Chetak

PROJECT TITLE :TO *ELIMINATE REWORK AT CYLINDER HEAD TAPPET SETTING*

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IIT(ISM) Dhanbad

M.TECH , (MECHANICAL,MACHINE DESIGN)

Subject matter:Currently additional manpower is required for KTM engine assembly tappet clearance adjustment.

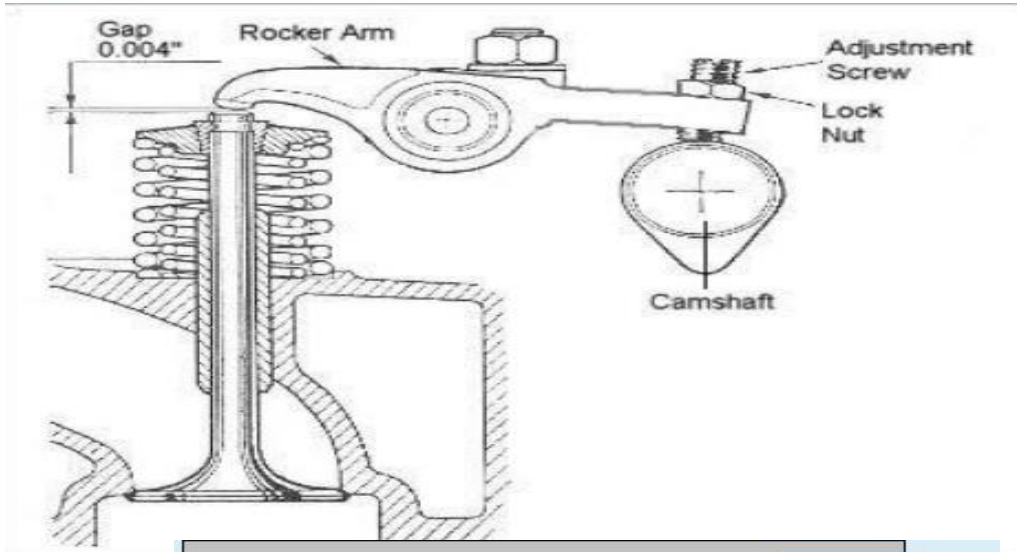
There is variation in shim values shown by machine at cylinder head sub assembly & manual confirmation of shim values with filler gauge after cylinder head fitment stage.

BASIC CONCEPT

Tappet clearance : The gap maintained between cam & rocker arm when engine is in cold condition and piston at TDC.

If tappet clearance is less:

1. Valve will open early & close late.
2. Air induced through inlet valve may leak out. So less air for combustion.
3. Power will be reduced.

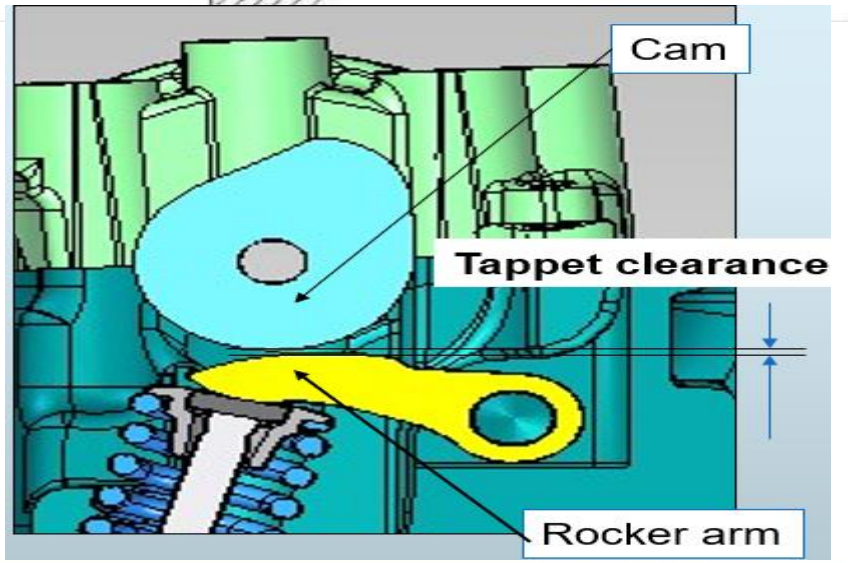


Purpose of tappet clearance

1. To allow for some mechanical expansion and lengthening of the valve stem and push rods as the engine warms up.
2. To facilitate in making of lubrication film in-between rocker arm and cam

If tappet clearance is more:

1. Valve will open late & close early.
2. Lesser scavenge air -No proper removal of gases & hence less power.
3. **Hammering of valve stem-may cause damage to valve stem & resulted noise is called as Tappet noise.**



PROCESSES INVOLVED

Process followed

C'Case-LH Sub-Assembly

- ❑ Bearing Pressing
- ❑ Oil seal pressing
- ❑ Engine No. Punching
- ❑ Sealant Application
- ❑ Oiling/Greasing
- ❑ Plug Pressing
- ❑ Thread Tightening
- ❑ Oil path Continuity Check

C'Case-LH Sub-Assembly

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Cylinder Head Sub-assembly

- ❑ Valve insertion
- ❑ Stem seal press
- ❑ Collet assly
- ❑ Collet locking
- ❑ Collet Inspection
- ❑ Tappet Setting
- ❑ Shim selection
- ❑ Leak testing

Cam shaft Sub-Assembly

- ❑ Bearing Pressing
- ❑ Washer Insertion

Crank Shaft Sub-Assembly

- ❑ Bearing Pressing
- ❑ Crank Pin Press
- ❑ Cr'Shaft LH/RH Assly
- ❑ Runout cheking
- ❑ Leak testing
- ❑ Group marking

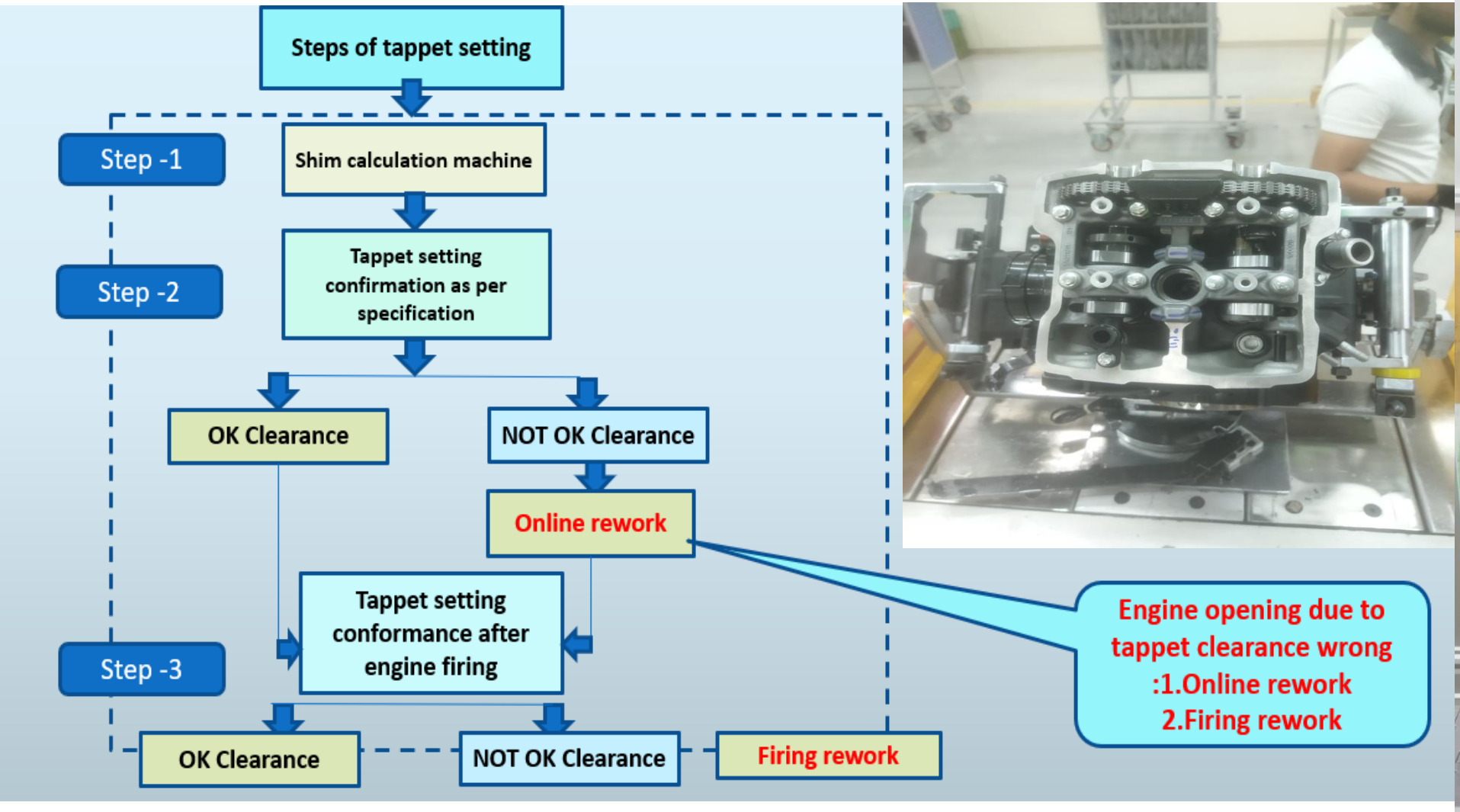
Body Balancer Sub-Assembly

- ❑ Bearing Pressing
- ❑ Sleeve Pressing

Engine Testing

- ❑ Leak Testing
- ❑ Engine Firing
- ❑ Torque Checking
- ❑ Speed Checking
- ❑ Noise Level
- ❑ Vibrations
- ❑ Gear Change Operation
- ❑ Clutch Operation

Chetak STEPS FOLLOWED



Chetak STEPS AT SHIM MACHINE

Operator assembles the respective Master Shim on the cylinder head

Operators load and locate the Cylinder head and Camshaft with Cam Cover Manually on the Fixture

The Operator Authorizes Cycle Start.

The Swing Clamp (Pneumatic) clamps the Part; The Top Clamp (Hydraulic) Slide Clamps the Cam cover with Camshaft

The Bottom Probe take reading1.

The Top Clamp (Hydraulic) Slide descends and Clamps the Cam cover with the Camshafts.

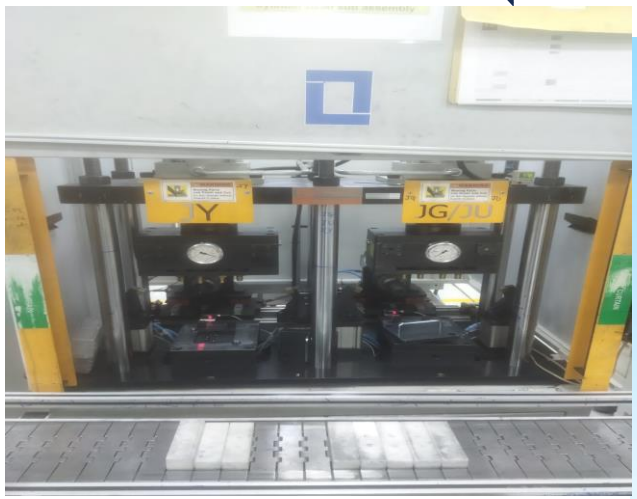
The Bottom Probe takes Reading 2.

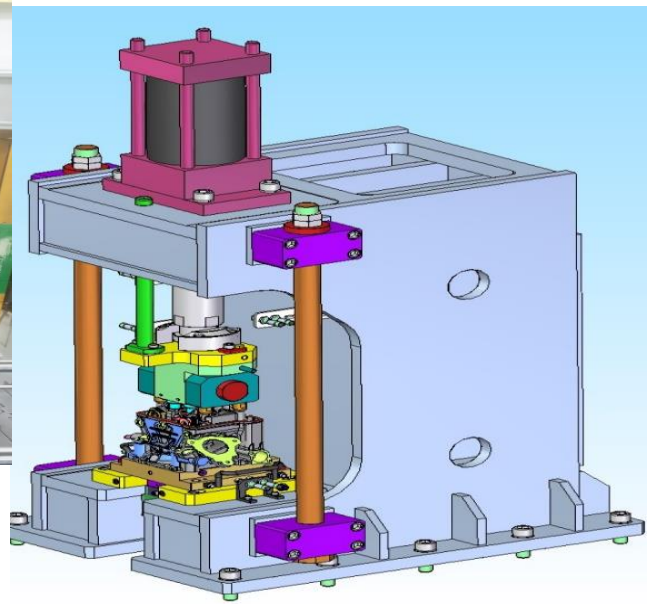
Top Clamp Slide Retracts. (Hydraulic)

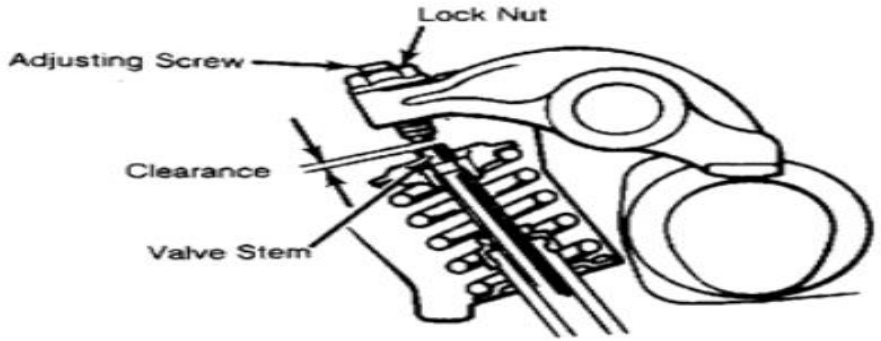
The Head Clamp Slide Retracts. (Pneumatic)

The System Calculates the Shim Size and Displays on the HMI

Operator Manually unloads the Part and assembles displayed Shim.







Chetak SHIM CALCULATION

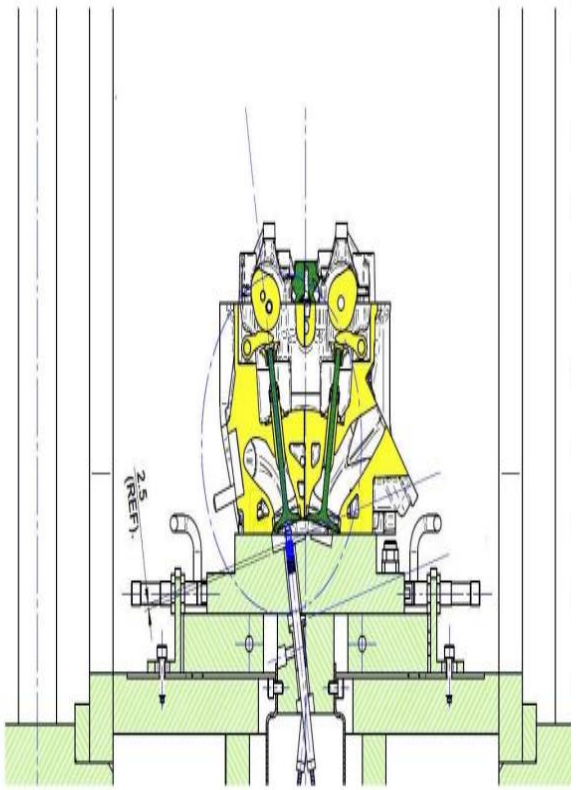
The formula for Shim Calculation:

Shim Size = Master Shim – (R2-R1) – Gap - Constant

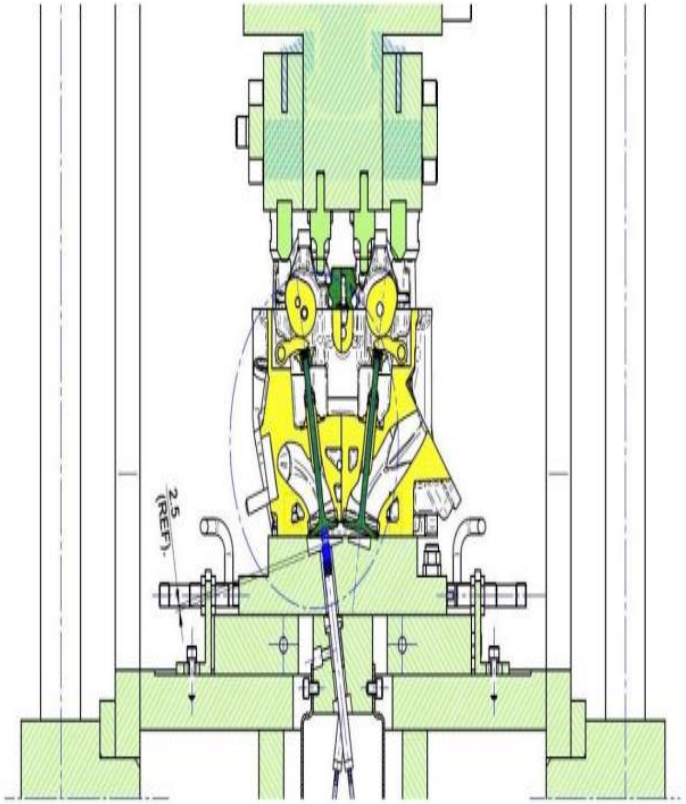
Note:

1. Master Shim is of Maximum size to ensure that there is NO Gap B the Base Circle and the Rocker
2. Gap (Separate for Intake and exhaust) is the required Gap to be maintained between the Base Circle and the Rocker
3. Constant can be Positive or Negative and used for adjustment; th separate for intake and exhaust

Reading – 1 Position



Reading – 2 Position



- **System Description**

The Automatic Shim Selection System is designed to consist of the following systems.

- ***Cam Cover Clamp (Hydraulic)***

This is a Hydraulic slide that is capable of moving @ 37.5 mm/sec. This slide is used to move the Top Clamp to Work and Home Position.

The End positions "Work " and "Home" are sensed with the help of Proximity Sensors.

Specifications

Stroke: 150 mm

Bore: Ø125 mm

Max Speed: 37.5 mm/sec

- ***Head Clamp (Pneumatic)***

This is a pneumatic slide that is capable of moving @ 150mm/sec. This slide is used to Clamp the Part on the Fixture.

The End positions "Home" and "Work" are sensed with the help of Proximity Switches.

Specifications

Stroke: 40 mm

Max Speed: 150 mm/sec

- ***Head Clamp (Pneumatic)***

This is a pneumatic slide that is capable of moving @ 150mm/sec. This slide is used to Clamp the Part on the Fixture.

The End positions "Home" and "Work" are sensed with the help of Proximity Switches.

Specifications

Stroke: 40 mm

Max Speed: 150 mm/sec

- ***Hydraulic Power Pack***

The hydraulic power pack is used to control the Top Clamping Slides.

Specifications

Motor Rating: 3.7KW,

Current: 7.4A,

Voltage: 415 VAC, 3 Phase,

RPM: 1445 RPM.

- ***Keyence Probes***

Keyence GT2 Probes are used with CC-Link Interface to measure the Valve Displacement.

Specifications

Item Code: GT2 -12mm Stroke Probe with Pneumatic Push

GT-2 probe -12mm Displacement.

Communication CC-link Module DL-CL1

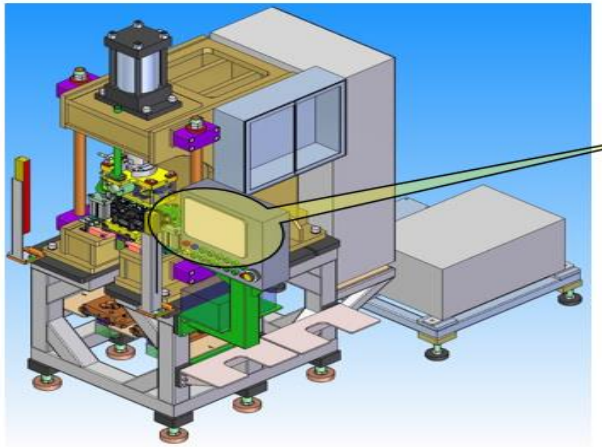
Amplifiers GT2-550 (Main) & GT500 (Sub)

Accuracy: 2µm

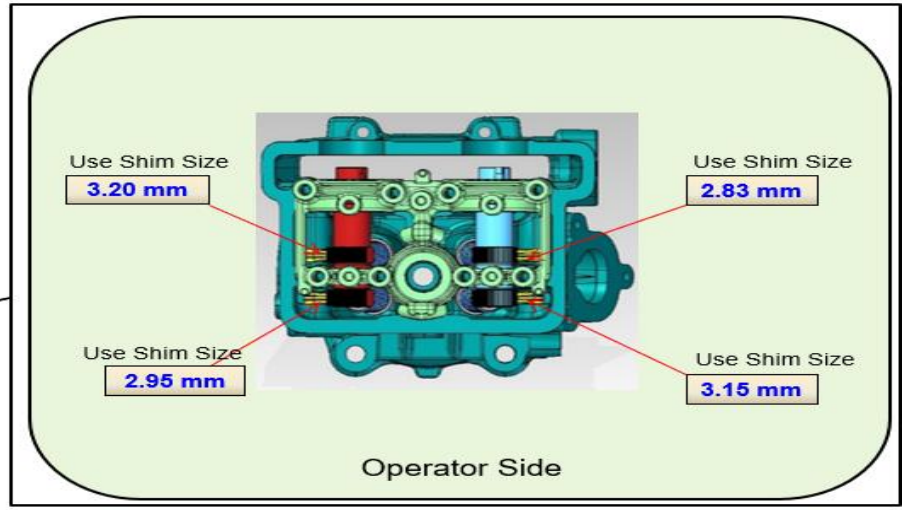
Resolution: 0.5µm

Operating Requirements :

The system requires electric power (3 phase with Ground, 415 VAC, 7 KVA), regulated within +/- 10%. The air requirement is 600 LPM at 5 bar (minimum), clean (10 micron filter) and free of condensation.



Display For Identification Of Shim Sizes & Locations



- **Functions of Operator Panel**

- **Mode Selector Switch**

This is as two position selector switches; One can select Automatic and Manual mode from the Operator Console.

With Manual mode you can perform all Manual Actions of the slide through HMI; You can also select the appropriate Program for component type from the HMI.

With Automatic mode you can perform Automatic Cycle by pressing Cycle start Pushbutton on the console.

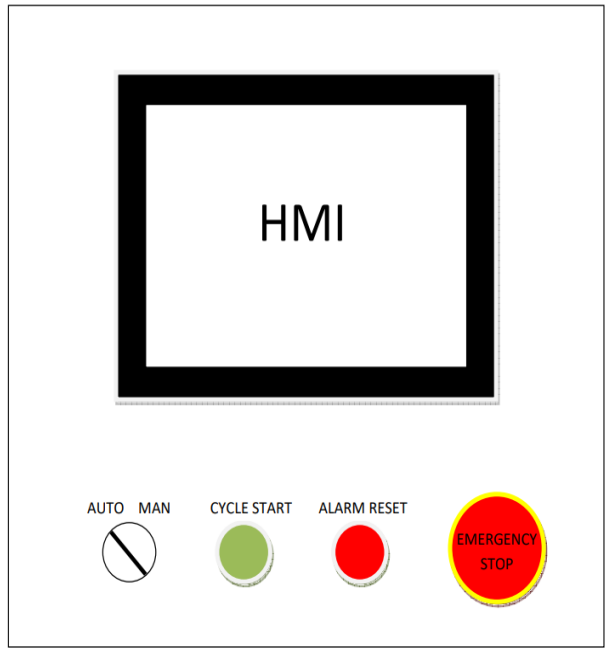
- **Emergency Stop**

This is Red Mushroom Head Push Button; This can be used to stop the sequence at any stage.

One can restart the cycle by pressing the Reset Push button and then pressing cycle start to restart the cycle.

The Emergency Stop Push button de-energizes the power from the actuators.

The Emergency Stop Button has been hardwired with Power On Contactor



- **Cycle Start**

This is the momentary Green Illuminated Push button to activate automatic operation of the system.

Operator has to press this button once after clearing the errors and emergency conditions and also after placing the part at the fixture.(When the cycle start push button is flashing)

The Automatic Mode Lamp will be lightened after the cycle has been started.

- **Tower Lamp**

The Tower lamp Indicated the status of Machine.

Green Lamp on Steady: Cycle Running

Green Lamp Flashing: A waiting Operator Authorization/ Cycle Start

Red Lamp Flashing with Buzzer: Alarm Present

Startup Sequence

- **Pre-Power up Checks**
- **First Time Power Up Checks**

1. Ensure that there is no physical damage to the system.
2. Check that all components inside the control panel are in good condition.
3. Tighten all components mounting screws.
4. Tighten all electrical connections inside the panel.
5. Check that the panel isolation switch is OFF.
6. Switch off all MCBs in the control panel.
7. Confirm that there is no short circuit at the three-phase terminals of the control panel.
8. Confirm that there is no short circuit at 24V DC power supply output.
9. After conforming above point switch on all MCBS in the control panel.
10. Keep the EMERGENCY STOP button on the control panel in OFF condition.
11. Turn ON the panel isolation switch and press the RESET push button on the operator console.
12. After the controller is booted, check that no alarm has been generated.

- **Before Starting the System**

Check for the following.

- The air supply is ON, and the dial OR pressure switch on the FR unit is showing 5 bar or more pressure.
- FR unit is free of condensation and dirt.
- FR unit contains the lubricant required.
- There are no visible obstructions in the robot working area.
- There are no visual damages on the automation system.

- **System Power Up**

On satisfactory completion of these checks, start up the control system by turning ON the main isolator switch provided at the side of the control panel to the ON position.

Line 1 :- Process flow for tappet setting

Operator 1

Intake Set

- Feeler gauge between the two valve stems and the tappet screw
- Tighten the screws using the ratchet tool.
- Check the looseness/ tightness of the feeler
- Torque tighten the nuts

Exhaust Set

- Feeler gauge between the two valve stems and the tappet screw
- Tighten the screws using the ratchet tool.
- Check the looseness/ tightness of the feeler
- Torque tighten the nuts

Operator 2

Check

- Check the feeler gap for all the four gaps.

Correct

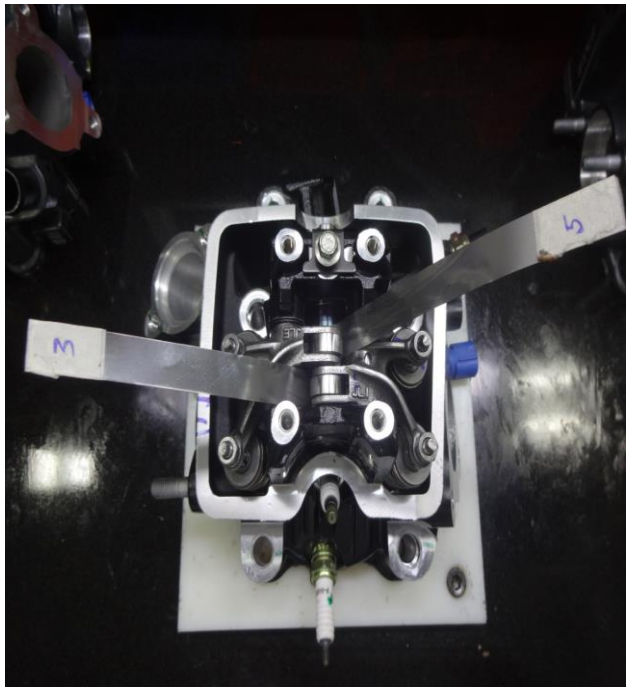
- Individually correct the feeler gaps according to the values obtained to the requirements

Torque

- Torque the nuts to the specified torque

Check

- Final Check for the feeler gap and confirmation. Repeat the process for improper valves.



Chetak OBSERVATIONS

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GENERALLY,

- Intake tappet is (0.02-0.2)mm
- Exhaust tappet is (0.05-0.3)mm

Conveyor A (manual)	Conveyor B (robotic)
KT26,JY,KT10,TRIUMPH	JU,JG,KT23,KT25,KT26

MODEL	NO. OF CAMSHAFT USED
JU/JG/JY/KT10/KT26	DOUBLE(DOHC,4 LOBES)
KT23/KT25	SINGLE(SOHC,2 LOBES)

MODELS	RANGE OF SHIM VALUES TO BE SHOWN BY MACHINE(in mm)
JY/TRIUMPH/KT26	2.16 to 2.70
KT10	2.4 to 3.12
JU/JG	2.7 to 2.8
KT23	2.40 to 2.60
KT25	2.30 to 3.12

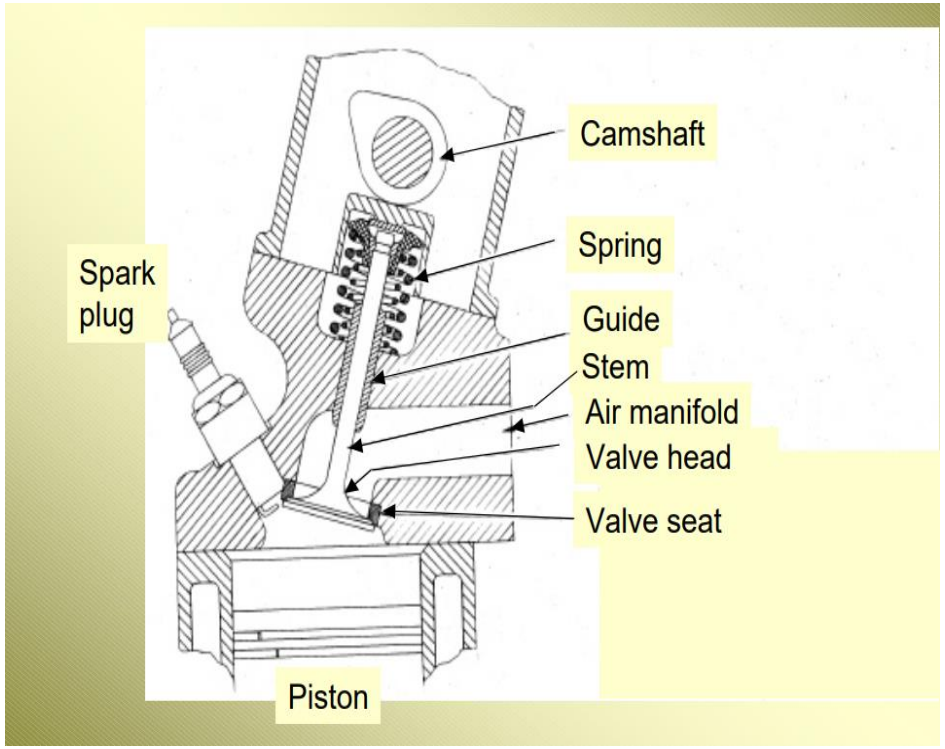
Chetak KEY NOTES

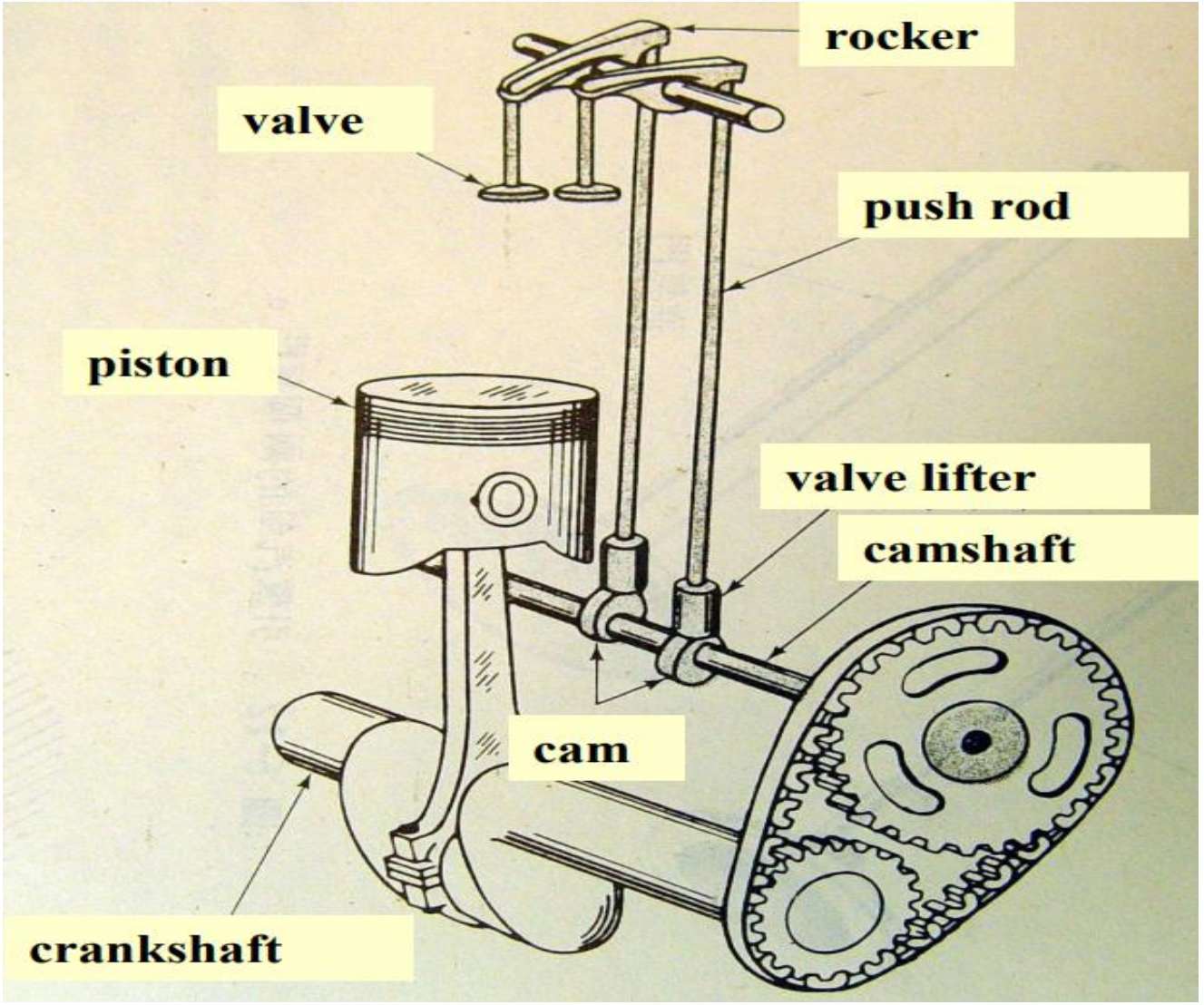
MODEL	MASTER SHIM (mm)
KT26/KT10/TRIUMPH	3.50
JY	3.02
JU/JG	3.54
KT25	3.54
KT23	3.00

INTAKE SIDE	EXHAUST SIDE
GO gauge (90 micron)	GO gauge(140 micron)
NO GO gauge (130 micron)	NO GO gauge (180 micron)

MODEL	CC (cylinder capacity in cubic centimeter)
JU	DUKE 200 (GEN 2)
JY	DUKE 390/ADV 390 (GEN 2)
JG	DUKE 125 (GEN 2)
KT10	ADV 250/DUKE 250 (GEN 2)
KT23	DUKE 125 (GEN 3)
KT25	DUKE 250 (GEN 3)
KT26	DUKE 390 (GEN 3)

Chetak SCHEMATIC DIAGRAM





Chetak UNDERSTANDING THROUGH IMAGES

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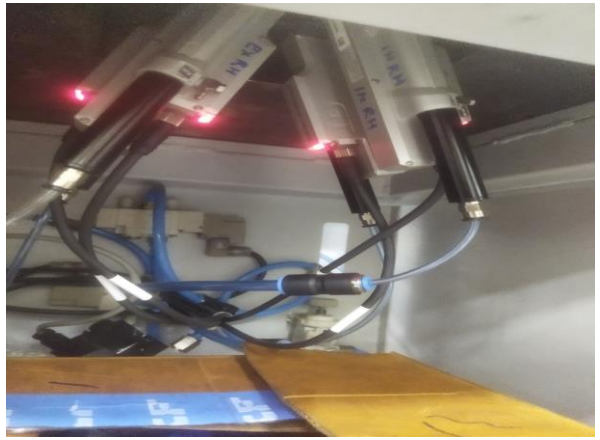
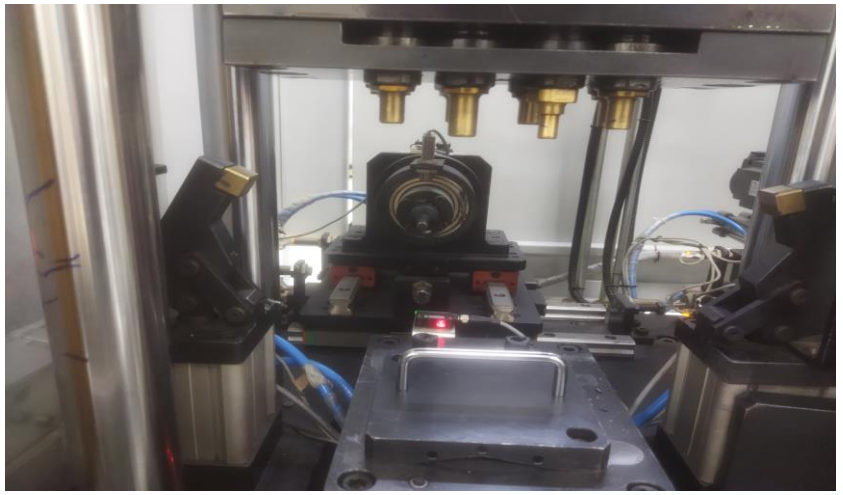
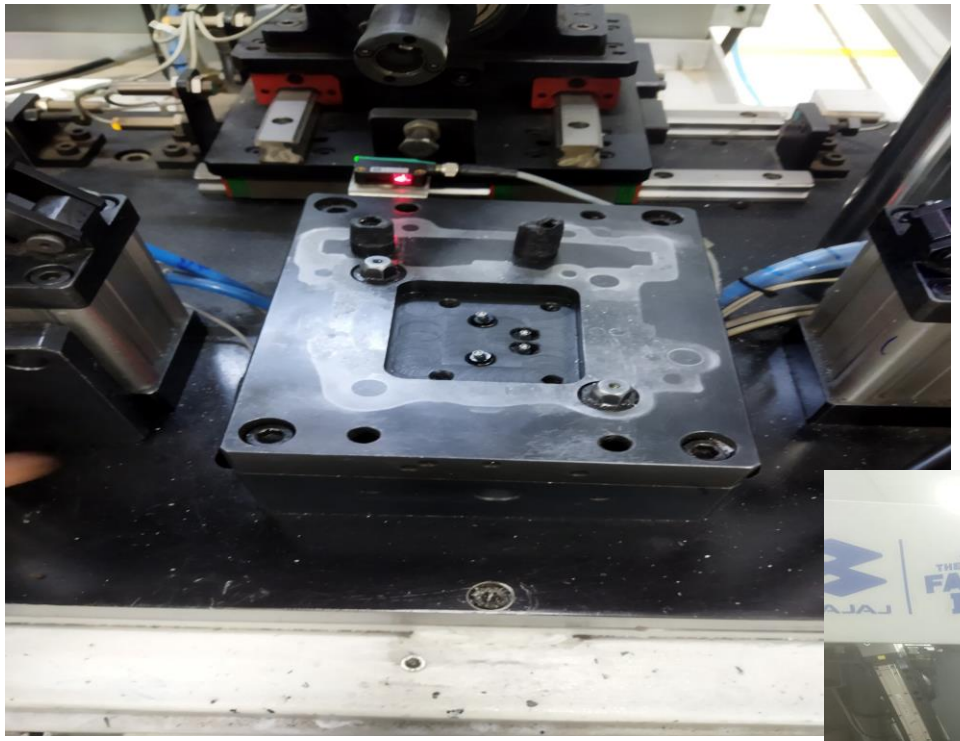




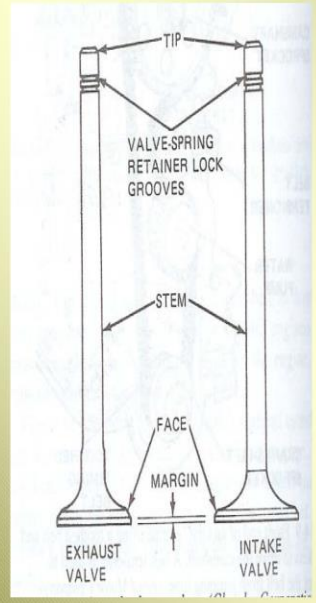



THE WORLD'S FAVOURITE INDIAN

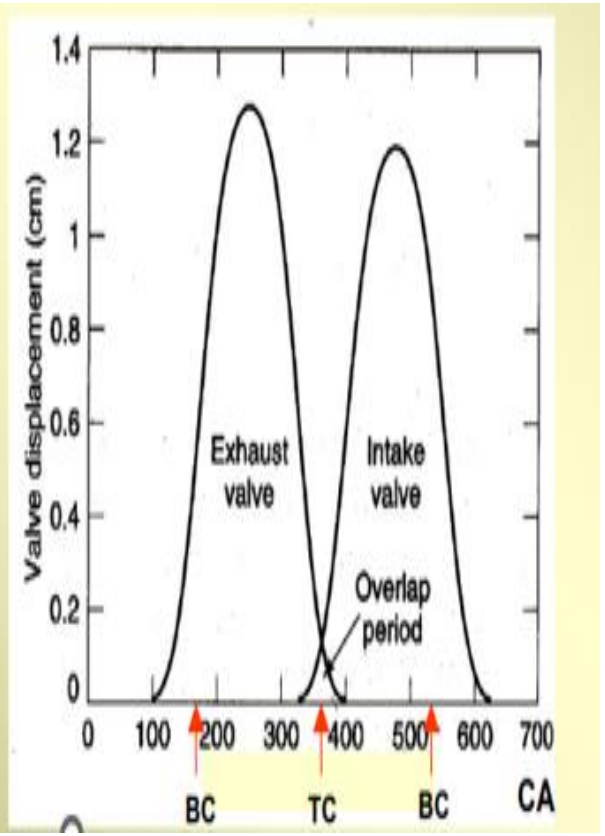

Production Plan SG-1
Total Loss
Actual Qty
Expected Qty
Shift Plan
174
21
195
480
Plan Qty
Next SKU
Qty (Plan/Actual)
Current SKU
0
48 / 17
KT10
RUNNING MODEL : Adv 250
Hour
Plan
Actual
Loss
Loss Reason
Total Production : 219
Total Loss : 71

- INTAKE VALVES ARE LARGER THAN EXHAUST VALVES
- PRESSURE DIFFERENCIAL ACOSS INTAKE VALVE < 1 ATMOSPHERE
  WHILE IT IS > (3,4) ATMOSPHERE FOR EXHAUST SIDE

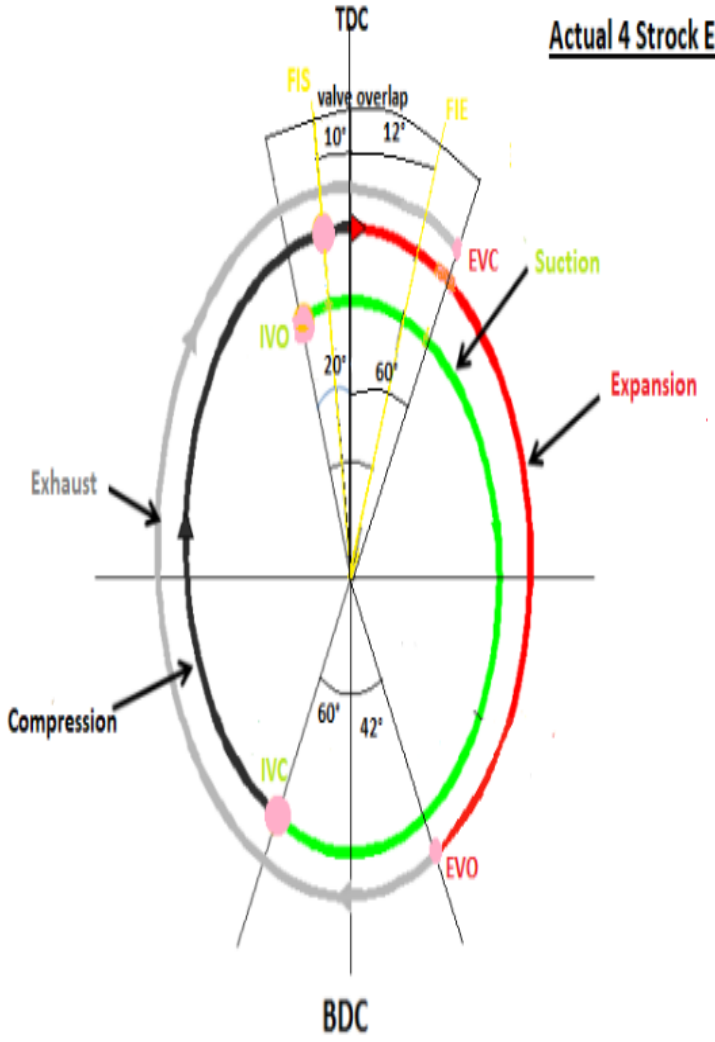
Poppet valves



The poppet valve is so called because it pops up and down. Also, known as mushroom valve as the valve head looks like a mushroom.



Actual 4 Strock Engine Valve Timing Diagram



TDC- Top Dead Center
BDC- Bottom Dead Center
IVO- Inlet Valve Open
IVC- Inlet valve Close
EVO- Exhaust Valve Open
EVC- Exhaust Valve Close
FIC- Fueloil Injection Starts
FIE- Fueloil Injection Ends

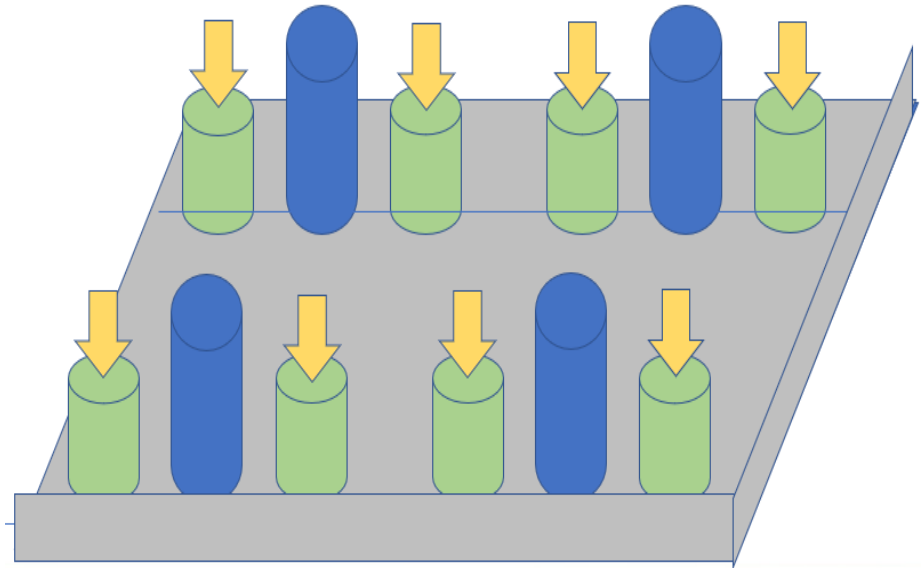
Chetak FORCE CALCULATIONS

- Tightening torque for 8 holding bolts= 0.9 kgm
- We know that, T=C*D*F

Where, T=tightening torque

C=nut factor (0.2)

F=axial clamping force , Cam Holder Clamping Force = Final clamping force in Engine Assembly



F=T/(C*D)

D=6mm,CD=0.0012m

F=7389.521N=753.26kg

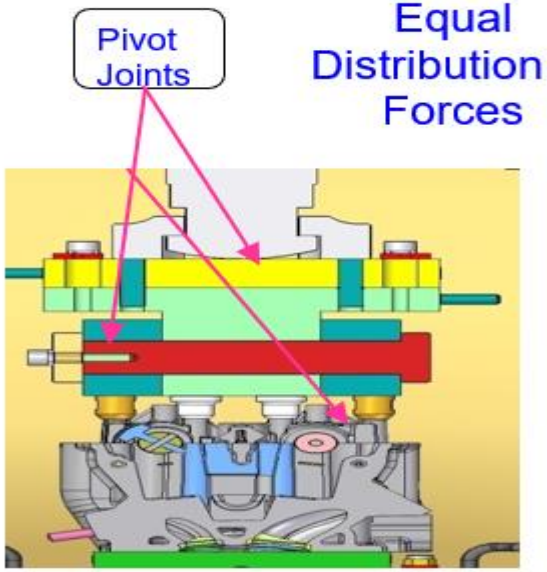
Dia. Of cylinder =30mm

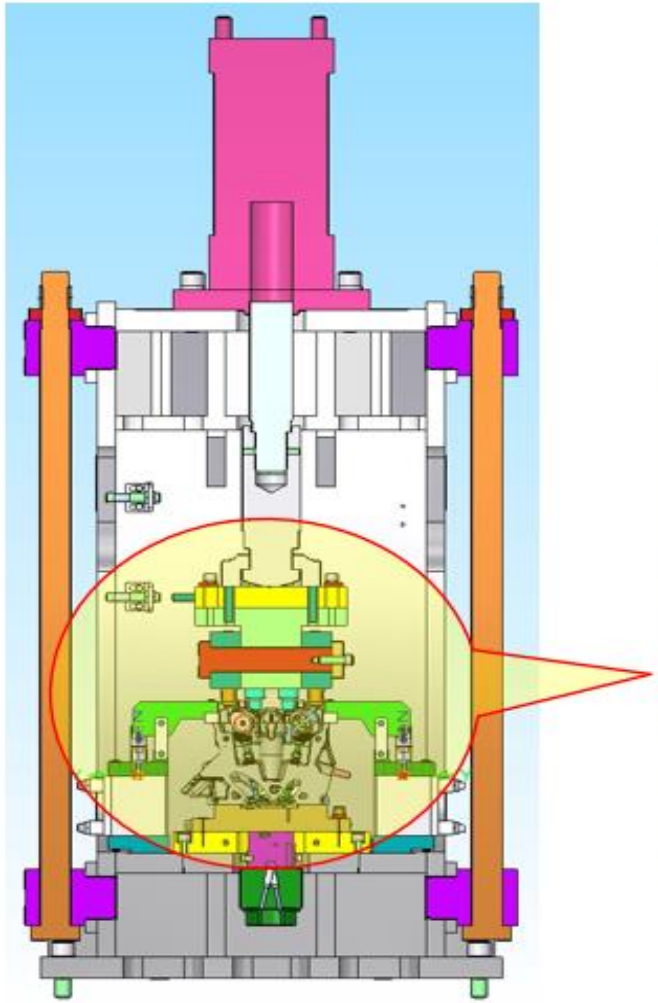
Area=3.14*(0.03^2)/4=7.0685cm^2

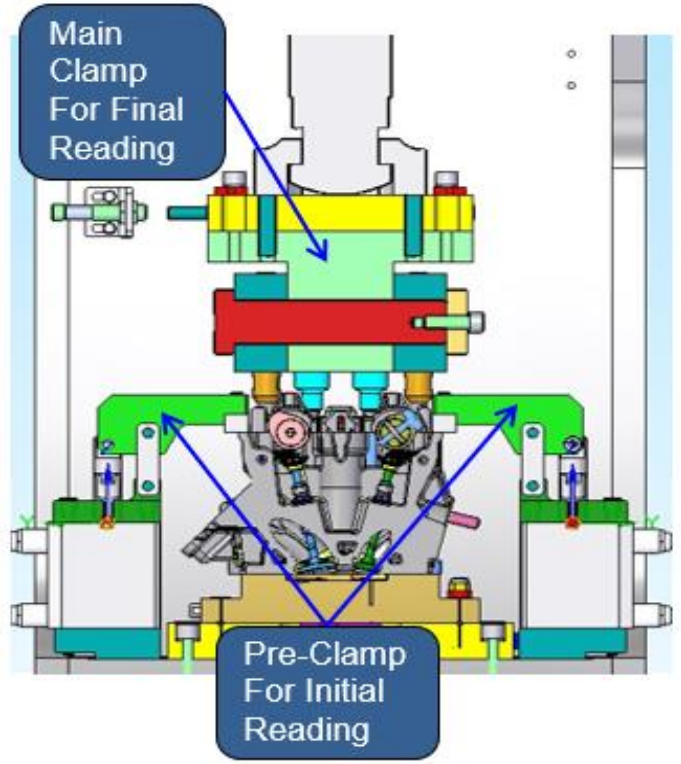
Pressure required in 30mm cylinder =753.26/7.0685=106.57kg/cm^2

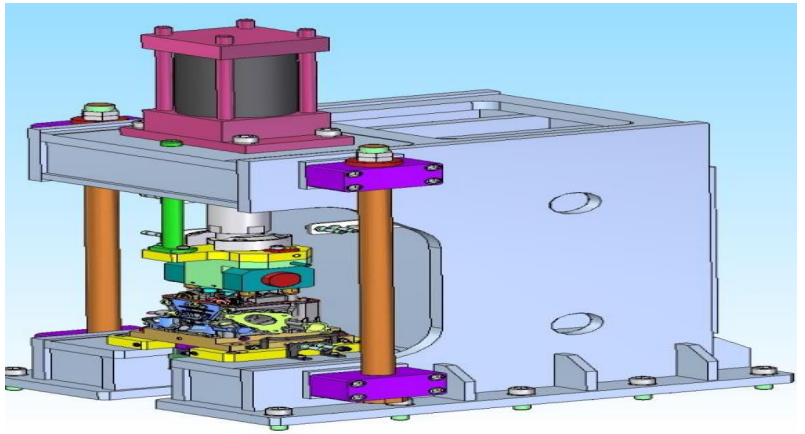
Part clamping force=753.26*8=6026.08kg=6.02 ton

Pressure required in 125mm cylinder =49.10 kg/cm^2


Pivot Joints
Equal Distribution of Forces




Main Clamp For Final Reading
Pre-Clamp For Initial Reading



- We can also calculate it by MOTOSH equation,
- T=F*[(p/2*3.14)+{u(t)*r(t)/cos(b)+u(n)*r(n)}]
- Bolt –M6*1
- Where,p=pitch of thread=1mm
- U(t)=coeff of friction in threads=0.15
- U(n)=coeff of friction under head(b/w head and mating parts)=0.15
- R(t)=effective radius of thread contact(half of thread pitch diameter)=0.5*{d(majaor)-0.6495*p}=0.5*(5.974-0.6495)=2.662mm
- R(n)=(y+1)*d/4
- D=nominal dia of bolt
- Y=ratio of outside to inside radii of contact area=11/6.8=1.618
- R(n)=3.926mm
- B=half angle of thread form=30 degree;
- F=744.27kg
- P(30mm) cylinder =105.3kg/cm^2
- Part clamping force=5954.15 kg ; P(in 125mm) cylinder =48.48kg/cm^2

Chetak METHODOLOGY

Aim : To achieve tappet setting as per spec

Engine opening - 1

- Online tappet conformance stage

Engine opening - 2

- Firing rework stage

Challenge - 1

- To eliminate the variation between machine reding and actual tappet setting online as per spec

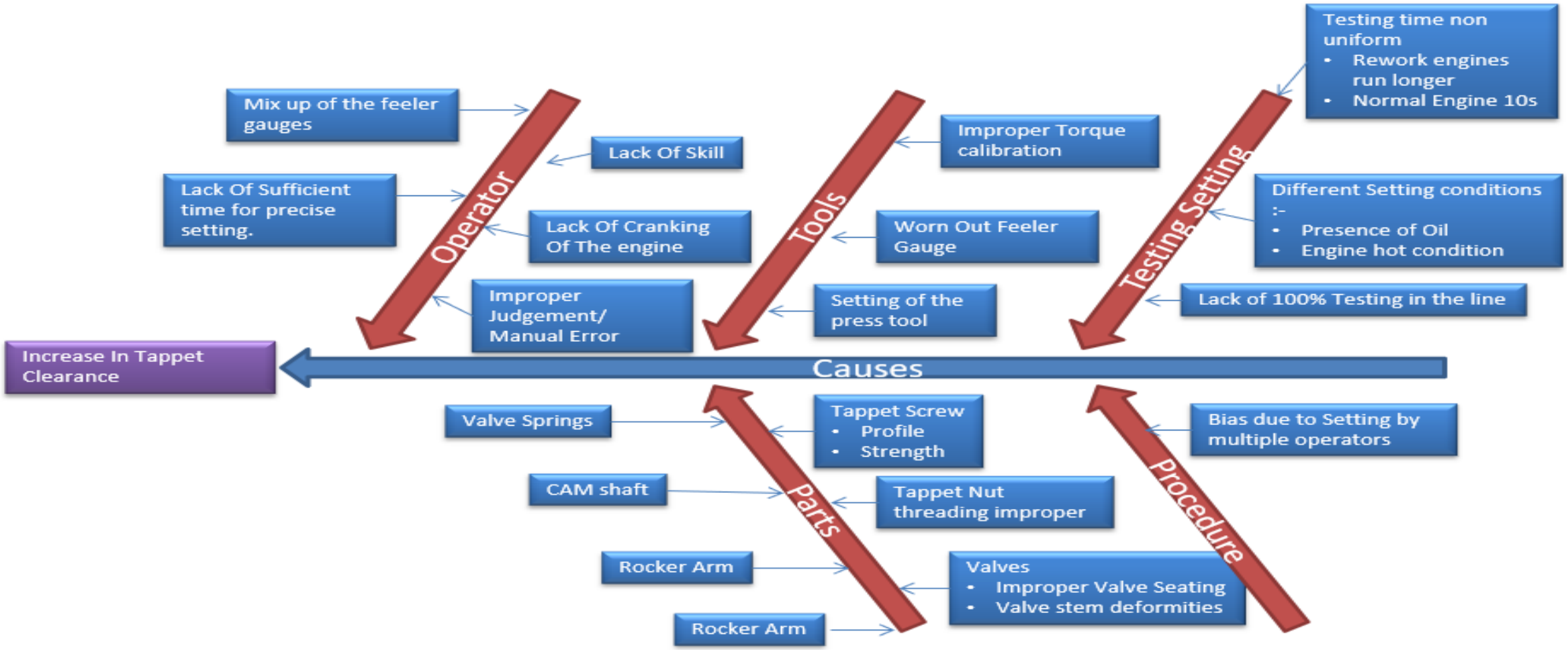
Challenge -2

- To eliminate variation of tappet clearance in cold and hot condition

Step - 1

- Confirmation of all parameters as per standard
- Studied the FTA
- Methodology
- Trials
- Monitoring the trials result and changes as per trails and error method
- Result

Fish Bone Diagram



Chetak COMPONENTS WISE POSSIBILITY

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Aim : To achieve tappet clearance as per spec

Material (1)

- Checked the cylinder head all parameters
- Checked the child parts as per dimension
- Checked the master shim value as per standard
- Checked the filler gauge as per spec

Method (2)

- Studied the process flow and tappet clearance variation relation
- Change in operation sequence

Machine (3)

- Machine calibration
- Comparison of old machine and new machine
- Studied the possibilities of wrong shim reading
- Established poka-yoke on machine
- Program setting as per data analysis – Trial and error method

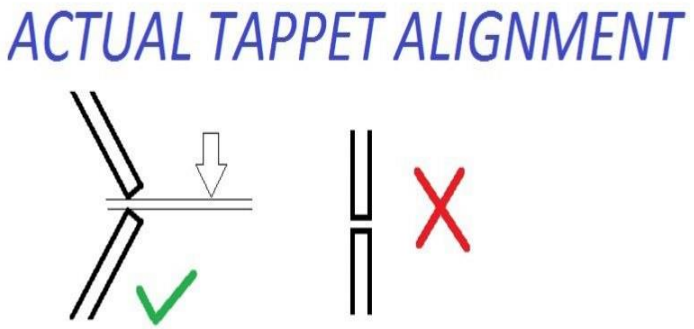
Man (4)

- Allocated the trained manpower on tappet setting stage

Data analysis

- Shim reading value of machine and actual shim value inserted
- Tappet confirmation online
- Tappet confirmation after firing

An indicative figure as to show how the tappets are angled to each other. The clearance between them is not parallel to each other. So the feeler gauge has to be inserted to the point where it starts becoming difficult to enter it any further.



Check points

- The process calls for highly skilled operator
  The GO/NO-GO of the feeler gauges is dependent on the operator's judgement of tightness.

OPERATOR

- The process calls for highly skilled operator
- The GO/NO-GO of the feeler gauges is dependent on the operator's judgement of tightness.
- Thus the process can be said to be highly biased
- The tool that is used to tighten the screw initially does not provide a definite torque
- Thus a torque wrench was provided
- The cranking of engine ensures proper seating of valves. Thus cranking is to be done without failure.

TOOLS

- The torque wrench that is used to tighten the nut must be properly calibrated to apply a constant torque.
- The recommended torque value is 0.7-0.9kgm

TESTING OF ENGINE

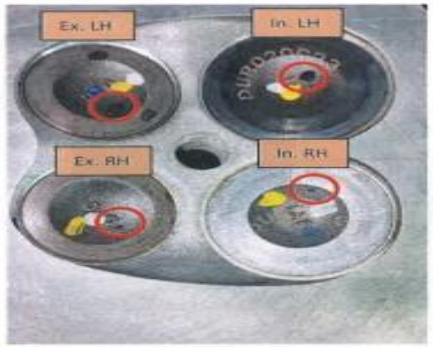
- In case of rework the engine runs for a longer period of time.
- Once the engine is fired the valves get heated up causing them to expand. This causes the valve to be pushed down and the clearance increases.
- Thus the tappet clearance must be set only in the cold condition

Chetak PROBE ANGLE

BAJAJ | THE WORLD'S FAVOURITE INDIAN

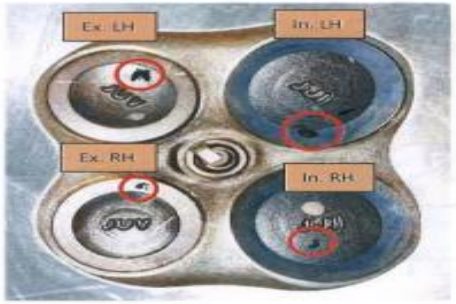
LVDT probe angle & contact point on valve

JY

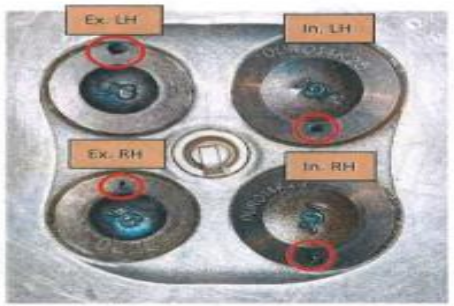


KT10

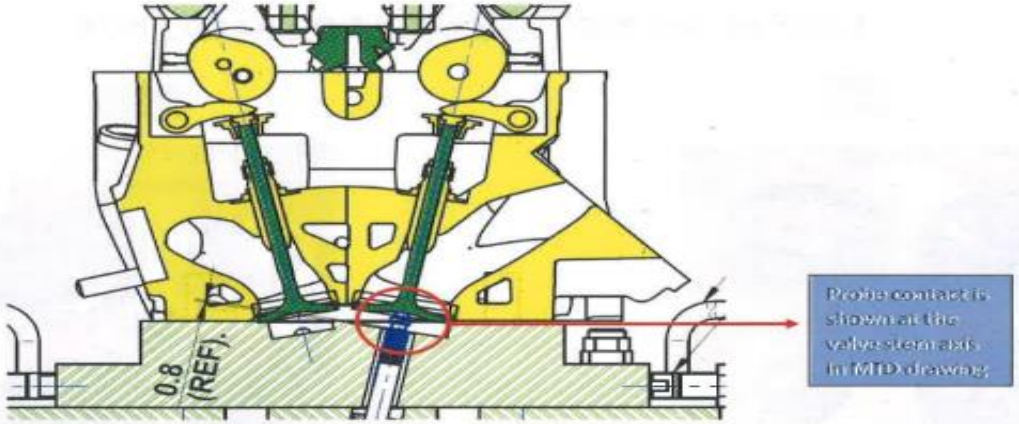
JU



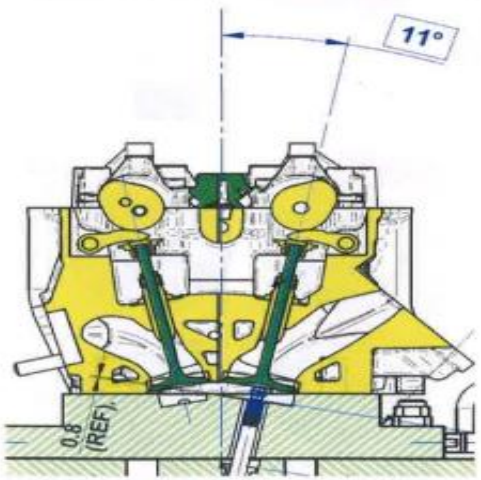
JG



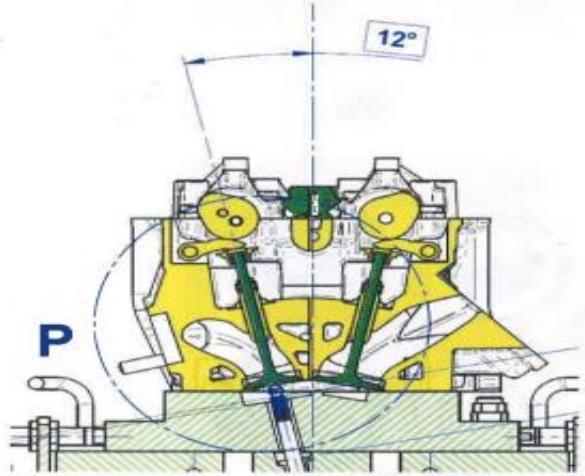
	JY	KT10	JU	JG
Intake valve stem angle (degree)	11	13	14	15
Exhaust valve stem angle (degree)	12	15	15.5	17
Intake valve diameter (mm)	36	29	28.5	22.5
Exhaust valve diameter (mm)	29	24	24	19



Intake valve stem angle in MTD drawing



Exhaust valve stem angle in MTD drawing



EXHAUST BOTTOM VALVE GUIDE CO-ORDINATE

EXHAUST BOT VG BORE 1DIA	5.002	5.000	0.012	0.000	0.002	
EXHAUST BOT VG BORE 1 R	0.001	0.000	0.005	0.000	0.001	
EXHAUST BOT VG BORE 2 DIA	5.005	5.000	0.012	0.000	0.005	
EXHAUST BOT VG BORE 2 R	0.001	0.000	0.005	0.000	0.001	
EXHAUST BOT VG BORE 3 DIA	5.005	5.000	0.012	0.000	0.005	
EXHAUST BOT VG BORE 3R	0.001	0.000	0.005	0.000	0.001	
Cylindricity EX BOT VG	0.002	0.000	0.008	0.000	0.002	
Y Value_Int_ EXHAUST BOT VG	-15.411	-15.439	0.050	-0.050	0.028	
Z Value_Int_ EXHAUST BOT VG	-16.536	-16.500	0.030	-0.030	-0.036	-0.006
A 1 EXHAUST BOT VG	15° 33' 34"	15° 30' 0"	0° 5' 2"	-0° 5' 2"	0° 3' 34"	
A2 EXHAUST BOT VG	-0° 2' 32"	0° 0' 0"	0° 5' 2"	-0° 5' 2"	-0° 2' 32"	

INTAKE BOTTOM VALVE GUDIE CO-ORDINATE

INTAKE BOT VG BORE 1 DIA	4.503	4.500	0.012	0.000	0.003	
INTAKE BOT VG BORE 1 R	0.001	0.000	0.005	0.000	0.001	
INTAKE BOT VG BORE 2 DIA	4.505	4.500	0.012	0.000	0.005	
INTAKE BOT VG BORE 2 R	0.001	0.000	0.005	0.000	0.001	
INTAKE BOT VG BORE 3 DIA	4.506	4.500	0.012	0.000	0.006	
INTAKE BOT VG BORE 3 R	0.001	0.000	0.005	0.000	0.001	
Cylindricity INTAKE BOT VG	0.002	0.000	0.008	0.000	0.002	
Y Value_Int_ INTAKE BOT VG	11.919	11.905	0.050	-0.050	0.014	
Z Value_Int_ INTAKE BOT VG	-16.504	-16.500	0.030	-0.030	-0.004	
A1 Cylinder INTAKE BOT VG	-14° 1' 53"	-14° 0' 0"	0° 5' 2"	-0° 5' 2"	-0° 1' 53"	
A2 Cylinder INTAKE BOT VG	0° 0' 52"	0° 0' 0"	0° 5' 2"	-0° 5' 2"	0° 0' 52"	

EXHAUST BOTTOM VALVE GUIDE CO-ORDINATE

Ø	EXHAUST BOT VG BORE 1DIA	5.003	5.000	0.012	0.000	0.003
○	EXHAUST BOT VG BORE 1 R	0.003	0.000	0.005	0.000	0.003
Ø	EXHAUST BOT VG BORE 2 DIA	5.005	5.000	0.012	0.000	0.005
○	EXHAUST BOT VG BORE 2 R	0.002	0.000	0.005	0.000	0.002
Ø	EXHAUST BOT VG BORE 3 DIA	5.005	5.000	0.012	0.000	0.005
○	EXHAUST BOT VG BORE 3R	0.002	0.000	0.005	0.000	0.002
⌭	Cylindricity EX BOT VG	0.004	0.000	0.008	0.000	0.004
Y	Y Value_Int_ EXHAUST BOT VG	-15.402	-15.439	0.050	-0.050	0.037
Z	Z Value_Int_ EXHAUST BOT VG	-16.511	-16.500	0.030	-0.030	-0.011
∠	A 1 EXHAUST BOT VG	15° 32' 19"	15° 30' 0"	0° 5' 2"	-0° 5' 2"	0° 2' 19"
∠	A2 EXHAUST BOT VG	0° 0' 5"	0° 0' 0"	0° 5' 2"	-0° 5' 2"	0° 0' 5"

INTAKE BOTTOM VALVE GUDIE CO-ORDINATE

Ø	INTAKE BOT VG BORE 1 DIA	4.499	4.500	0.012	0.000	-0.001	-0.001
○	INTAKE BOT VG BORE 1 R	0.003	0.000	0.005	0.000	0.003	
Ø	INTAKE BOT VG BORE 2 DIA	4.502	4.500	0.012	0.000	0.002	
○	INTAKE BOT VG BORE 2 R	0.002	0.000	0.005	0.000	0.002	
Ø	INTAKE BOT VG BORE 3 DIA	4.502	4.500	0.012	0.000	0.002	
○	INTAKE BOT VG BORE 3 R	0.003	0.000	0.005	0.000	0.003	
⌭	Cylindricity INTAKE BOT VG	0.004	0.000	0.008	0.000	0.004	
Y	Y Value_Int_ INTAKE BOT VG	11.916	11.905	0.050	-0.050	0.011	
Z	Z Value_Int_ INTAKE BOT VG	-16.478	-16.500	0.030	-0.030	0.022	
∠	A1 Cylinder INTAKE BOT VG	-14° 1' 28"	-14° 0' 0"	0° 5' 2"	-0° 5' 2"	-0° 1' 28"	
∠	A2 Cylinder INTAKE BOT VG	0° 1' 58"	0° 0' 0"	0° 5' 2"	-0° 5' 2"	0° 1' 58"	

COMPONENTS

- All the components in the engine head have an allowable tolerance in the dimensions
- Since the tappet clearance is in the order of micrometre excessive tolerance can affect the accuracy of tappet setting
- The clearances introduced due to dimensional tolerances were analysed.
- But these clearances do not have much significance when it comes to variation in tappet clearance

Stack Analysis of rocker assembly:				
Clearance between bore and shaft:				
Shaft	9.99	9.99	9.981	9.981
Bore	10	10.015	10	10.015
Clearance	0.01	0.025	0.019	0.034
Minimum clearance				0.01
Maximum clearance				0.034

Clearance between shaft and rocker arm:				
Shaft	9.99	9.981	9.99	9.981
Rocker arr	10	10	10.012	10.012
Clearance	0.01	0.019	0.022	0.031
Minimum clearance				0.01
Maximum clearance				0.031

Repeatability tests

- Shims kept in the same position and the machine is activated at regular intervals without any other changes
- Shims are kept in the same position and the cylinder is taken out and kept back in without any other changes
- Shims are simply replaced in their own positions without any other changes
- Shims are rearranged from their original positions and put in randomly selected positions

Possibilities	Action taken
Possibility of wrong master shim fitment	Program provided
Possibility of wrong intake and exhaust camshaft fitment	Value set in program logic,sensor provided to detect
Wrong position of cam lobe	Provided sensor
Ensure correct decom height	Provided sensor
Ensure valve seat depth as per model	Value set in program logic
Ensure cam lobe position in 45 degree	Operator instructed

Improvements Identified & Status

	Pain	Root Cause	Kaizen Idea	Status
1	Possiblity of error in notings of Selected Shim Sizes - 4 Nos. per Cylinder	Manual Activity	Auto-Printing of Selected Shim Sizes	.

Before

SHIM measurement process Cycle

- Put Cyl head Assly with Master SHIM on M/c Fixture
- Each Valve home position will checked by LVDT Probe
- Hydraulic Ram come down and will press assembled Head and hold
- Each Valve displacement position due to higher size Of Master SHIM again checked by LVDT Probe
- Hydraulic Ram move back.
- Required SHIM value after calculation will Display on Screen

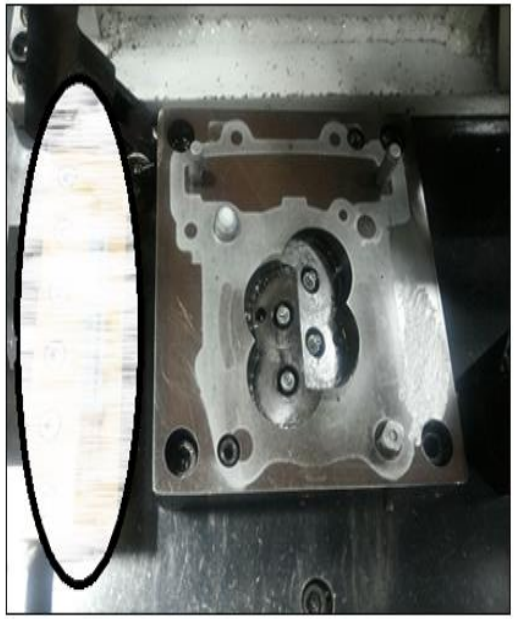
After

SHIM measurement process Cycle

- Put Cyl head Assly with Master SHIM on M/c Fixture
- Job clamping with pneumatic arrangement
- Hydraulic Ram come down and will press assembled Head for few second & move back
- Each Valve home position will checked by LVDT Probe
- Hydraulic Ram again come down and will press assembled Head and hold
- Each Valve displacement position due to higher size Of Master SHIM again checked by LVDT Probe
- Hydraulic Ram and job clamping cylinder move back
- Required SHIM value after calculation will Display on Screen
- Auto round off of SHIM value in 20µ

Before

Manual Cleaning of fixture plate with wipex / cloth



After

Auto cleaning of fixture plate with air blowing knife in each cycle

- MASTER SHIM CALIBERATION for JU model

Models	Value of master shim(exact)
JU/JG/KT25	3.54mm

s.no8	Master shim exact value(mm)	Measured value(mm)	Deviation (micron)	Status/remark
1	3.54	3.542	2	ok
2	3.54	3.541	1	ok
3	3.54	3.549	9	Not ok
4	3.54	3.544	4	Not ok
5	3.54	3.541	1	ok
6	3.54	3.541	1	ok
7	3.54	3.547	7	Not ok
8	3.54	3.543	3	Not ok
9	3.54	3.540	0	ok
10	3.54	3.547	7	Not ok
11	3.54	3.554	14	Not ok
12	3.54	3.548	8	Not ok

- excel (1).xlsx

excel (1).xlsx

3 JULY,SHIM VARIATION.xlsx

EXCEL 2.xlsx

- **Routine checks (daily before start-up)**

- Check for any air leaks, lost connections, pipe breakage, or pinching (visual, and audible)
- Check for pipe caught-up or wound-up conditions, especially at swivel joints.
- Check if the filter contains excess moisture and water.
- Check for oil in the FRL unit.

- **Preventive Maintenance (Recommended Monthly)**

- Tighten loose screws on moving parts
- Check and clean rust, dirt, or clogging of moving parts and bearings.
- Check for lubrication (wet surface) on all wear surfaces
- Check and replace worn parts, seals, connectors, etc.

Chetak

THANKING YOU.