

Your Ref: Toyota Engine  
(number 1AZ3121238)  
Our Ref : CI/TP21005767/D

12 May 2021

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#01-47  
Singapore 737775

**INSPECTION REPORT OF A TOYOTA ENGINE WITH NUMBER 1AZ3121238**

1. I refer to your request on 07 May 2021 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 1AZ model engine.
3. Following the request, I had carried out a physical inspection of the Toyota engine on 11 May 2021 at the premises of No. 138 Woodlands Industrial Park E5, Singapore 757856
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 1AZ model engine.
5. I now set out below my observations and comments regarding this inspection.

**Inspection of the Toyota Engine**

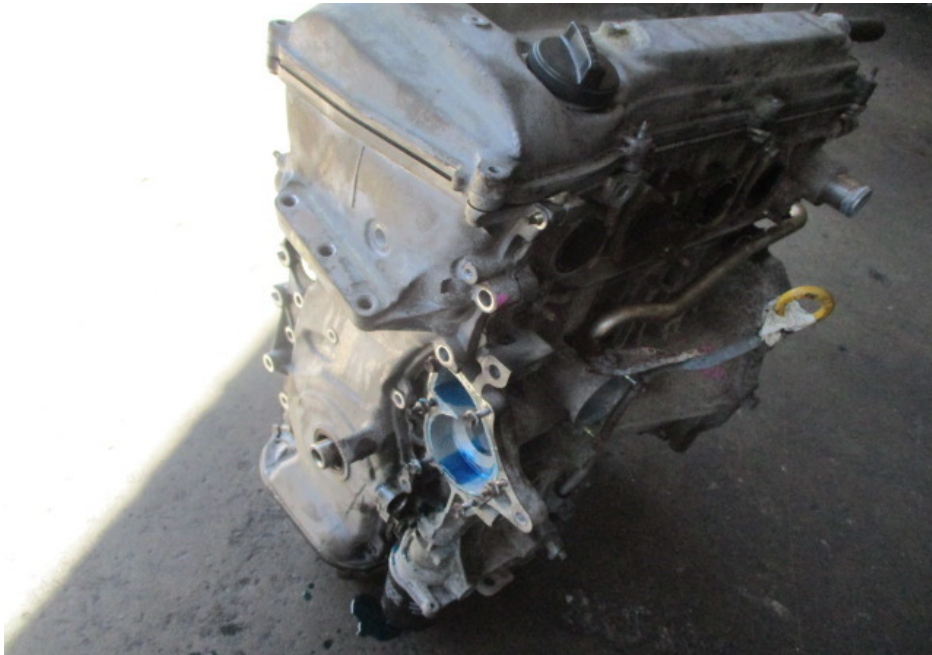
6. Firstly, I had noted that the Toyota engine was a used engine and not fitted on any motor car at the time of my inspection. It was observed to be a complete assembly with all mechanical parts still intact, within the engine housing. The engine number engraved on the housing was 1AZ3121238.
7. My visual 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 closer 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.

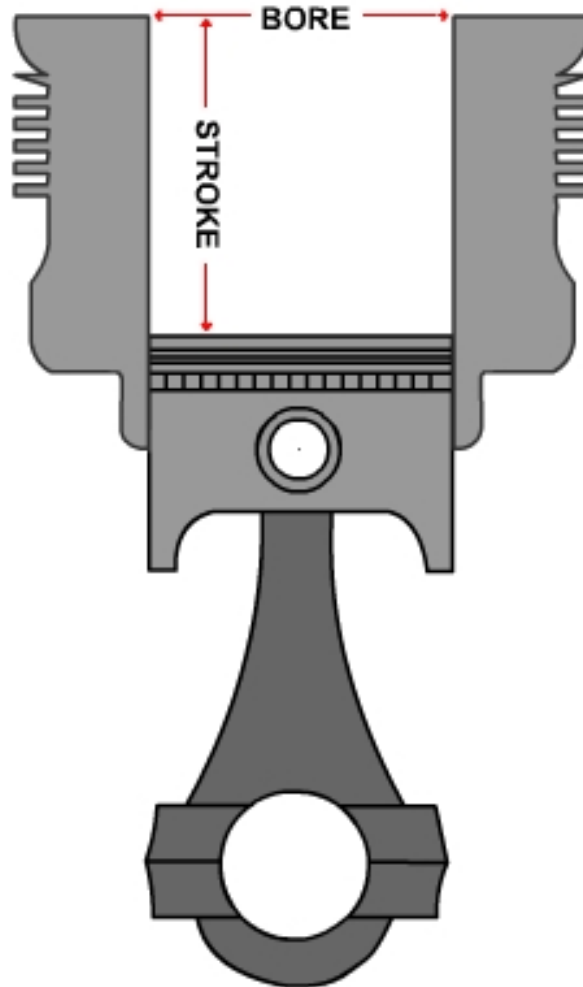


**Photo 3** shows a general view of the Toyota engine that I had inspected. My visual examination of the engine housing revealed the housing to be of serviceable/satisfactory condition. There was no crack and/or hole observed on the engine housing.



**Photo 4** shows the engine number engraved on the housing of the Toyota engine that I had inspected. The engine number was 1AZ3121238.

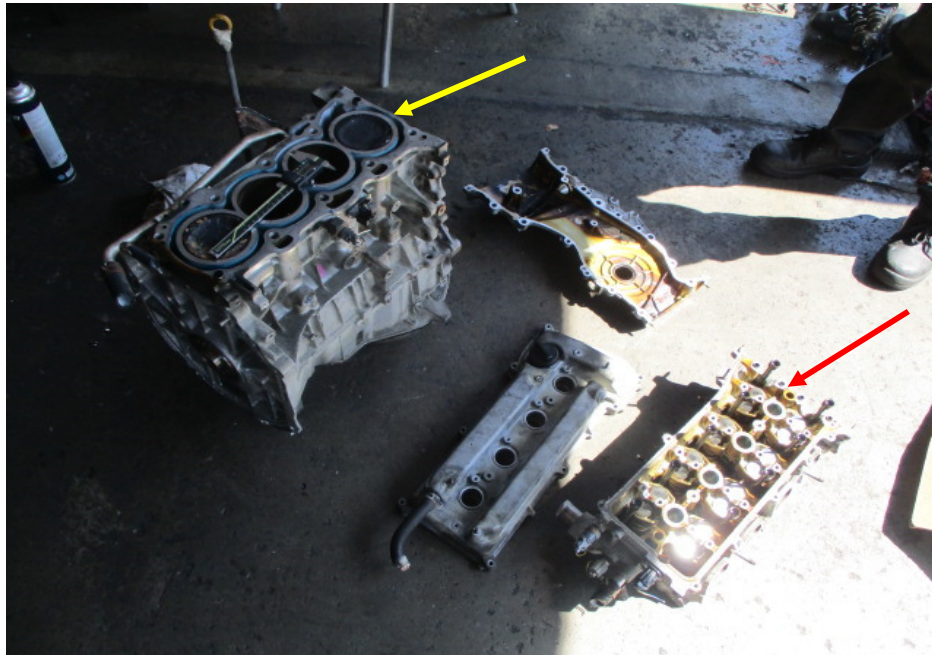
9. The bore refers to the measurement of the inside diameter of the cylinder while the stroke refers to the distance the piston moves in one direction of upward or downward movement in the cylinder. See diagram below for illustration purposes.



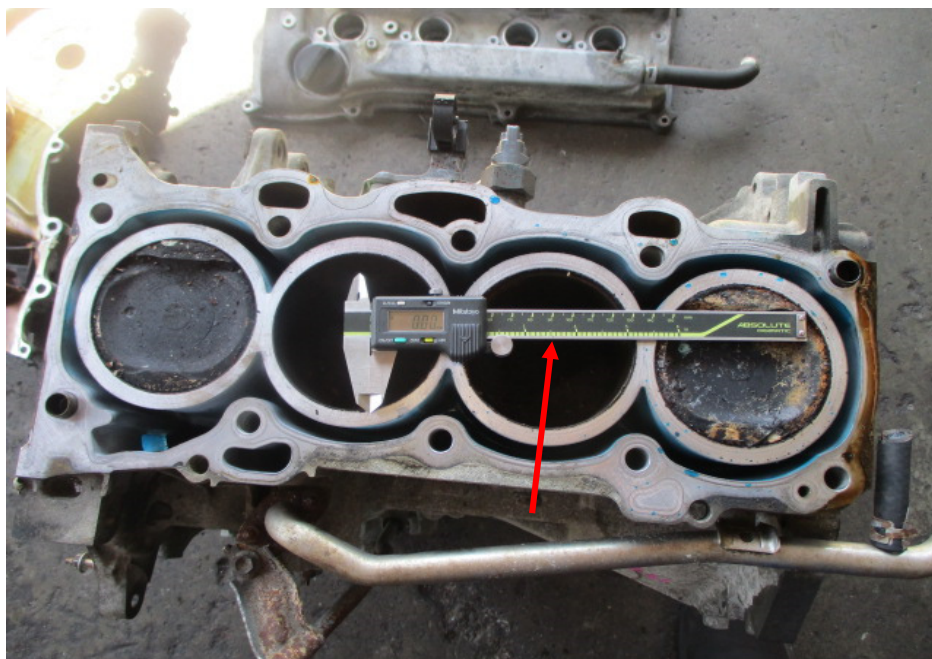
10. The bore and stroke measurements of the 4 cylinders of the Toyota engine are set out in the table below. Photo 5 – 22 thereafter shows the photographs taken during the measurements.

	<b>Bore (mm)</b>	<b>Stroke (mm)</b>
<b>Cylinder 1</b>	85.62	85.07
<b>Cylinder 2</b>	85.67	85.34
<b>Cylinder 3</b>	85.39	85.36
<b>Cylinder 4</b>	85.76	85.13

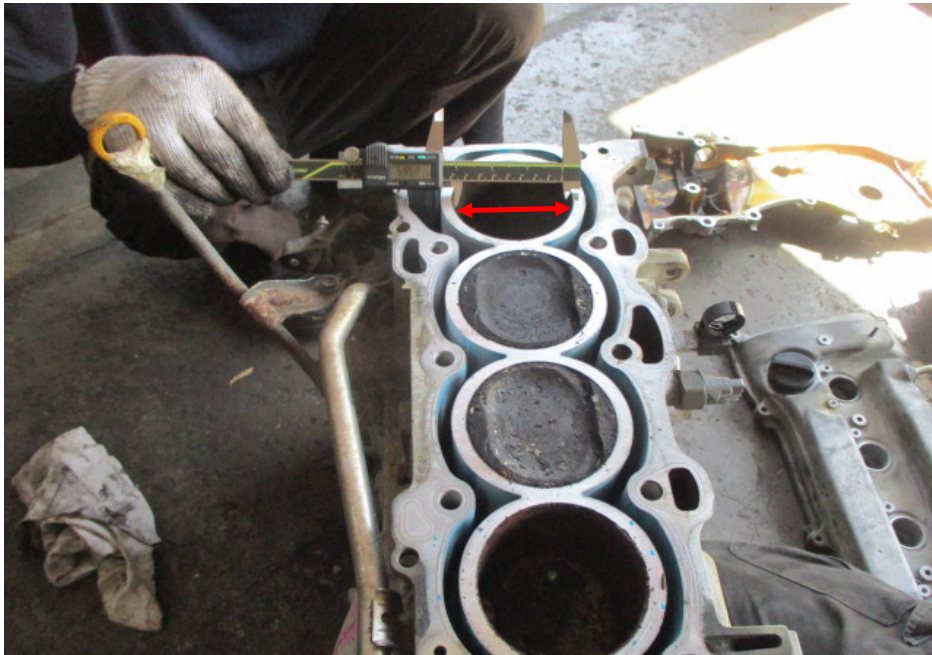




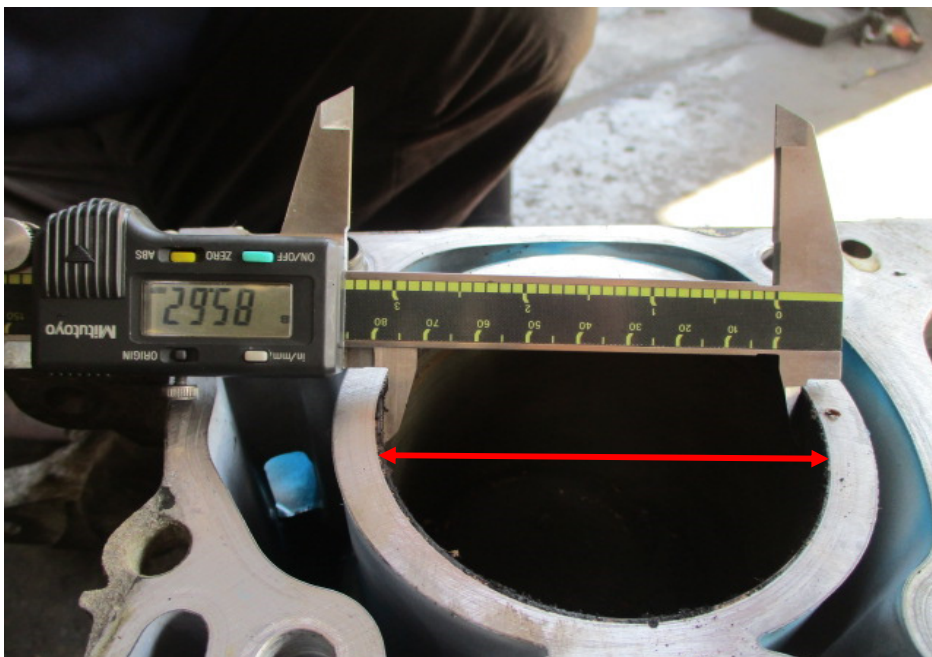
**Photo 5** shows the top block (red arrow) of the Toyota engine separated from its bottom block (yellow arrow). This was to enable me to carry out measurements of its cylinders, in particular the bore and stroke measurements of each cylinder, which typically can be used to determine the engine displacement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

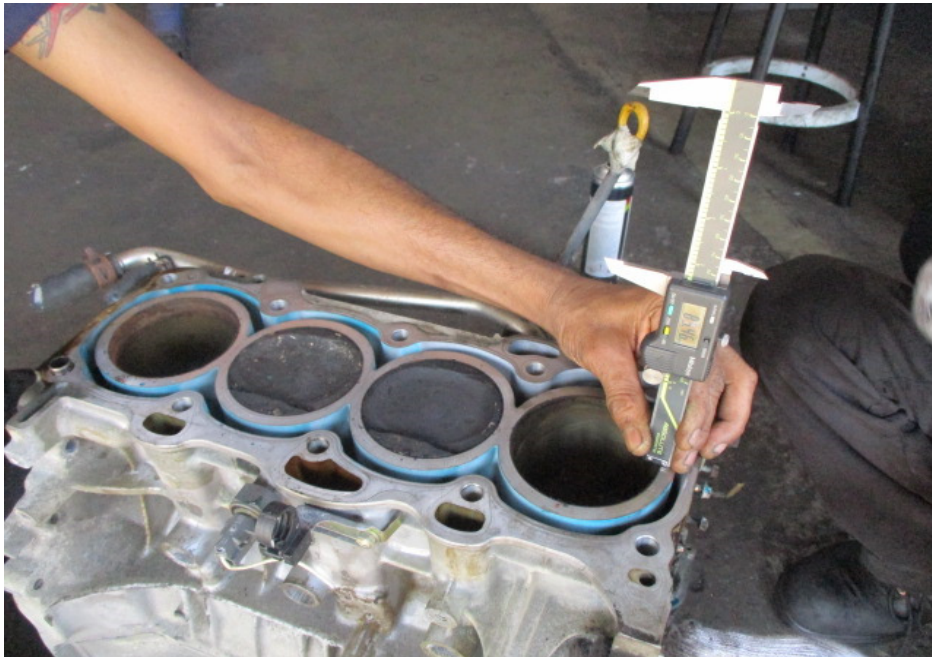


**Photo 7** shows measurement being carried out to the bore (arrowed) of cylinder 1 of the Toyota engine. The measurements were carried out using a digital Vernier Caliper that was calibrated before the start of the measurements.



**Photo 8** shows the bore (arrowed) measurement of cylinder 1, which was recorded to be 85.62mm.





**Photo 9** shows measurement being carried out to the stroke of cylinder 1 of the Toyota engine. The bore and stroke measurements of the Toyota engine were carried out using a digital Vernier Caliper.



**Photo 10** 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,

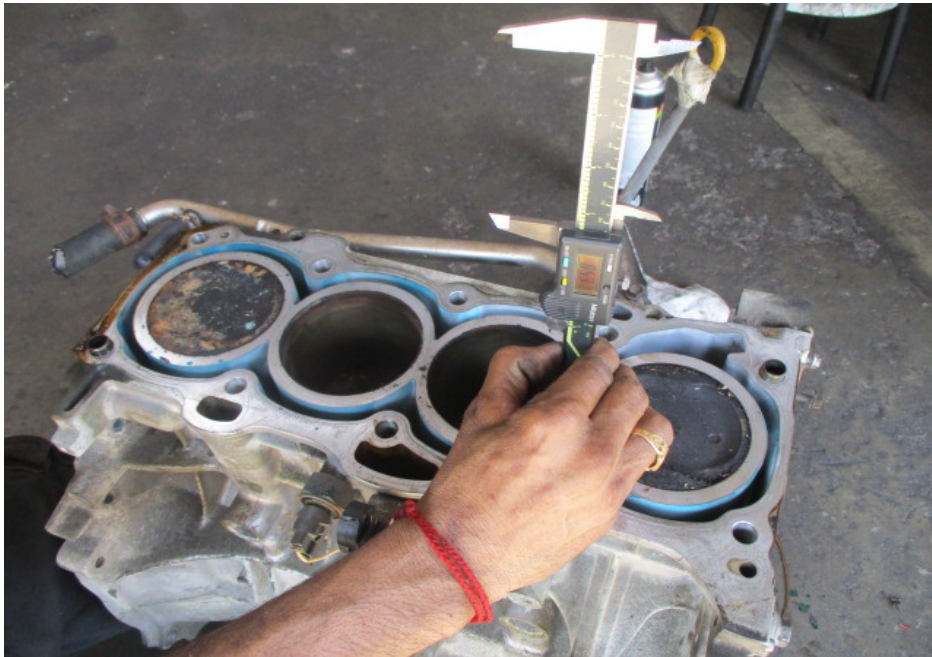


**Photo 11** shows the stroke measurement of cylinder 1, which was recorded to be 85.07mm.

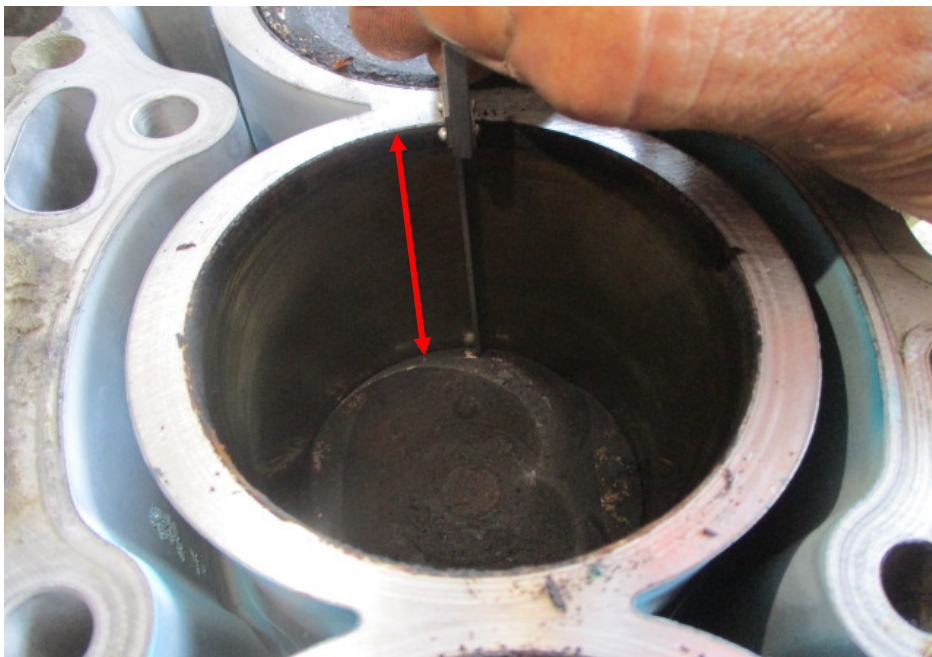


**Photo 12** shows measurement being carried out to the bore (arrowed) of cylinder 2 of the Toyota engine. The bore measurement of cylinder 2 was recorded to be 85.67mm.





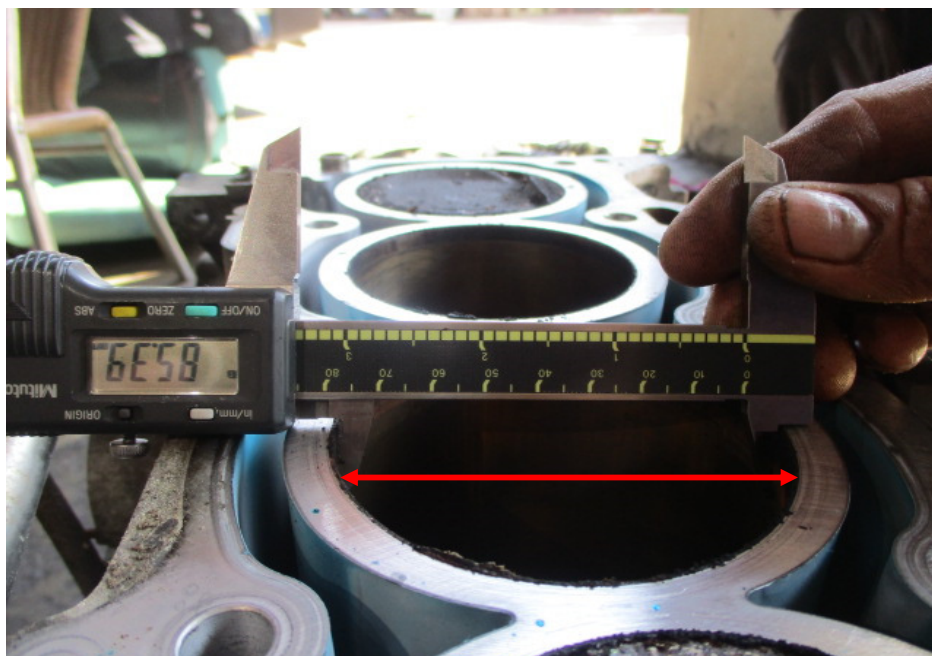
**Photo 13** shows measurement being carried out to the stroke of cylinder 2 of the Toyota engine that I had inspected.



**Photo 14** shows measurement of the stroke (arrowed) for cylinder 2 of the Toyota engine that I had inspected.



**Photo 15** shows the stroke measurement of cylinder 2, which was recorded to be 85.34mm.



**Photo 16** 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. The bore measurement of cylinder 3 was recorded to be 85.39mm.



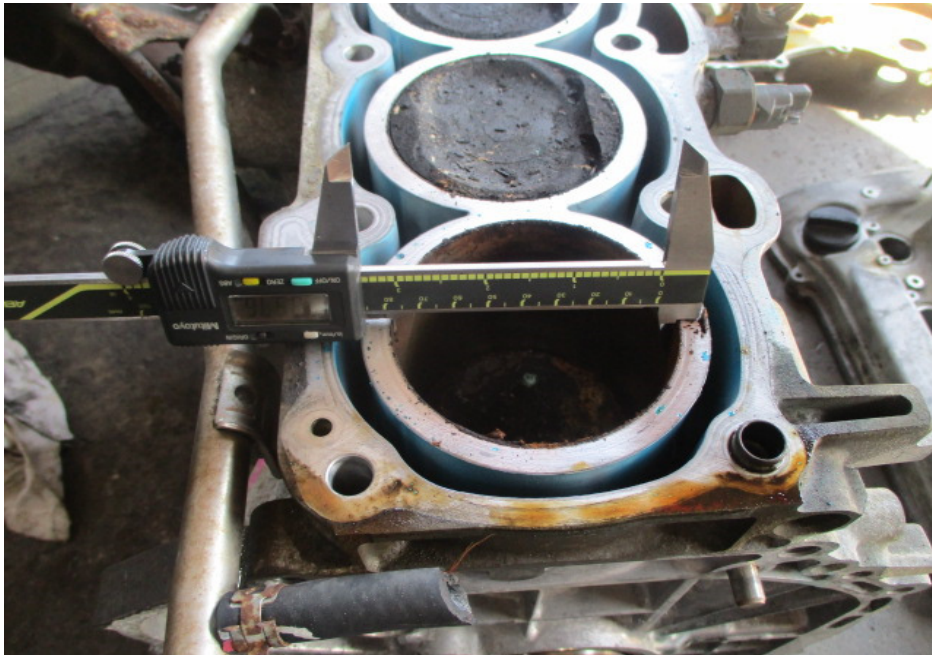


**Photo 17** shows measurement being carried out to the stroke (arrowed) of cylinder 3 of the Toyota engine. The bore and stroke measurements of the Toyota engine were carried out using a digital Vernier Caliper that was calibrated before the start of measurements.

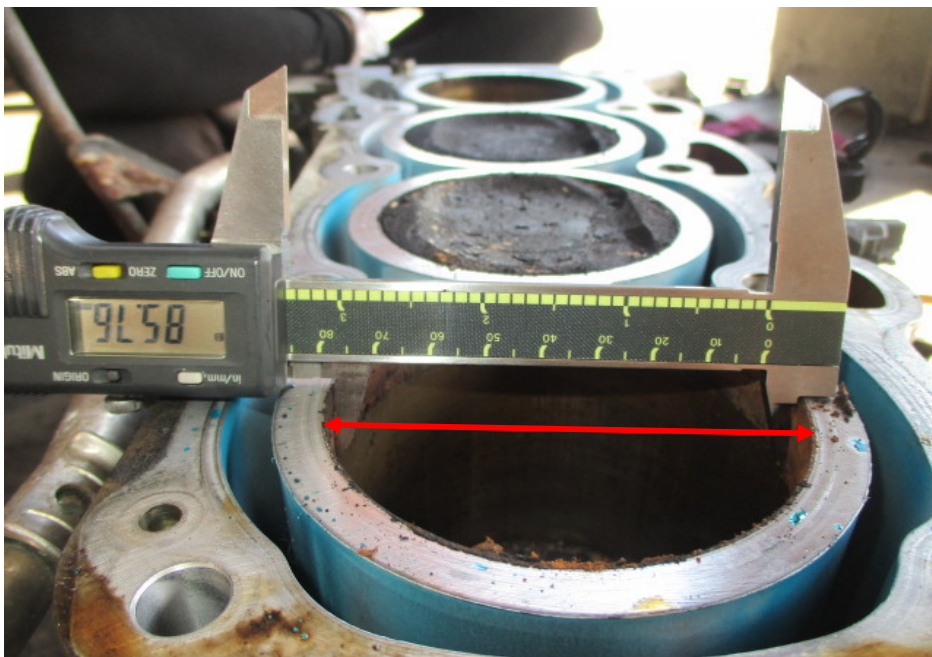


**Photo 18** shows the stroke measurement of cylinder 3, which was recorded to be 85.36mm.





**Photo 19** shows measurement being carried out to the bore of cylinder 4 of the Toyota engine. The bore and stroke measurements of the Toyota engine were carried out using a digital Vernier Caliper.



**Photo 20** shows the bore (arrowed) measurement of cylinder 4, which was recorded to be 85.76mm.



**Photo 21** 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.


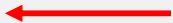
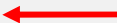


**Photo 22** shows the stroke measurement of cylinder 4, which was recorded to be 85.13mm.

## Toyota 1AZ Engine Technical Specifications

11. In order to determine whether the Toyota engine that I had inspected was a Toyota 1AZ model engine, I had compared the measurements of the bore and stroke of the Toyota engine with the bore and stroke size of the Toyota 1AZ model engine, as stated in its technical specifications. According to the technical specification of the Toyota 1AZ model engine, the bore and stroke size was 86.00mm and 86.00mm 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 size as stated in the technical specifications of a Toyota 1AZ model engine. The measurements recorded from the Toyota engine were all slightly lesser (at maximum 0.93mm 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 size of the Toyota engine had corresponded to a Toyota 1AZ model engine, the engine displacement of the Toyota engine that I had inspected would then be 1998cc. See technical specifications of Toyota 1AZ model engines below.

### Toyota 1AZ engine specs

Manufacturer	Kamigo Plant Shimoyama Plant
Also called	Toyota 1AZ
Production	2000-present
Cylinder block alloy	Aluminum
Configuration	Straight-4
Valvetrain	DOHC 4 valves per cylinder
Piston stroke, mm (inch)	86 (3.39) 
Cylinder bore, mm (inch)	86 (3.39) 
Compression ratio	9.6
	9.8
	10.5
	11
Displacement	1998 cc (121.9 cu in) 



## Conclusion

14. In summary, the Toyota engine that I had inspected was a Toyota 1AZ model engine. The engine number engraved on the housing of this Toyota engine was 1AZ3121238. The engine displacement of the Toyota engine is 1998cc as per the technical specification.



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