

ENGINE

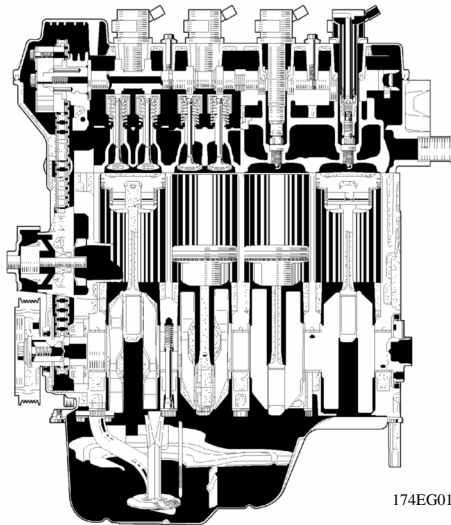
1ZZ-FE ENGINE

■ DESCRIPTION

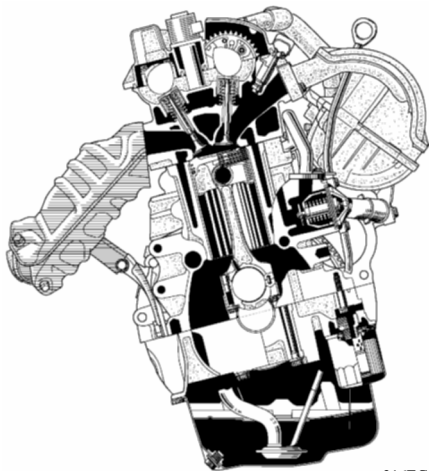
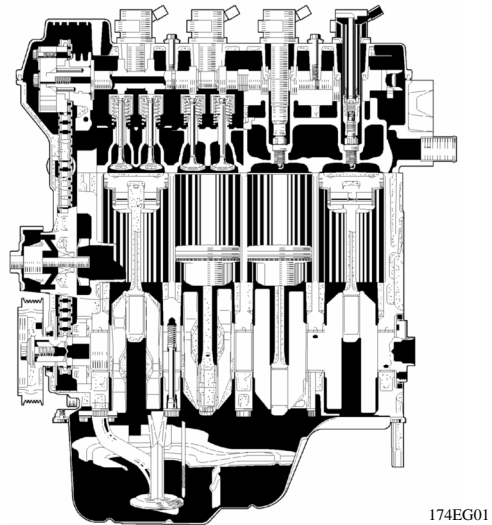
The VVT-i (Variable Valve Timing-intelligent) system, the DIS (Direct Ignition System), and a plastic intake manifold have been used on the 1ZZ-FE engine in order to achieve higher engine performance and lower fuel consumption and to reduce exhaust emissions.

- The engine (for 2WD) meets the U-LEV (Ultra-Low Emission Vehicle) regulations. This engine is based on the 1ZZ-FE engine equipped on the '02 Corolla. See page EG-4 for the major differences of this engine from the '02 Corolla.
- The engine (for 4WD) meets the LEV (Low Emission Vehicle) regulations. This engine is based on the 1ZZ-FE engine equipped on the 2WD models. However, slight differences in specifications exist between the 2WD and 4WD models. For details, see page EG-4.

► 2WD Model ◀



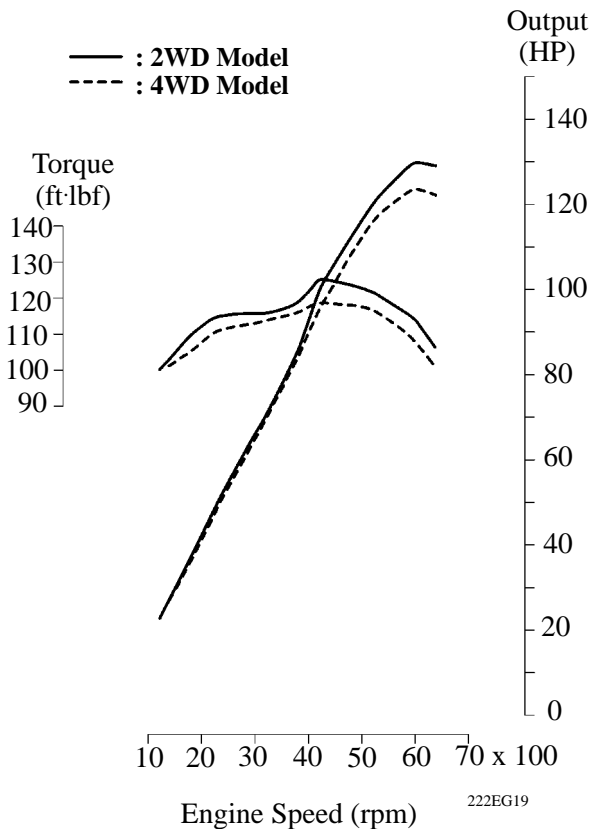
► 4WD Model ◀



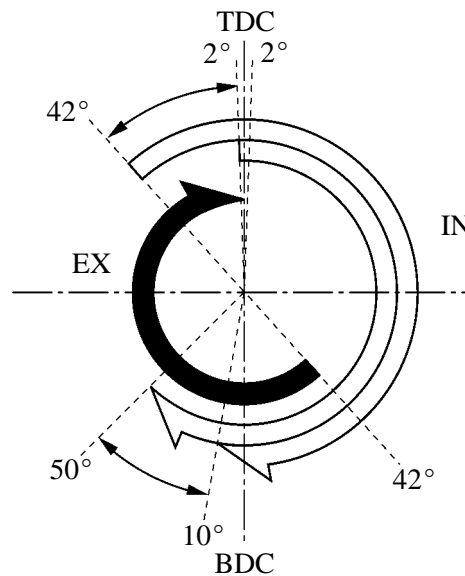
► Engine Specification ◀

Model			2WD Model	4WD Model
No. of Cyls. & Arrangement			4-Cylinder, In-line	←
Valve Mechanism			16-Valve DOHC, Chain Drive	←
Combustion Chamber			Pentroof Type	←
Manifolds			Cross-Flow	←
Fuel System			SFI	←
Displacement		cm ³ (cu. in.)	1794 (109.5)	←
Bore x Stroke		mm (in.)	79.0 x 91.5 (3.11 x 3.60)	←
Compression Ratio			10.0 : 1	←
Max. Output		[SAE-NET]	97.0 kW @ 6000 rpm (130 HP @ 6000 rpm)	92.0 kW @ 6000 rpm (123 HP @ 6000 rpm)
Max. Torque		[SAE-NET]	170 N·m @ 4200 rpm (125 ft·lbf @ 4200 rpm)	161 N·m @ 4200 rpm (118 ft·lbf @ 4200 rpm)
Valve Timing	Intake	Open	2° ~ 42° BTDC	←
		Close	50° ~ 10° ABDC	←
	Exhaust	Open	42° BBDC	←
		Close	2° ATDC	←
Firing Order			1 – 3 – 4 – 2	←
Octane Rating			87 or more	←
Oil Grade			API SL-EC or ILSAC	←
Engine Service Mass		kg (lb)	106 (233.7)	105 (231.5)

► Performance Curve ◀



► Valve Timing ◀



■ MAJOR DIFFERENCE

1. From '02 Corolla

Item	Outline
Valve Mechanism (See page EG-10)	Change of the valve timing (cam profile) of the intake camshaft
Intake and Exhaust System (See Page EG14)	<ul style="list-style-type: none"> ● Change of the throttle valve diameter ● Change of the intake manifold shape and material ● Change of the exhaust manifold and heat insulator shapes ● Change of the exhaust pipe construction ● Addition of the TWC with excellent warm-up performance ● Disconnect of the 2-way exhaust control system
Starting System (See page EG-22)	PS type starter has been adopted.
Engine Control System (See page EG-25)	<ul style="list-style-type: none"> ● Change of the knock sensor structure ● Adoption of the cooling fan control ● Adoption of 32-bit ECM
Other	Configuration and structure are the same as '02 Corolla

2. 2WD and 4WD Models

- Exhaust manifold shape (See page EG-16)
- No.1 TWC construction (See page EG-17)
- ECM software

■ FEATURES OF 1ZZ-FE ENGINE

The 1ZZ-FE engine has been able to achieve the following performance through the adoption of the items listed below.

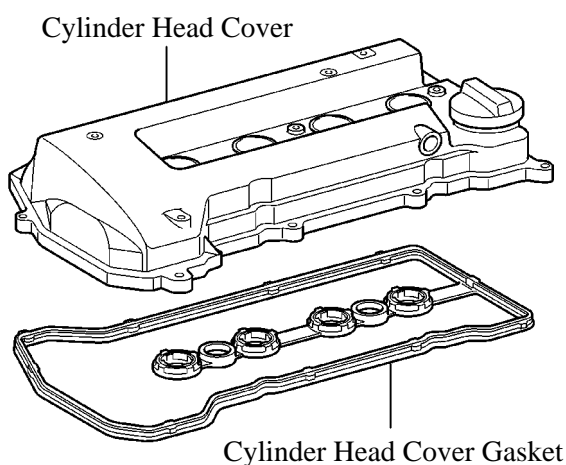
- (1) High performance and fuel economy
- (2) Low noise and vibration
- (3) Lightweight and compact design
- (4) Good serviceability
- (5) Clean emission

Item	(1)	(2)	(3)	(4)	(5)	'03 Corolla Matrix	'02 Corolla
The VVT-i system is used.	○				○	○	○
Intake manifold made of plastic has been adopted.			○			○	—
A cylinder block made of aluminum alloy has been used.			○			○	○
A stainless steel exhaust manifold is used.			○			○	○
The DIS (Direct Ignition System) makes ignition timing adjustment unnecessary.				○		○	○
Iridium-tipped spark plugs have been used.				○		○	○
A rearward exhaust layout has been used to realize an early activation of the TWC (Three-Way Catalytic Converter).					○	○	○
Upright intake port has been used.	○					○	○
The fuel returnless system has been used.			○	○	○	○	○
Quick connectors are used to connect the fuel hose with the fuel pipe.				○		○	○
12-hole type fuel injectors have been used.	○				○	○	○
ORVR (On-Board Refueling Vapor Recovery) system has been used.					○	○	○
A timing chain and chain tensioner have been used.		○		○		○	○
2-way exhaust control system is used.	○					—	○
PS type starter has been adopted.			○			○	—
Two TWCs have been adopted.					○	○	—

■ ENGINE PROPER

1. Cylinder Head Cover

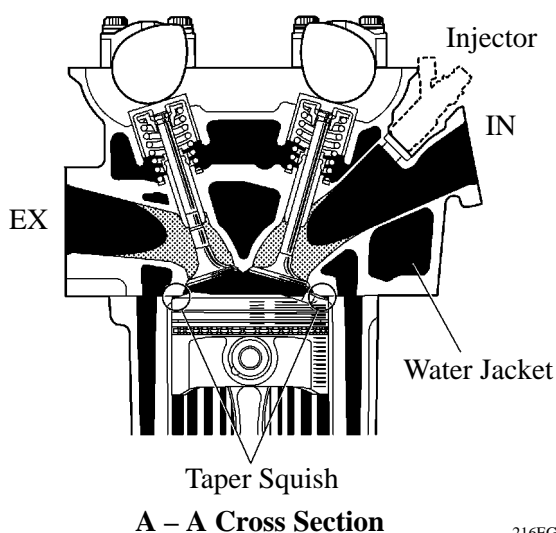
- Lightweight yet high-strength aluminum die-cast cylinder head cover is used.
- The cylinder head cover gasket and the spark plug gasket have been integrated to reduce the number of parts.
- Acrylic rubber, which excels in heat resistance and reliability, has been adopted for the cylinder head cover gasket.



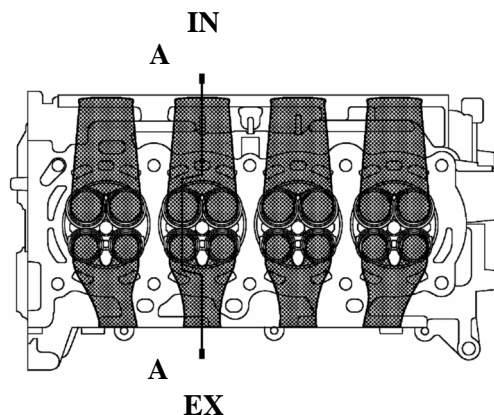
222EG17

2. Cylinder Head

- Upright intake ports are used to increase intake efficiency.
- The injectors have been installed in the cylinder head to prevent the fuel from adhering to the intake port walls, thus reducing exhaust emissions.
- The routing of the water jacket in the cylinder head has been optimized to achieve higher cooling performance. In addition, a water bypass passage has been provided below the intake ports to reduce the number of parts and to reduce weight.
- Through the using of the taper squish combustion chamber, the engine's knocking resistance and fuel efficiency have been improved.



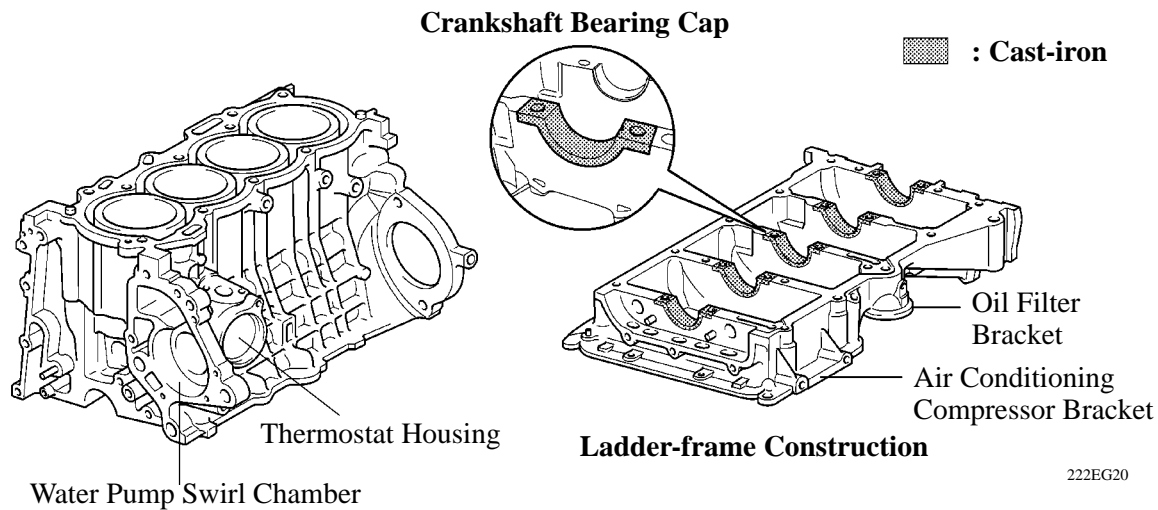
216EG36



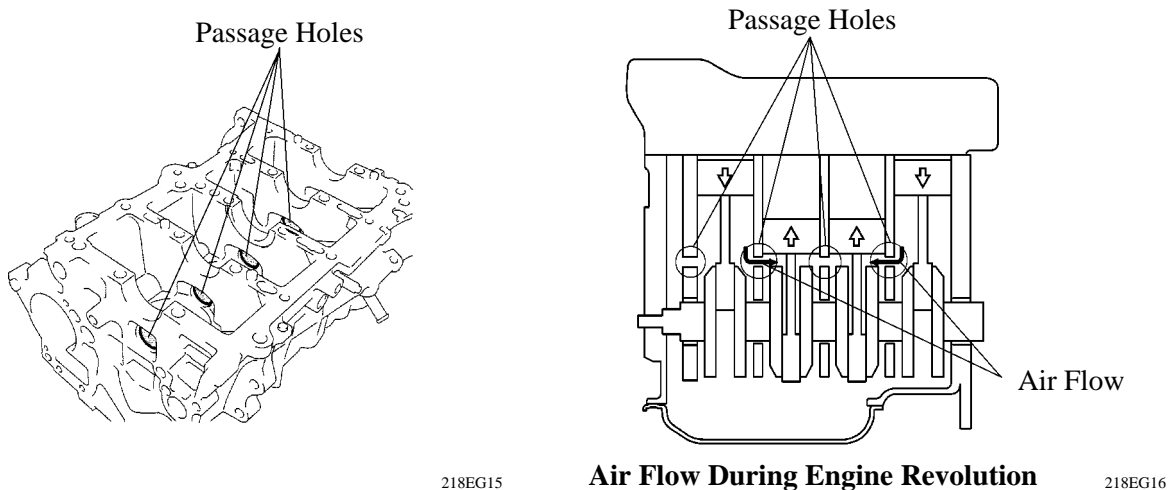
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3. Cylinder Block

- Lightweight aluminum alloy is used for the cylinder block.
- The crankshaft bearing caps with ladder-frame construction have been used to increase the rigidity, to reduce noise, and to increase the coupling rigidity with the transaxle.
- Cast-iron is used as a material for part of the bearing journal of the crankshaft bearing cap and thus help prevent heat deformation. In addition, the oil filter bracket, the air conditioning compressor bracket, the water pump swirl chamber, the thermostat housing and the rear oil seal retainer have been integrated to reduce the number of parts.



- Passage holes are provided in the crankshaft bearing area of the cylinder block. As a result, the air at the bottom of the cylinder flows smoother, and pumping loss (back pressure at the bottom of the piston generated by the piston's reciprocal movement) is reduced to improve the engine's output.



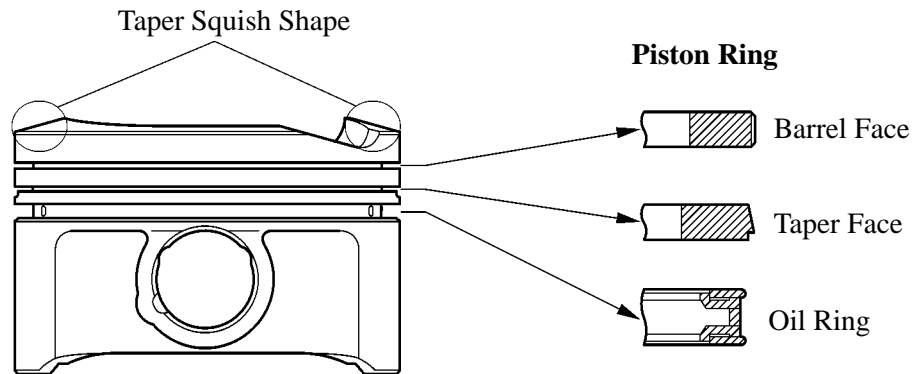
- A thin cast-iron liner is press-fitted inside the cylinder to ensure an added reliability.

NOTICE

Never attempt to machine the cylinder because it has a thin liner thickness.

4. Piston

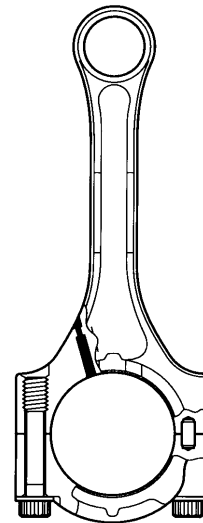
- The piston is made of aluminum alloy to be compact and lightweight.
- The piston head portion uses a taper squish shape to accomplish fuel combustion efficiency.
- Full floating type piston pins are used.
- By increasing the machining precision of the cylinder bore diameter, only one diameter of piston is available.



221EG29

5. Connecting Rod

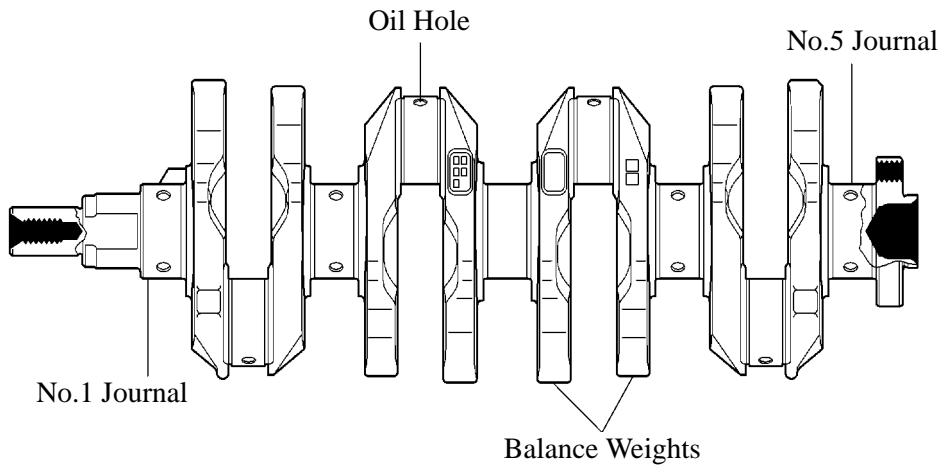
- The connecting rods are made of high-strength material for weight reduction.
- The connecting rod bearings have been reduced in width to reduce friction.
- Nutless-type plastic region tightening bolts are used for a lighter design.



178EG29

6. Crankshaft

- The forged crankshaft has 5 journals and 8 balance weights.
- The crankshaft bearings have been reduced in width to reduce friction.
- The pins and journals have been machined with increased precision and the surface roughness minimized to reduce friction.



216EG38