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Implement Of Cost Effective Method And Increasing Warranty Period Of Single Cylinder Engine

J.Soundhar , R.Rastrapathi , S.Sugavanam , V.S.Tamil arasu

Abstract— This paper describes the failure found at value guides on single cylinder forced splashing lubrication system 4 stroke engine. We are found that problem and designing the valve for this engine. Also our project maximizes the engine duration period, life and reduces the huge emissions, high fuel consumption and high engine noise. We are analyzed engine break down report and failure crankcase model. Also this project reduces the cost of values and increasing warranty duration of engine. We have shown the crankcase side view, root cause for problem, valve guide failure: possible causes, contribution to engine cost, crankcase assembly with valve guide, valve guide seating arrangement technique, valve nomenclature, and implementation of solution for this engine.

Key Word - *value guide, side valve engine,forced splashing lubricating system.*

I. IMPORTANCE OF THE PROJECT

We have chosen MK20 engine for our side valve engine technique. It has severe drawbacks, as it locating the hot exhaust port immediately next to the cylinder. It has long burn times, larger combustion chamber surface area, and higher pollution outcome. Many of these factors combine to cause inherently high emission levels, (particularly - HCs, NO_X), high fuel consumption and high engine noise.

II. AIM OF THE PROJECT

By utilizing the benefits of side valve engine to achieve the power and green emission norms. As of reducing the warranty rejection of crank case assembly into value reengineering & productive range.

III. ENGINE NOMENCLATURE

The piston slides up and down in the cylinder bore and is linked to the crankshaft by means of a connecting rod. They require two up-and-down strokes of the piston to complete one cycle of operation. The power stroke converts chemical energy into mechanical motion by burning the gasoline's hydrogen and carbon mixed with the air's oxygen.

J.Soundhar[1], U.G Students, Department of Mechanical Engineering in Jayalakshmi Institute of Technology, Thoppur, India.
(email : jsrmechforce@gmail.com)
R.Rastrapathi[2], U.G Students, Department of Mechanical Engineering in Jayalakshmi Institute of Technology, Thoppur, India.
S.Sugavanam[3], U.G Students, Department of Mechanical Engineering in Jayalakshmi Institute of Technology, Thoppur, India.
V.S.Tamil arasu[4] U.G Students, Department of Mechanical Engineering in Jayalakshmi Institute of Technology, Thoppur, India.

IV. ENGINE SPECIFICATION

Terms	Specifications
Model	MK 20
Type	4 Stroke , Single Cylinder, Side Valve Engine
Fuel	Petrol
Bore X Stroke(Mm)	68 X 53
Total Displacement (Cc)	192
Max.Power (Hp)	3.4 @3600rpm
Compression Ratio	4:8:1
Ignition System	Transistor System
Lubrication System	Forced Splashing

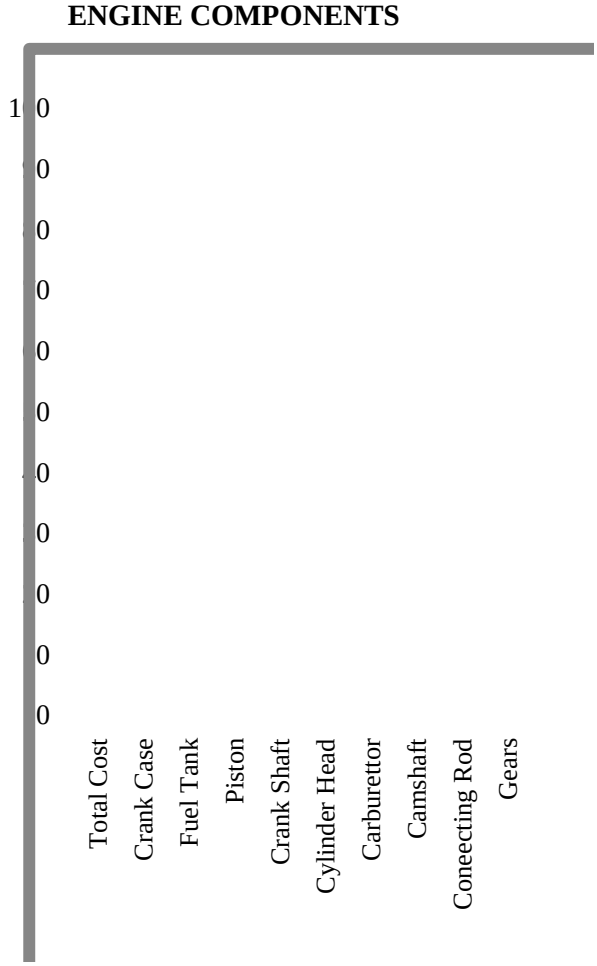
V. DEFINING THE CRANK CASE

Crank case is cast integral with the cylinder block made of Aluminum alloys. It supports crankshaft and camshaft with the help of bearings. Crank case takes the high cost efficient part in the engine

VI. CRANKCASE SIDE VIEW

Figure 1, it shows a side view of crankcase.

VII. CONTRIBUTION TO ENGINE COST



In this chart represents a contributions of total cost installation of an engine.

VIII. ROOT CAUSE FOR PROBLEM

Valve guide wear is the root cause for the crankcase warranty failure problem, due to longer burn times. The primary symptom of valve failure is loss of compression. When the wear absorbed, crank case must be replaced, which is totally high cost reduction.

IX. VALVE GUIDE FAILURE: POSSIBLE CAUSES

Improper Valve Guide material. Wrong fit-tolerance between Valve guides – Valve stem. Manufacturing variation of valve guide and valve components. Wrong / less / No lube oil usage.

X. DIAGRAM SPECIFICATION;

A. Engine Top View

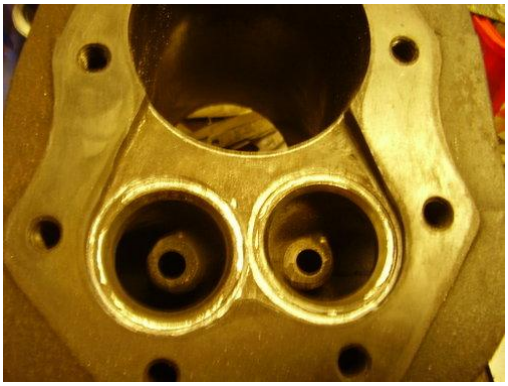
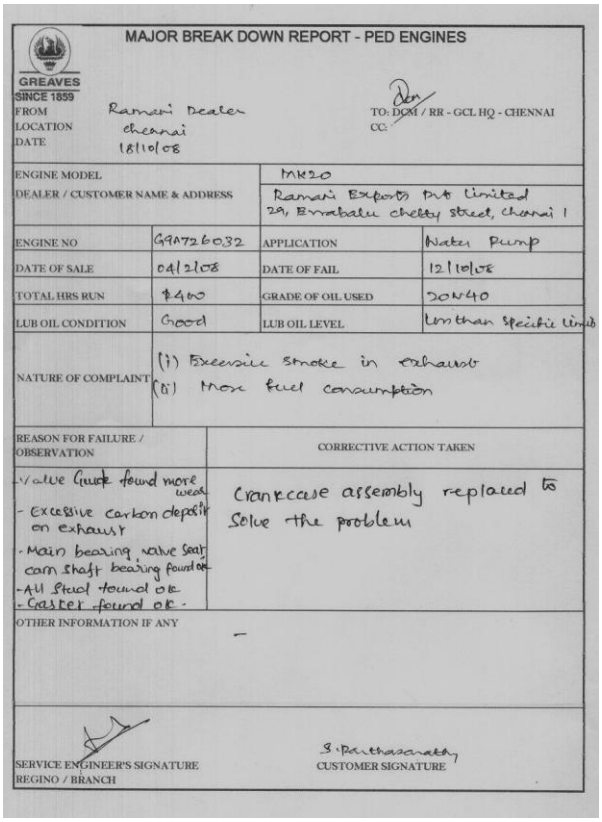


Figure 2

B. Valve

Figure 3, it shows a valve figure.

XI. BREAK DOWN REPORT BY CUSTOMER



MAJOR BREAK DOWN REPORT - PED ENGINES

GREAVES SINCE 1859

FROM: Ramani Dealer
LOCATION: chennai
DATE: 18/10/08

TO: DCM / RR - GCL HQ - CHENNAI
CC:

ENGINE MODEL		MK20	
DEALER / CUSTOMER NAME & ADDRESS		Ramani Exports Pvt Limited 29, Ennabalu chetty street, Chennai 1	
ENGINE NO	G9A7260.32	APPLICATION	Water Pump
DATE OF SALE	04/2/08	DATE OF FAIL	12/10/08
TOTAL HRS RUN	840	GRADE OF OIL USED	20W40
LUB OIL CONDITION	Good	LUB OIL LEVEL	Less than Specific Limit
NATURE OF COMPLAINT	(i) Excessive smoke in exhaust (ii) More fuel consumption		

REASON FOR FAILURE / OBSERVATION	CORRECTIVE ACTION TAKEN
- Valve Guide found more wear - Excessive carbon deposit on exhaust - Main bearing, valve seat, cam shaft bearing found ok - All Steel found ok - Caster found ok.	Crankcase assembly replaced to solve the problem

OTHER INFORMATION IF ANY: –

SERVICE ENGINEER'S SIGNATURE
REGINO / BRANCH

S. Parthasarathy
CUSTOMER SIGNATURE

It is a customer report for problem in engine.

XII. FALIURE MODEL

Figure 4

This is the failure model of the crank case assembly. In the past days the crank case is to be replaced fully, now both the valve guides replacement is enough. By this criteria, the cost will be saved.

XIII. CRANKCASE ASSEMBLY WITH VALVE GUIDE

A. VALVE GUIDE PULLED

Figure 5, shows a valve pulled in position.

B. VALVE GUIDE IN POSITION

Figure 6, shows the positioning a valve.

XIV. VALVE GUIDE SEATING ARRANGEMENT TECHNIQUE

Remove the cylinder head from the vehicle to a safe working area & clean the parts. Both the valves are shrink in Liquid Nitrogen at Sub-Zero degree temperature, which provide leak proof.Insert the valve into the guide, allowing the valve to remain off of its seat.

XV. VALVE GUIDE CHECKING DEVICES

Dial indicator is used to check the amount of valve guide wear. Small hole gauge is used to check the inner diameter of the valve guide. Micrometer is used to measure the valve stem.

XVI. VALVE GUIDE SERVICING

When servicing valve guides, remember that the guides must be clean and in good condition for normal valve seating. If, after cleaning a valve guide, you find it worn, remove it and install a new one. To remove old or worn valve guides and install new ones, you need special guide removing and replacing tools.

XVII. VALVE NOMENCLATURE

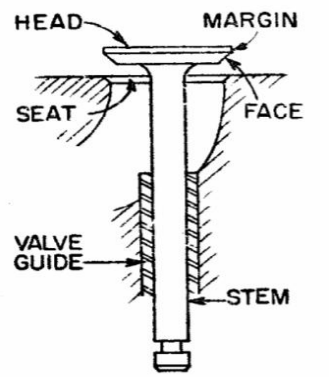


Figure 7, shows a basic and nomenclature of valve

XVIII. IMPLEMENTATION OF SOLUTION

The puller for the Valve Guide was produced with the help of production Engineering department

A. VALVE GUIDE PULLER

Figure 8, shows a puller of valve guide.

B. CAD MODEL

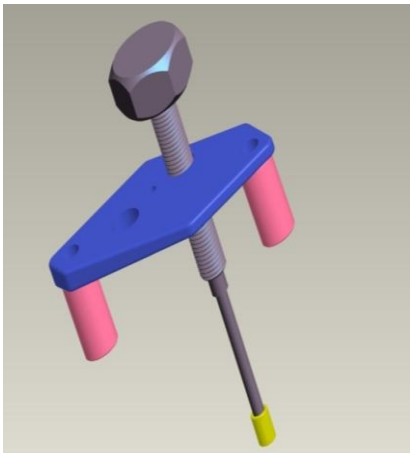


Figure 9, shows a cad model of valve guide puller.

XIX. CAD MODEL VALVE GUIDE PULLER ASSEMBLY

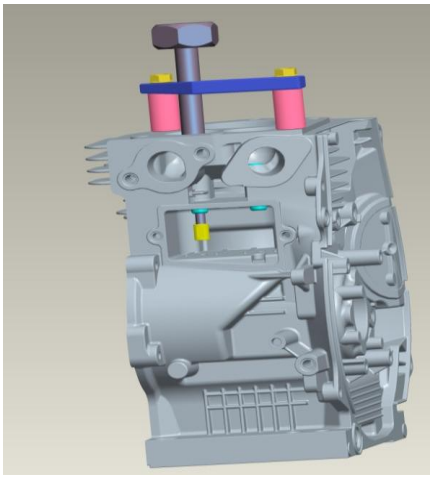


Figure 10

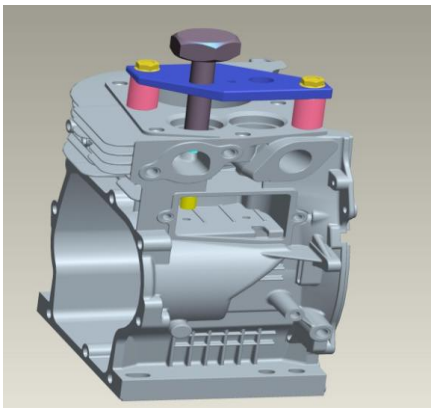


Figure 11

Above figure 10 and figure 11 are shows the cad model valve guide puller assembly in engine.

XX. VERIFICATION

COST COMPARISION

BEFORE IMPROVEMENT;

Crankcase warranty average (month) = 8
Crankcase cost = 2250 INR
Total warranty cost = 6750 INR

AFTER IMPROVEMENT;

Crankcase warranty average (month) = 8
Valve Guide cost= 45 INR
(Including inlet and exhaust valve)
Total Warranty cost = 135 INR

XXI. CONCLUSION

An engine manufacturing company has receiving ‘n,number of warranty claims from customers, whoconsumed the products within the warranty period offered by company to compete its competitors in the product range. And thus our project to increase the life of the Engine andincreasing the warrantyperiod by necessary changes in the area.

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