

Your Ref: Toyota Engine
(number 2AZH320901)
Our Ref : CI/TP20011786/D

29 October 2020

Yee Hai Weay
Block 208C Punggol Place
#16-926
Singapore 823208

INSPECTION REPORT OF A TOYOTA ENGINE WITH NUMBER 2AZH320901

1. I refer to your request on 26 October 2020 to conduct a physical inspection of a Toyota engine.
2. The purpose of this inspection was to primarily determine whether the Toyota engine is a Toyota 2AZ model engine.
3. Following the request, I had carried out a physical inspection of the Toyota engine on 28 October 2020 at the premises of F1 Garage Pte Ltd, 8 Kaki Bukit Avenue 4 #03-33 Premier @ Kaki Bukit, Singapore 415875.
4. Measurements of the bore and stroke of the Toyota engine were obtained and thereafter compared with the bore and stroke measurements as stated in the technical specifications of a Toyota 2AZ model engine.
5. I now set out my observations and comments pertaining to this inspection.

Inspection of the Toyota Engine

6. Firstly, I had noted that the Toyota engine was a used engine and not fitted on any motor car at the time of my inspection. It was observed to be a complete assembly with all mechanical parts still intact, within the engine housing. The engine number engraved on the housing was 2AZH320901.
7. My visual examination of the engine housing revealed the housing to be of serviceable/satisfactory condition. There was no crack and/or hole observed on the engine housing.
8. Upon my request, the Toyota engine was dismantled, specifically the top block was separated from the bottom block. This was to enable me to carry out measurements of its cylinders, in particular the bore and stroke measurements of each cylinder, which typically can be used to determine the engine displacement or more commonly referred to as engine cc or engine size. See photo 1 – 4 below.

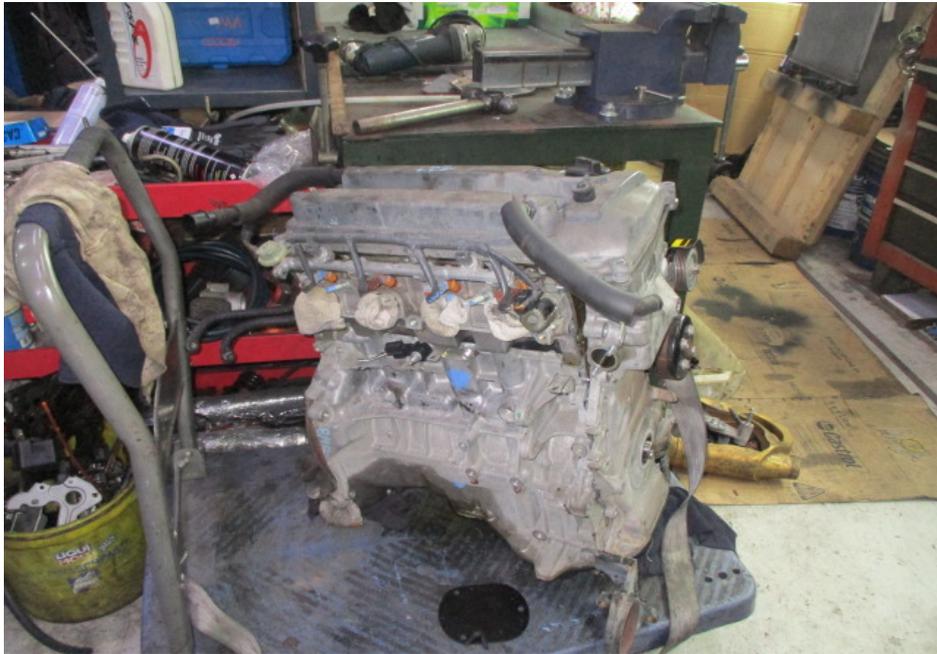


Photo 1 shows a general view of the Toyota engine that I had inspected. The Toyota engine was observed to be a used engine and was not fitted on any motor car. It was also observed to be a complete assembly with all mechanical parts still intact, within the engine housing.



Photo 2 shows a general view of the Toyota engine that I had inspected. My visual examination of the engine housing revealed the housing to be of serviceable/satisfactory condition. There was no crack and/or hole observed on the engine housing.

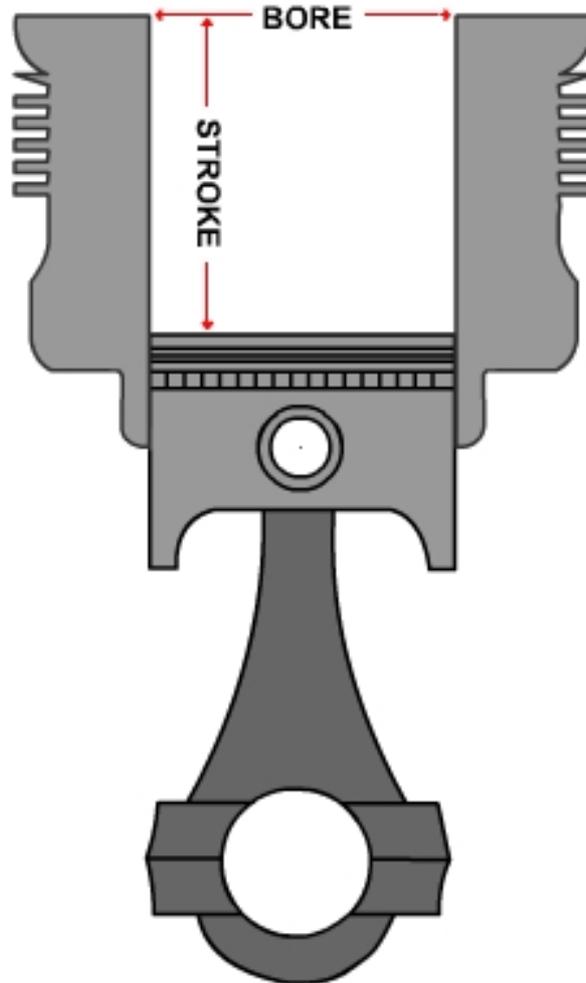


Photo 3 shows a general view of the Toyota engine that I had inspected. My visual examination of the engine housing revealed the housing to be of serviceable/satisfactory condition. There was no crack and/or hole observed on the engine housing.



Photo 4 shows the engine number engraved on the housing of the Toyota engine that I had inspected. The engine number was 2AZH320901.

9. The bore refers to the measurement of the inside diameter of the cylinder while the stroke refers to the distance the piston moves in one direction of upward or downward movement in the cylinder. See diagram below for illustration purposes.



10. The bore and stroke measurements of the 4 cylinders of the Toyota engine are set out in the table below. Photo 5 – 19 thereafter shows the photographs taken during the measurements.

	Bore (mm)	Stroke (mm)
Cylinder 1	88.37	95.55
Cylinder 2	88.18	95.33
Cylinder 3	88.11	95.28
Cylinder 4	88.16	95.78



Photo 5 shows the top block (yellow arrow) of the Toyota engine separated from its bottom block (red arrow). This was to enable me to carry out measurements of its cylinders, in particular the bore and stroke measurements of each cylinder, which typically can be used to determine the engine displacement or more commonly referred to as engine cc.

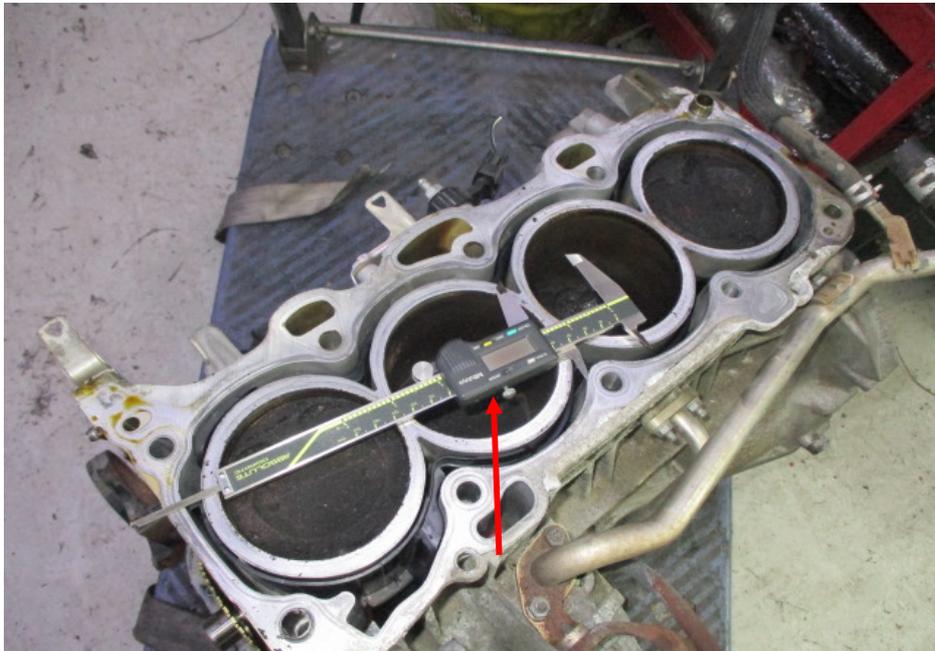


Photo 6 shows the bottom block of the Toyota engine and the digital Vernier Caliper (arrowed) that was used to measure the bore and stroke measurements of each cylinder. The digital Vernier Caliper was calibrated before the start of the measurements.

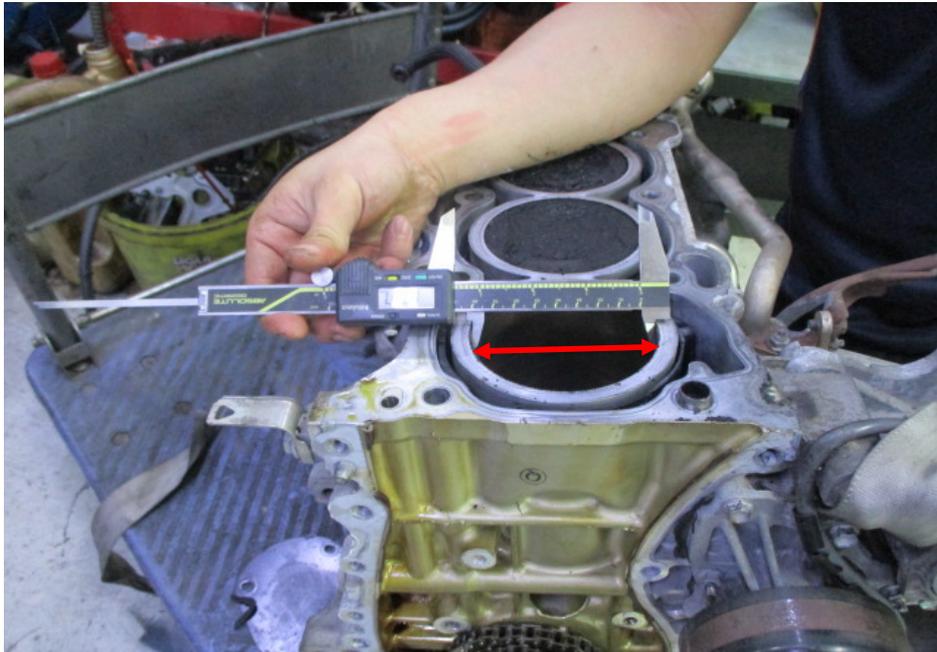


Photo 7 shows measurement being carried out to the bore (arrowed) of cylinder 1 of the Toyota engine. The measurements were carried out using a digital Vernier Caliper that was calibrated before the start of the measurements.

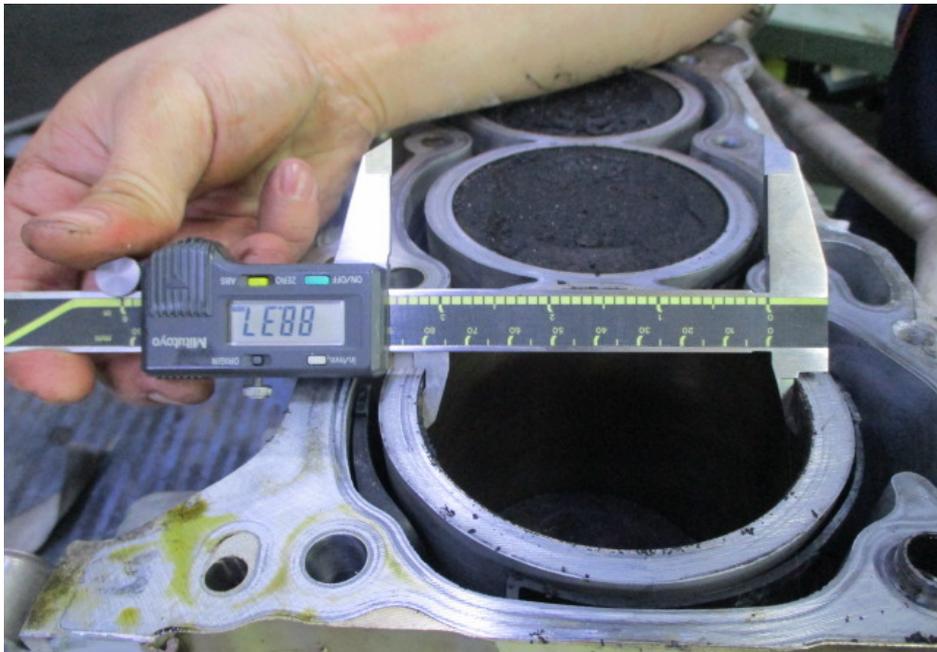


Photo 8 shows the bore measurement of cylinder 1, which was recorded to be 88.37mm.



Photo 9 shows measurement being carried out to the stroke (arrowed) of cylinder 1 of the Toyota engine. The bore and stroke measurements of the Toyota engine were carried out using a digital Vernier Caliper that was calibrated before the start of the measurements.

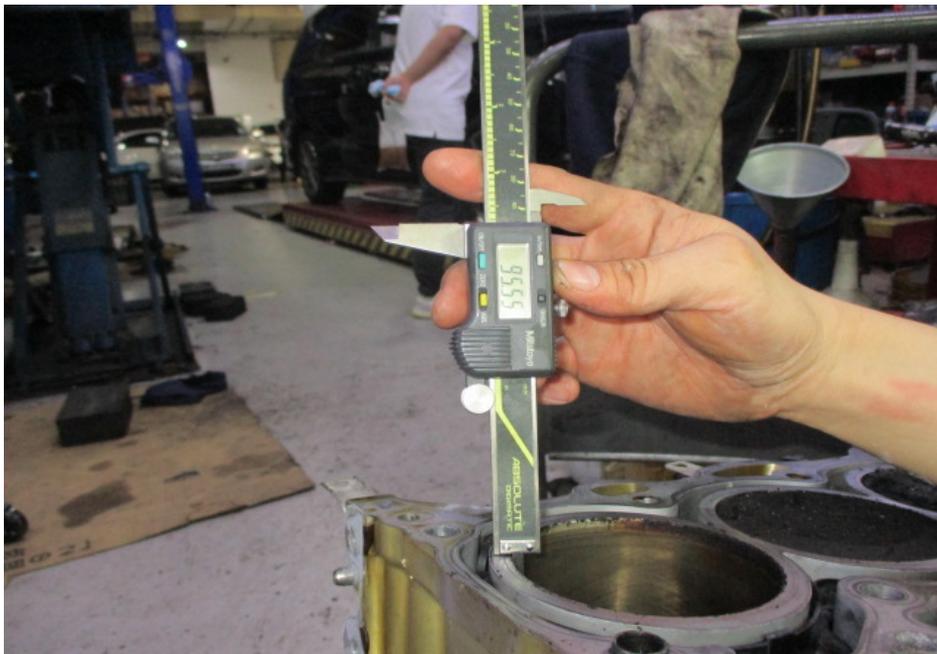


Photo 10 shows the stroke measurement of cylinder 1, which was recorded to be 95.55mm.

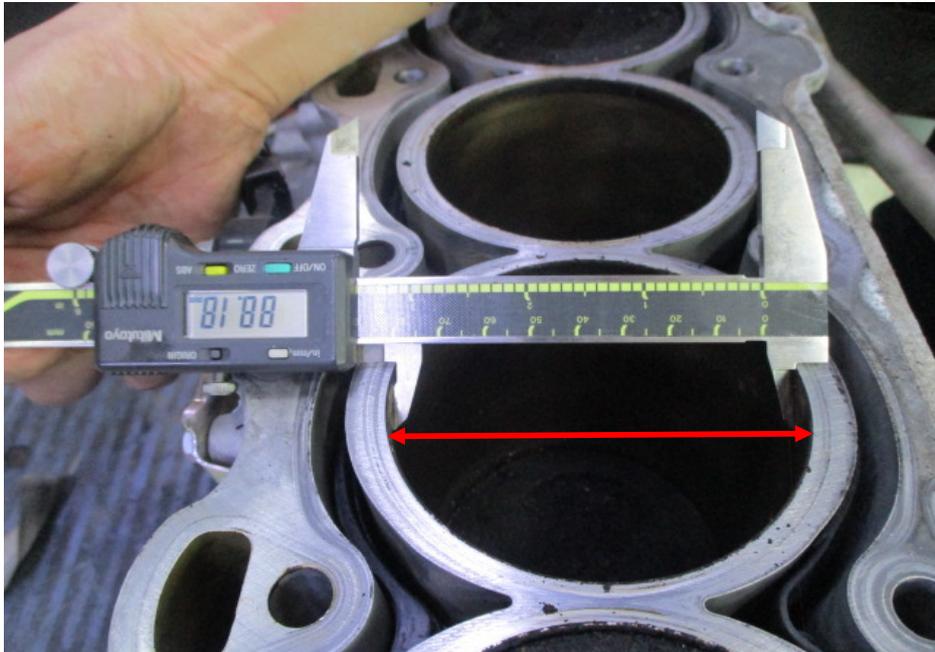


Photo 11 shows measurement being carried out to the bore (arrowed) of cylinder 2 of the Toyota engine. The bore measurement of cylinder 2 was recorded to be 88.18mm.



Photo 12 shows measurement of the stroke for cylinder 2 of the Toyota engine that I had inspected. The bore and stroke measurements of the Toyota engine were carried out using a digital Vernier Caliper that was calibrated before the start of the measurements.



Photo 13 shows the stroke measurement of cylinder 2, which was recorded to be 95.33mm.

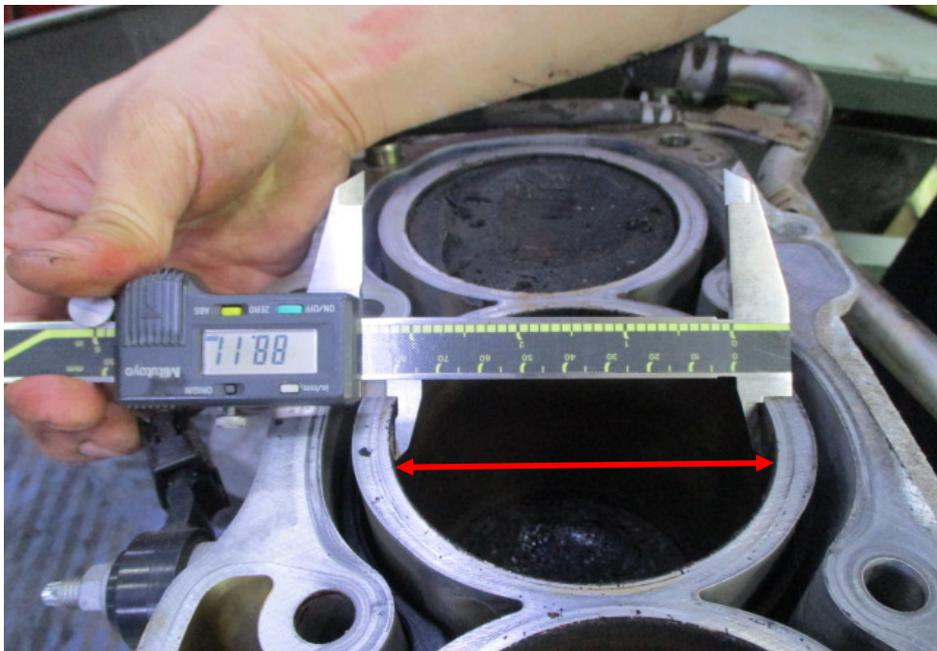


Photo 14 shows measurement being carried out to the bore (arrowed) of cylinder 3 of the Toyota engine. The bore and stroke measurements of the Toyota engine were carried out using a digital Vernier Caliper that was calibrated before the start of measurements. The bore measurement of cylinder 3 was recorded to be 88.11mm.



Photo 15 shows measurement of the stroke (arrowed) for cylinder 3 of the Toyota engine that I had inspected. The bore and stroke measurements of the Toyota engine were carried out using a digital Vernier Caliper that was calibrated before the start of measurements.



Photo 16 shows the stroke measurement of cylinder 3, which was recorded to be 95.28mm.

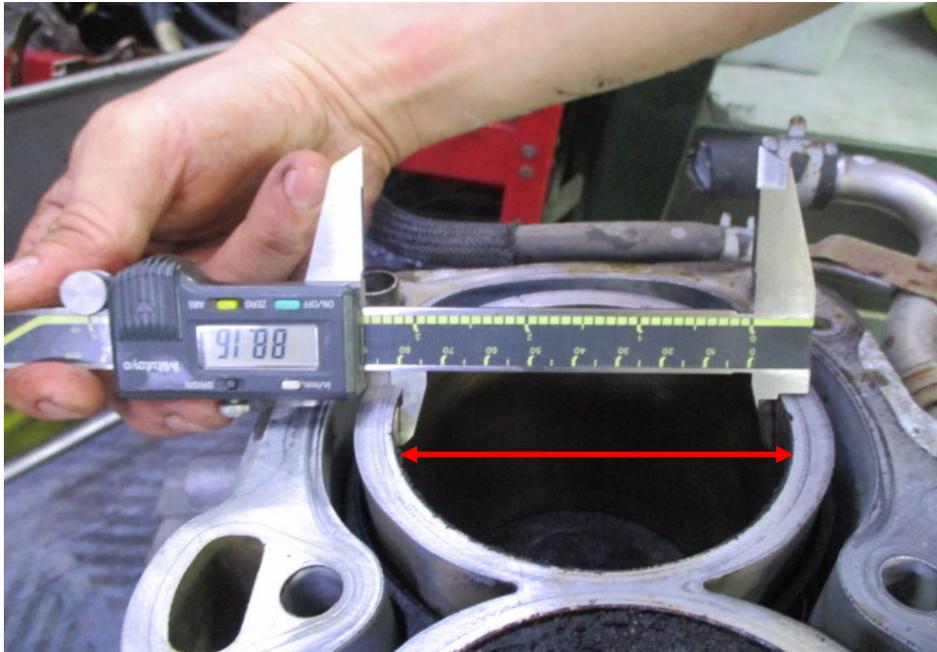


Photo 17 shows measurement being carried out to the bore (arrowed) of cylinder 4 of the Toyota engine. The bore measurement of cylinder 4 was recorded to be 88.16mm.



Photo 18 shows measurement being carried out to the stroke (arrowed) of cylinder 4 of the Toyota engine. The bore and stroke measurements of the Toyota engine were carried out using a digital Vernier Caliper that was calibrated prior to the start of measurements.



Photo 19 shows the stroke measurement of cylinder 4, which was recorded to be 95.78mm.

Toyota 2AZ Engine Technical Specifications

11. In order to determine whether the Toyota engine that I had inspected was a Toyota 2AZ model engine, I had compared the measurements of the bore and stroke of the Toyota engine with the bore and stroke measurements of the Toyota 2AZ model engine, as stated in its technical specifications. According to the technical specification of the Toyota 2AZ model engine, the bore and stroke measurement was 88.50mm and 96.00mm respectively.
12. Upon comparison, I note that the bore and stroke measurements of the Toyota engine that I had inspected (shown in paragraph 10 above) had corresponded to the bore and stroke measurements as stated in the technical specifications of a Toyota 2AZ model engine. The measurements recorded from the Toyota engine were all slightly lesser (at maximum 0.72mm lesser). This difference can be attributed to carbon accumulation within the cylinders, as the Toyota engine that I had inspected was a used engine.
13. Since the bore and stroke of the Toyota engine had corresponded to a Toyota 2AZ model engine, the engine displacement of the Toyota engine that I had inspected would then be 2362cc. See technical specifications of Toyota 2AZ model engines below.

TOYOTA 2AZ-FE ENGINE SPECS	
Manufacturer	Toyota Motor Manufacturing Kentucky, Inc. Kamigo Plant Shimoyama Plant
Also called	Toyota 2AZ
Production	2000-present
Cylinder block alloy	Aluminum
Configuration	Straight-4
Valvetrain	DOHC 4 valves per cylinder
Piston stroke, mm (inch)	96 (3.78) ←
Cylinder bore, mm (inch)	88.5 (3.48) ←
Compression ratio	9.6 9.8 11 12.5
Displacement	2362 cc (144.1 cu in) ←

Conclusion

14. In summary, the Toyota engine that I had inspected was a Toyota 2AZ model engine. The engine number engraved on the housing of this Toyota engine was 2AZH320901. The engine displacement of the Toyota engine is 2362cc as per the technical specification.



Ang Bryan Tani

AMSOE, AMIRTE, AFF SAE, M.MATAI, AFF.Inst.AEA

Senior Technical Investigator

Technical Investigation & Accident Reconstructionist (SAE-A)

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