

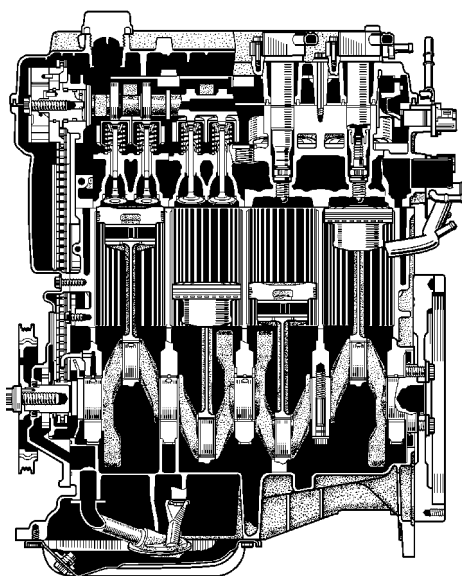
ENGINE

1NZ-FXE ENGINE

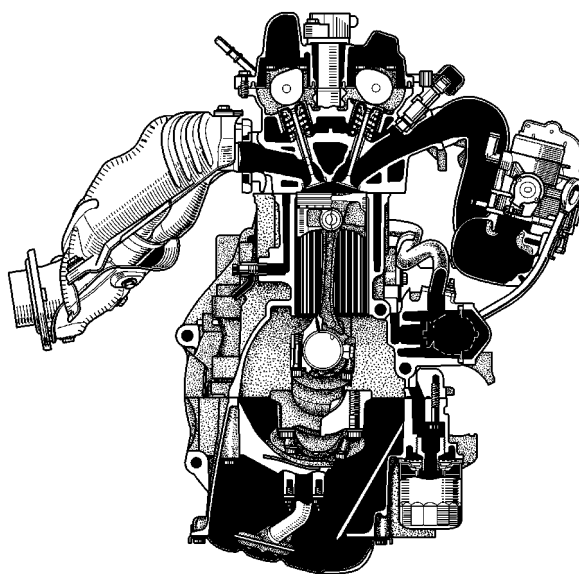
■ DESCRIPTION

The Prius uses the 1NZ-FXE engine that has been newly developed for hybrid system application. Based on the 1NZ-FE engine, the high-expansion ratio Atkinson cycle has been adopted. It is an in-line 4-cylinder, 1.5-liter, 16-valve DOHC engine.

This engine has adopted the VVT-i (Variable Valve Timing-intelligent) system has been developed to realize high performance, quietness, fuel economy and clean emissions.



182EG01



182EG02

- REFERENCE -

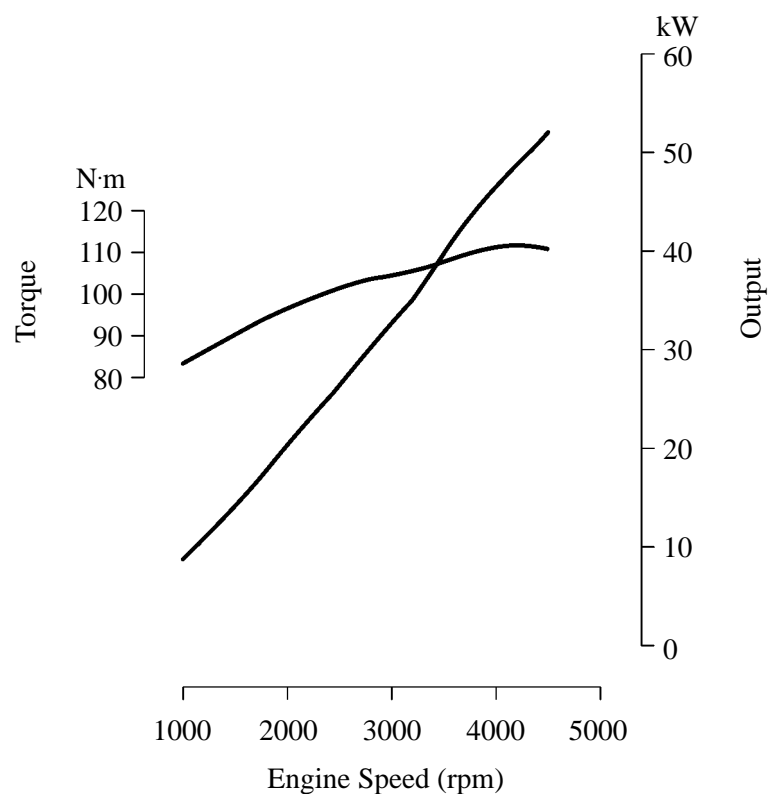
Atkinson Cycle: Proposed by an English engineer named James Atkinson, this thermal cycle enables the compression stroke and the expansion stroke of the mechanism to be set independently of each other. Later, this concept was realized by the American R. H. Miller, who developed a system called the Miller Cycle in which the opening and closing timing of the intake valves was made adjustable. Because this system does not generate high output, there is no practical application for this system unless it is combined with a supercharger; however, this system offers a high level of thermal efficiency.

On Prius, this weak point can be covered by combining the Atkinson cycle engine with THS.

► Engine Specifications ◀

Engine Type			1NZ-FXE	1NZ-FE (ECHO)
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.)			1497 (91.3)	←
Bore x Stroke mm (in.)			75.0 x 84.7 (2.95 x 3.33)	←
Compression Ratio			13.0 : 1	10.5 : 1
Max. Output [SAE-NET]			52 kW @ 4500 rpm 70 HP @ 4500 rpm	81 kW @ 6000 rpm 108 HP @ 6000 rpm
Max. Torque [SAE-NET]			111 N·m @ 4200 rpm 82 lb-ft @ 4200 rpm	142 N·m @ 4200 rpm 105 lb-ft @ 4200 rpm
Valve Timing	Intake	Open	18° ~ -25° BTDC	- 7° ~ 53° BTDC
		Close	72° ~ 115° ABDC	52° ~ -8° ABDC
	Exhaust	Open	34° BBDC	42° BBDC
		Close	2° ATDC	←
Fuel Octane Number RON			91 or more	←
Oil Grade			API SJ EC or ILSAC	←

► Performance Curve ◀



■ FEATURES OF 1NZ-FXE ENGINE

The 1NZ-FXE 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)	1NZ-FE
The VVT-i system is used.	○				○	○
High-expansion Atkinson cycle has been adopted.	○					
An offset crankshaft has been adopted.	○					○
A cylinder block made of aluminum has been adopted.		○	○			○
A stainless steel exhaust manifold is used for weight reduction.			○		○	○
A rearward exhaust layout has been adopted to realize the early activation of the catalyst.					○	○
HC Adsorber and catalyst system has been adopted.					○	
Fuel returnless system has been adopted.					○	○
12-hole type fuel injectors have been adopted.	○				○	○
The DIS (Direct Ignition System) makes ignition timing adjustment unnecessary.				○		○
Quick connectors are used to connect the fuel hose with the fuel pipes.				○		○
The oil filter is installed diagonally downward.				○		○
A timing chain has been adopted.				○		○
A vacuum system that detects leaks in the evaporative emission control system has been adopted.				○	○	○
The vapor reducing fuel tank system has been adopted. This system reduces the amount of fuel vapor that is generated.					○	