

**VARIOUS TYPES OF ENGINE LOSSES
(PRIVATE CAR)**

BY

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Internal Combustion Engine

Let's review about the internal combustion engine working principle.

Compression ignition cycle/Diesel engine

The air will have high temperature due to compression and spontaneously ignites the fuel spray and combustion takes place.

Spark ignition cycle/Petrol engine

A spark from spark plug will ignite the air fuel mixture and combustion takes place.

That means the has a tendency of sucking the air

What is Hydrostatic ?
How it happens ?

- ① Hydrostatic lock is a phenomenon that occurs when a vehicle's engine comes in contact with water. Water prevents the engine from starting, rendering the vehicle into a static position.
- ② When a running vehicle passes the stagnated water, the water will enter the air intake from there it enters combustion chamber. Here water is a non-ignitable element hence this will not ignite, and this will not allow to compress in the combustion chamber during the compression stroke. Then the engine stalls at the maximum compressible point, as a result of the drive force stored in the flywheel will damage the connecting rod, crankshaft and the cylinder bore sometimes.
- ③ This damage will occur within a few seconds of water ingress into air intake/ combustion chamber. Further if the user tries to start the engine, the damage would be more at connecting rod and crank case.







WhatsApp Video 2023-08-12 at 11.10.05 AM.mp4

- ⦿ Cross section video on hydrostatic lock (read water instead of coolant)



WhatsApp Video 2023-08-12 at 11.09.36 AM.mp4

How to Identify the Hydrostatic lock:

- ⦿ Check the air filter for water entry.
- ⦿ Check the water entry into the Engine by checking the oil level gauge.
- ⦿ Drain the Engine oil from the sump -check for water mix.
- ⦿ Try to rotate the crank shaft manually.
- ⦿ If the crank rotates 360°, then flushing of water is advisable. Then go for compression test. If the values are within the recommended range, then the engine is safe.
- ⦿ Counter check -Cold start of engine should be a mandate check in this case for engine idle performance.
- ⦿ If the manual cranking fails, there could be a connecting rod bend. At this stage dismantling of engine would be suggestable.



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MANUAL CRANKING.mp4

Compression test report



Compression test report



Extent of damage in case of Hydrostatic lock:

- Bend of connecting rods.
- Corrosion of injectors,
- Turbo charger blades damage and corrosion of impellor shaft
- Crank shaft may get affected due to force on shaft.
- Cylinder bore corrosion or Pitting due to water ingress
- Few of the manufacturers are providing special treatments to withstand the thermal factors.

Ex: The BMW engines are provided with electromagnetic coated cylinder walls, and BENZ engines are provided with NANO coat.

Note: This coat will increase the thermal efficiency of the engine and reduce friction. The contaminated water damages the layer very quickly. Quick flushing out the water from the engine could minimize the loss.

- If Cylinder bore damaged and if it is not supplied as a child part, then the complete engine assembly requires replacement.
- For normal engines where there is no special treatments on cylinder walls, the engine block will not damage if we take quick action. For those, replacing of connecting rods, etc is enough. It depends on case to case basis
- Sometimes for manual transmission vehicles, if we try for push start after the hydro static lock, then the bent connecting rods breaks and damages the engine block.
- The extent of damage depends on the rpm of the engine / quantity of water entry.
- Some times, the engine will be in running condition after hydrostatic lock but producing white smoke..it means, the connecting rod is bend and improper fuel combustion is taking place. Engine needs to dismantle



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Connecting rod measurement





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Bore reading



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◎ Bore reading checking




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WhatsApp Video 2023-08-11 at 6.56.56 PM.mp4

Bore report

Vehicle Reg. No. T309FN5555					
VIN: WBAJN6702LBS68739					
Engine Block, Cylinder Crankcase B48					
	Unit	Value With Tolerance			
Standard Bore Diameter	mm	84.00 mm			
Permitted out-of-round of cylinder bore	mm	0.01			
Permitted conicity of cylinder bore	mm	0.01			
		CYLINDER BORE			
THRUST SIDE		1	2	3	4
TOP	A	84.05	84.04	84.04	84.06
MIDDLE	B	84.04	84.05	84.05	84.03
BOTTOM	C	84.06	84.05	84.06	84.05
		CYLINDER BORE			
NON THRUST		1	2	3	4
TOP	A	84.05	84.04	84.05	84.06
MIDDLE	B	84.06	84.05	84.04	84.03
BOTTOM	C	84.04	84.06	84.07	84.05
					
Observation:		Cylinder bore beyond permit limit.			
Recommendation:		Replace Short Engine			

MARUTI PETROL ENGINE HYDROSTATIC



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Engine loss due to Engine oil leakage

The below stated conditions could lead the Engine seizure.

- ⦿ **Damage/ hole on the engine oil Pan due to external impact.**
- ⦿ **Impact on engine oil pan causes oil strainer broken cases**

Note : If the engine runs further in these conditions, the engine gets seized at crack shaft bearings due to lack of lubrication.



29-May-2023, 15:06









Head gasket and cylinder head mechanism damage

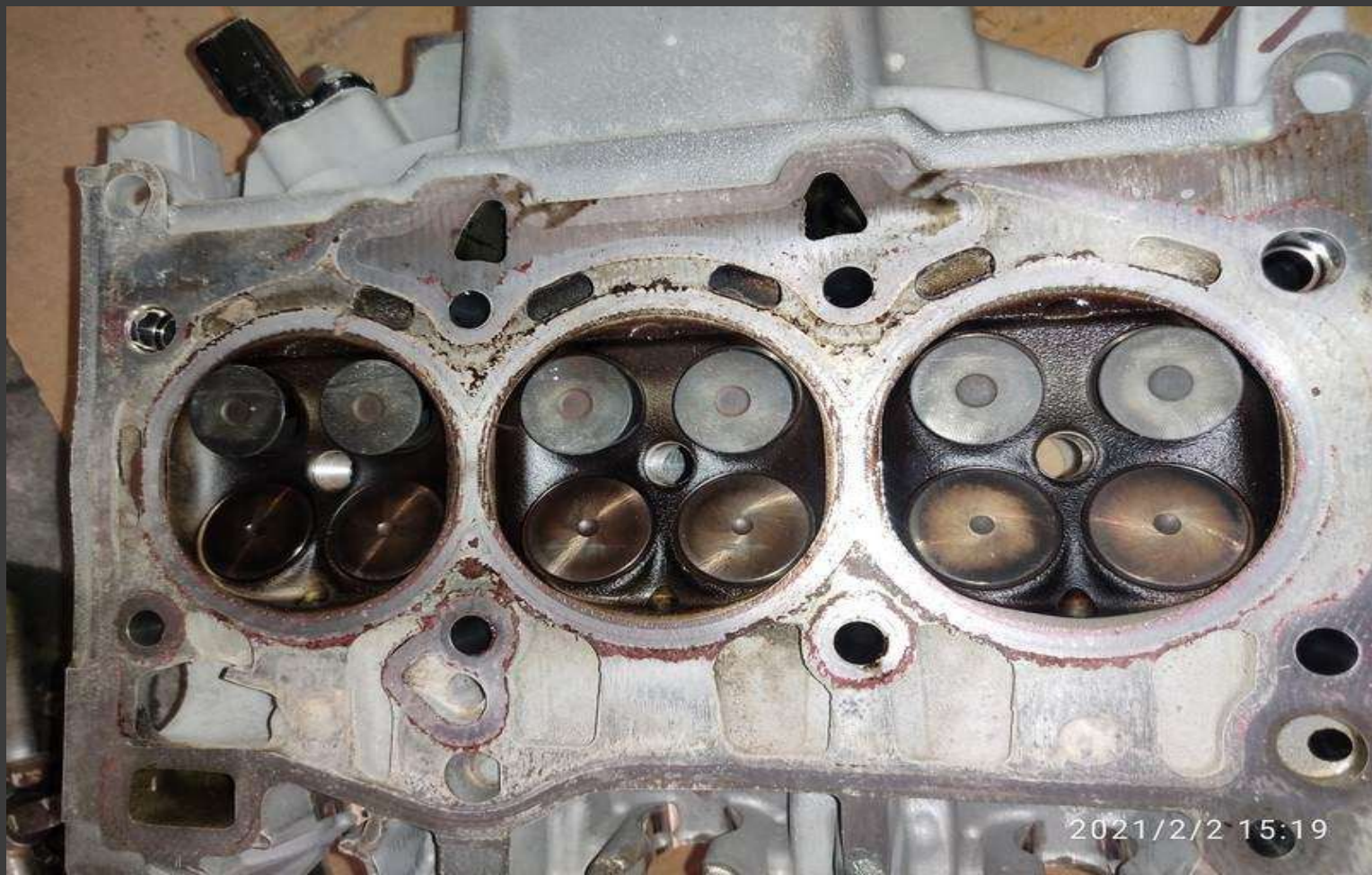
- Coolant loss due to external impact.

Note: Coolant helps pull heat away from the engine. So, without enough coolant, the engine could overheat or seize up. Continued use of an overheated engine could lead to permanent damage, such as pistons, cylinder walls, head.



● Melted due to over heat





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Vehicle rollover/ flipped Cases

- ⦿ An engine that has been flipped over may no longer have its fluids in the right places. Oil can work its way up into the top end of the engine. Brake fluid and power steering fluid is apt to leak, and automatic transmission fluid too.
- ⦿ If engine is in start condition, the engine oil will enter into combustion and that leads to damage.



Jul 5, 2022 16:59:10







Using inferior coolant/pouring coolant in the engine oil port.

- ⦿ The cooling will not be up to the mark as specified by the manufacturer and causes over heat of the engine. Head gasket will be affected.
- ⦿ **Pouring coolant in the engine oil port.**
- ⦿ The coolant mixed oil's efficiency will be reduced. Some times lubrication with coolant some times with coolant mixed oil. This cause over heat and seizure of the engine at crank shaft bearings.
- ⦿ If the oil strainer is of plastic component, the strainer will melt and no lubrication will be there





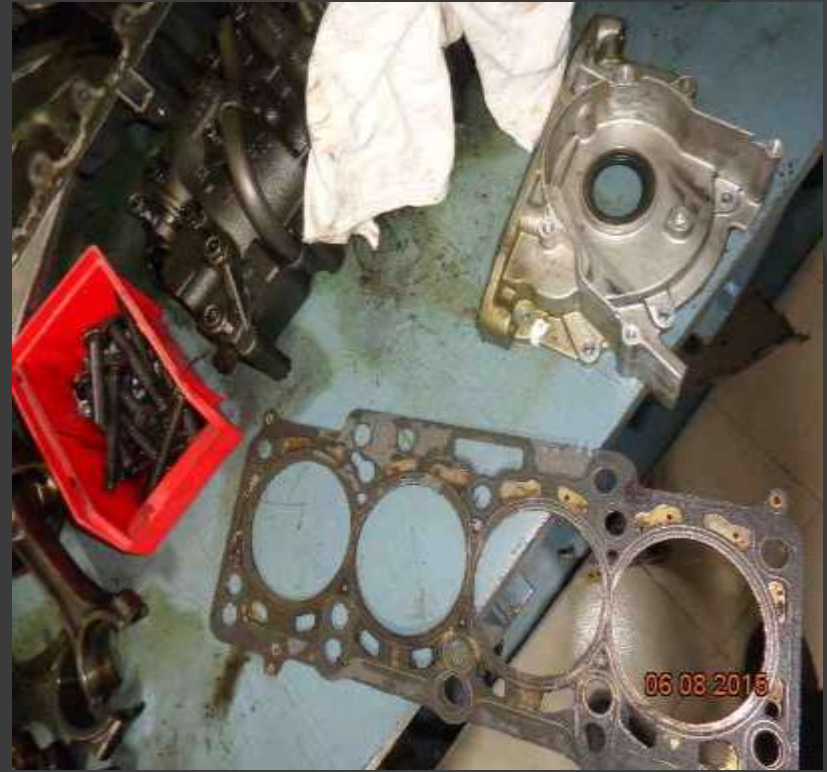


Colour of Audi coolant





06 08 2015





Case study....engine block

- Petrol engine....bent connecting rod tapped the edge of engine block
- We need to check the extent of damage
- How far it is located from BDC
- In few cases, the impact will not be up to BDC/no effect on the compression...we can use the same block if cylinders walls are fine.



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General information

- Q. After the hydrostatic lock, tried for cranking....resulting bend of connecting
- A. No..bendix of starter is designed to rotate the engine when it is in normal condition....the bendix will not have that much power to bend the connecting...finally the starter fails
- Q. When we try for cranking of petrol engine after hydrostatic lock, block breaks with broken connecting rod
- A. NO. The petrol engine is a spark ignition engine. The piston and connecting rods are not that much strong as diesel engines...so the connecting rod breaks and damages instantaneously.

Engine block damage due to impact/by drive shaft/breakage at mounting

- ◎ The drive shaft will dislocate and damages the engine block...in such cases, replacing of block with child parts like gasket kit, piston rings, etc.
- ◎ Now a days, the short block is economical than the child parts..we need to check the parts catalog

BROKEN BLOCK/CRANK CASE



BROKEN PIECES IN THE SUMP



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BROKEN CRANK CASE



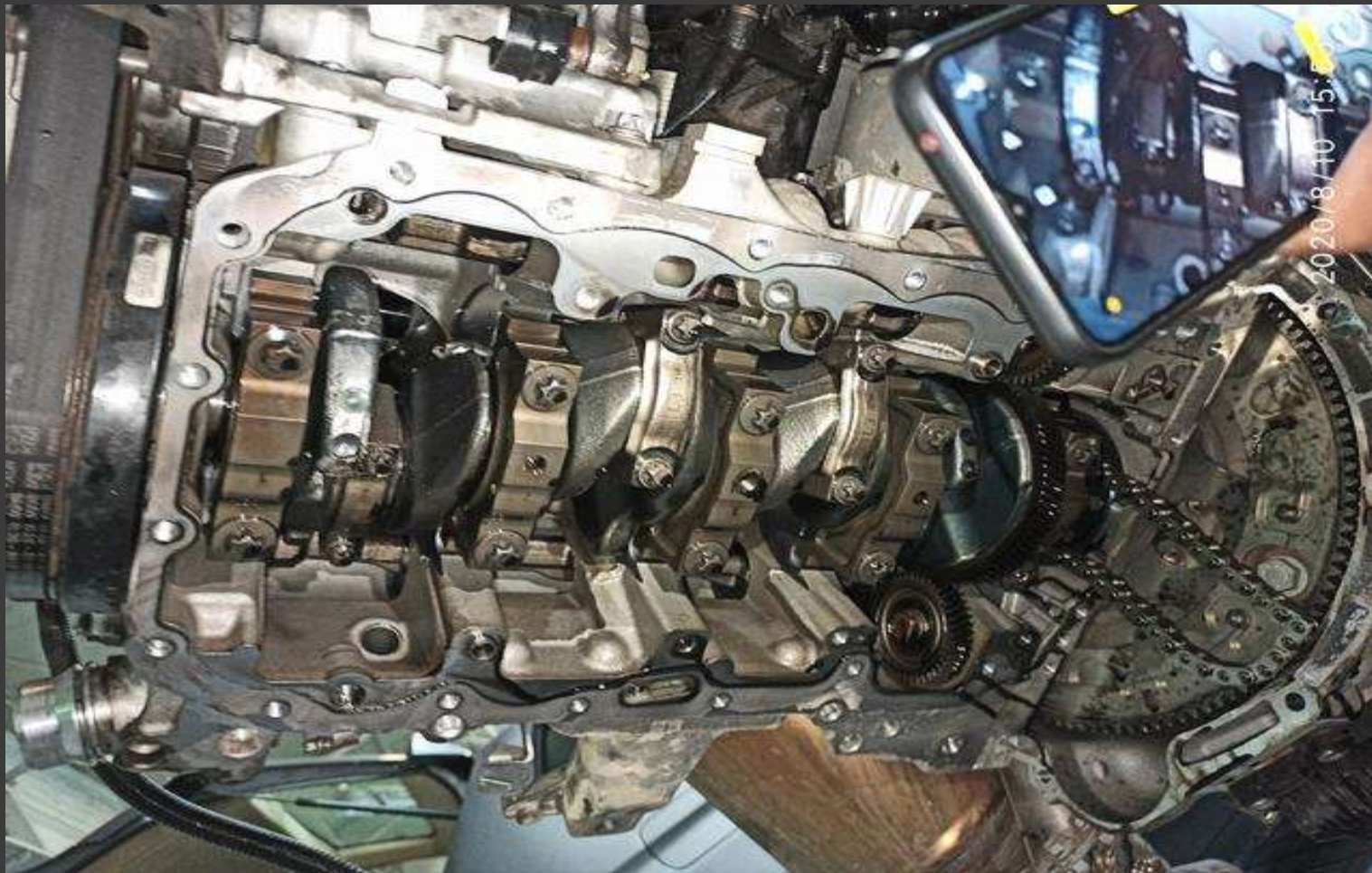
Hydrostatic lock engine delivered without proper checking.

- ⦿ A hydrostatic lock engine flushed and delivered without checking properly
- ⦿ The engine will run smoothly up to certain rpm/up to sustainable rpm and internal damage will occur...like breakage of piston/breakage of connecting rod/engine bore scoring

Broken piston pieces



Bottom view



Cylinder block



Cylinder bore



PISTON BROKEN



Thank you