

Session 1 - machine workshop

Time : 13:30

Date : 01/10/19

Technician : David

First session will be a introduction session to introduce ourselves to the workshop staff

- Aims :
- Learn who the technicians are
 - Understand basic Health and Safety
 - Know how to safely operate the machines

Health and Safety

- Firstly the basic PE (protective equipment)
 - Boots
 - overalls → provided every session
 - goggles → provided every session
- Before any work can be carried, barrier cream must be applied to your hands to protect the skin pores in the hands, for example oil staining the skin

- Remember to sign register for attendance
- Machine walk through
 - Lathe
 - Milling
 - Pillar drill

• Lathe

- Before using, check oil level
- *NOTE ANY DAMAGE ON THE EQUIPMENT*
- Far end of the lathe there is a nose taper where you can put drill bits or active centre
- A Chuck is a tool that is tighten or loosen your work piece in the lathe

• Milling

- It has got 3 axis
 - X - up and down
 - Z - left and right
 - Y - forward and back
- The axis are shown on the DRO
- It has a vice
 - make sure the vice is flat
 - gage - 2 layers on the bottom to make sure it is liner
 - adjust the Y-axis to make it level
 - tighten the vice
- All machines won't turn on unless safety visor is over the machine
- make sure everything is tight
- make sure cutting tool is in line with the material

• Pillar drill

- make sure everything is tightly secure
- Before using, make sure the guard is over the machine
- Tighten the work piece with a G-clamp
- For safety, must feed the lever back up after cutting/drilling, if not it will bounce back up
- Red button is for emergency stop.

Session 3 - Engine Workshop

Time : 13:30

Date : 26/11/19

Technician : Barry

The 3rd session is after the team disassembled the Engine in session 2

Aims :

- Measure components from the zetec engine

- Piston

- Valves, etc

- Calculate the actual Cubic Capacity of the engine (cc)

- Reassemble the engine

- First - Health and Safety requirements are met as for all previous sessions

- The team/group made use of the Sheet Barry supplied and filling it out.

- I am taking notes of all the required measurements (take photo and add it at the end)

- Reassemble the engine

- I connected the piston and rod to the Crankshaft

- After doing this I am aiding the group to fit it to the cylinder block

- Group fits the cylinder block assembly to the crankcase and I screw the bolts to connect
* 1 missing bolt *
- Valves are fitted to the cylinder head and connected to the head gasket
- Fitted to the cylinder block
* I went for a break while others continued on the engine
- When I returned I aligned the timing belts and tensioner
- member of the team fitted the water pump
* End of Session

Throughout the sessions I learned a lot about all components of the engine. In session 1 and during this session, I learned how to rebuild an entire engine (excluding wiring). I also learned how to measure the CC of an engine.

Next session is about gearboxes

TEAM 3.

018 Workshop Zetec Engine Measurements

Engine part to be measured	Measurement (mm)				
	CYL 1	CYL 2	CYL 3	CYL 4	
4 Piston crowns	78.43	78.42	78.42	78.37	
4 Piston skirts	79.00	78.94	78.99	78.93	
5 Main crankshaft journal diameters	1 2.95	2 3.05	3 3.02	4 3.04	5 3.07
4 Big End Journal diameters	1 /	2 /	3 /	4 /	
Thrust washers on main bearing 3	1.87		1.83		
All Cylinder bore values	1 78.86	2 78.68	3 78.76	4 78.61	
Cylinder 1 stroke (using cyl.2 on TDC)					
All Main bearings (both halves)	1 48.10	2 48.08	3 47.97	4 48.20	5 47.98
	1 44.11	2 44.01	3 44.09	4 44.09	5 /
All Big end bearings (both halves)	CYL 1 1.5	CYL 2 1.53	CYL 3	CYL 4	
	CYL 1 1.53	CYL 2 1.52	CYL 3	CYL 4	
Actual engine cubic capacity (cc) Using equation below	1610				cc
Inlet valve spring free length	48.16 mm				
Inlet valve stem diameter	5.97				
Inlet valve head diameter	28.83				

Engine cc equation:

$0.7854 \times \text{bore (cm)} \times \text{bore (cm)} \times \text{stroke (cm)} \times \text{number of cylinders} =$

$$0.7854 \times (7.86) \times (7.86) \times (8.3) \times 4 = \text{actual cc}$$

Guest lecture - Bloodhound

Time : 13:00

Date : 27/11/19

Presenter : Dr Ben Evans

- The Bloodhound LSR project began in 2007
- Dr Ben Evans has a PhD in CFD and is the head of aerodynamics for the Bloodhound
- Right now the Bloodhound is the 3rd fastest car in the world with aims of reaching 1000 mph
- The team have just come back from South Africa after testing the Bloodhound - to see what speed it can achieve
- CFD modelling - by Dr Ben Evans using CFD he can adjust the model on the software to see if theoretical improvements are made
- To test reliability of the software they test the bloodhound data and compare it to the theoretical data (and give 5% tolerance)
- Engine is made by Rolls Royce
- over the years it has had problems
 - Administration
 - Suspension on the rear

- To stop the bloodhound, they can't use the brakes at high speeds, to slow it, they use drag from a parachute and the wheels
- Future plans for the project is to put another engine on the rear to increase the top speed
- Potentially install a battery power system to aid the engine for environmental reasons
- Do more public testing to potentially gain more sponsors - To increase finances.

After the guest lecture, this has made me more interested in the aerodynamic field of the industry.