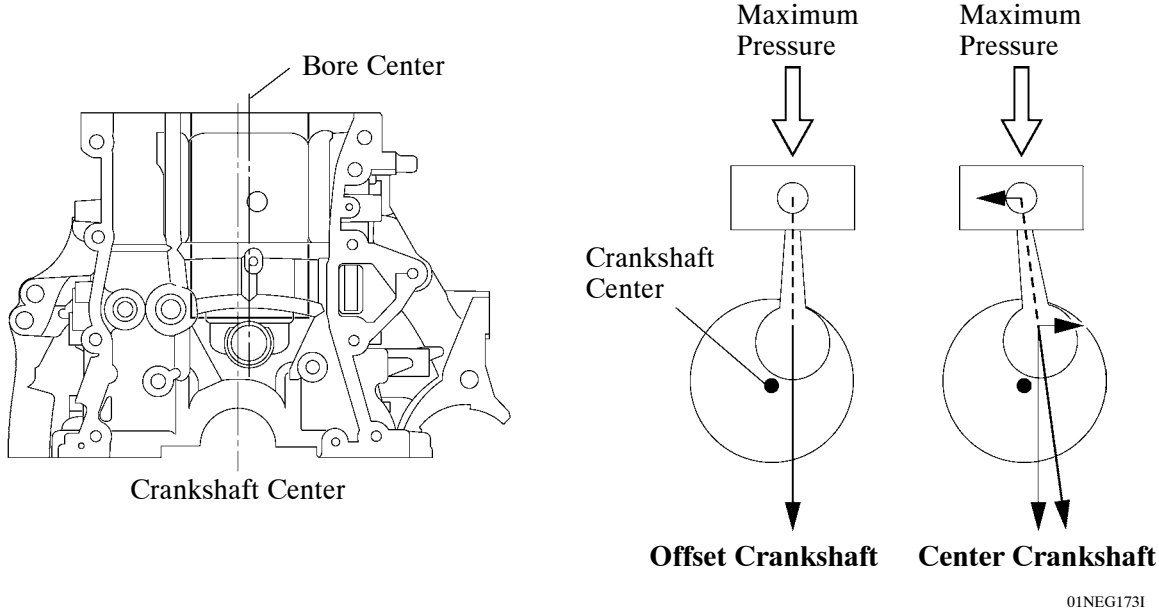
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4. Cylinder Block

- An aluminum cylinder block with a 7 mm (0.276 in.) distance between the cylinder bores is used to achieve a compact and lightweight configuration.
- An oil separator is provided in the blowby gas passage inside the cylinder block. This separates the engine oil from the blowby gas in order to reduce the degradation and consumption of volume of the engine oil.
- It is not possible to bore the block with this liner. The liners are the spiny type, which have been manufactured so that their casting exteriors form a large irregular surface in order to enhance the adhesion between the liners and the aluminum cylinder block. The enhanced adhesion helps heat dissipation, resulting in a lower overall temperature and reduced heat deformation of the cylinder bores.

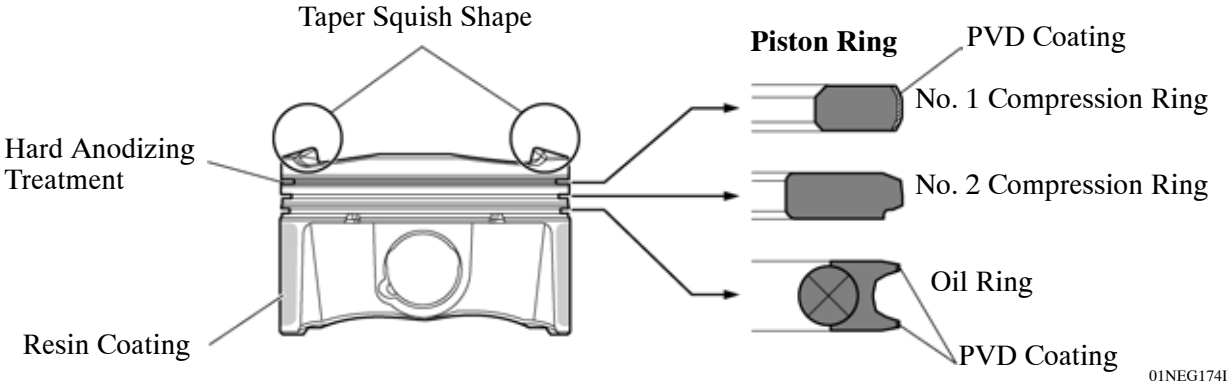


- Through the use of the offset crankshaft, the bore center is shifted 8 mm (0.315 in.) towards the intake, in relation to the crankshaft center. Thus, the side force to cylinder wall is reduced when the maximum pressure is applied, which contributes to fuel economy.



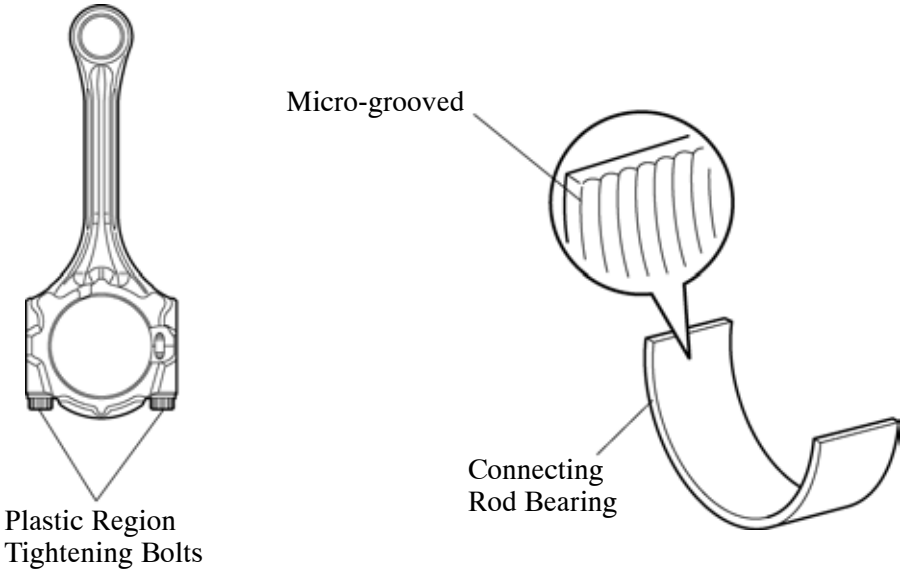
5. Piston

- The piston is made of aluminum alloy to be compact and lightweight.
- The piston head portion is a taper squish shape and accomplishes fuel combustion efficiency.
- Full floating type piston pins are used.
- The groove of the top ring is applied with hard anodizing treatment to ensure abrasion resistance.
- The piston skirt portion is applied with resin coating to reduce friction loss.
- Low-tension piston rings are used to reduce friction and achieve excellent fuel economy.
- Narrow-width piston rings are used to reduce weight and friction.
- A No. 1 compression ring with an inside bevel shape is used to reduce blowby gas.
- A Physical Vapor Deposition (PVD) coating has been applied to the surface of the No. 1 compression ring and oil ring, in order to improve its wear resistance.



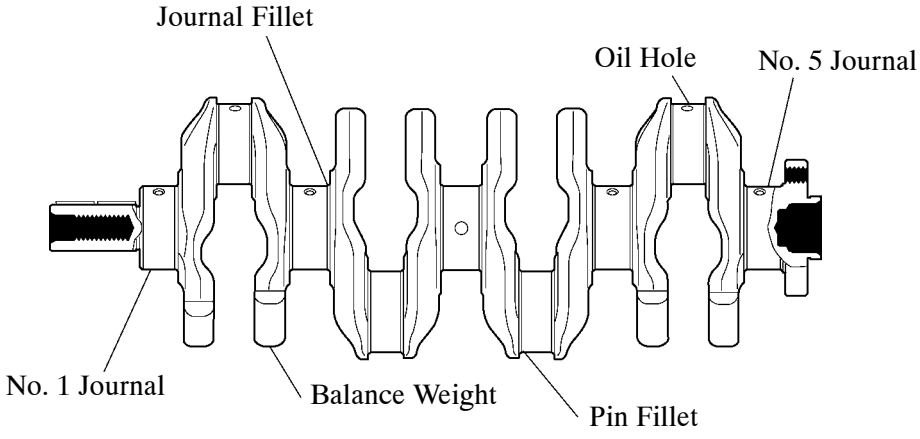
6. Connecting Rod and Connecting Rod Bearing

- The connecting rods are made of high-strength steel weight reduction.
- Plastic region tightening bolts are used.
- The crankshaft bearings have been optimized in width to reduce friction.
- The lining surface of the connecting rod bearing has been micro-grooved to provide an optimal amount of oil clearance. As a result, cold-engine cranking performance has been improved and engine vibrations have been reduced.

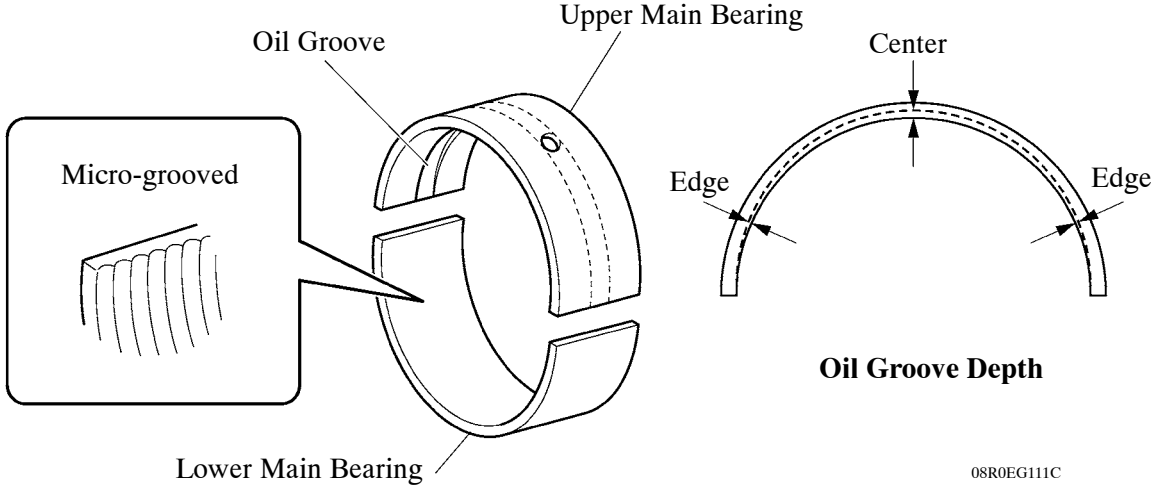


7. Crankshaft and Crankshaft Bearing

- The crankshaft has 5 journals and 8 balance weights.
- The pins and journals have been machined with increased precision and the surface roughness has been minimized to reduce friction.
- All pins and journal fillets have been hardened to improve their strength.



- The crankshaft bearings have been optimized in width to reduce friction.
- An oil groove is provided on each crankshaft bearing (upper main bearing). The oil groove is deep at the center and is shallow at the edges to reduce the amount of oil that will leak from the crankshaft bearing. As a result, the size of the oil pump is reduced, minimizing friction.
- The lining surface of the crankshaft bearing has been micro-grooved to provide an optimal amount of oil clearance. As a result, cold-engine cranking performance has been improved and engine vibrations have been reduced.



8. Oil Pan

- The No. 1 oil pan (crank case) is made of aluminum alloy.
- The No. 2 oil pan is made of steel.
- The oil pump is installed in the No. 1 oil pan to make the engine compact.
- To improve serviceability, the No. 1 oil pan has been designed so that it can be removed without removing the No. 2 oil pan and the oil pump.
- The air conditioning compressor brackets are integrated into the No. 1 oil pan.

