An Investigation of Dressing Problem in Fortuna Angular Grinding Machine for Crankshaft Production

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Abstract

In Reciprocating engine crankshaft is important part which is used to convert the linear motion of piston in to rotating motion. For smooth out the jerky motion created by the moving piston, the flywheel is attached to the end of the crankshaft. Fortuna angular grinding machine in which a grinding is done on the crankshaft. A machine consists different component like as grinding wheel, follower, template, diamond, hydraulic pump, hydraulic motor, head stock, tail stock, and bed. Dressing problem is arise when the same product is produce on the same machine after some period of time. The various factor which are affecting for this problem are hydraulic pressure, bed, follower, diamond alignments which are used in machine. This problem can be solved by proper alignment of template, regulating pressure, adjusting diamond position etc.

Keywords: Crank Shaft, Grinding Machine, Tail Stock, Hydraulic Pump, Hydraulic Motor

I. INTRODUCTION

Amul Industries employs 2500 people. Most employees have been with the company for over 10 years. Amul Industries practices friendly yet performance oriented workplace policies.

A. Machining

Amul has 28 connecting rod lines spread over 6 manufacturing plants. Amul manufactures both conventional machined face con rods and the fracture split con rods. Amul pioneered the fracture split technology in India. The manufacturing operations are supported by modern testing and inspection facilities and Standards Room for gauge calibration and first part approvals.

B. Testing

Amul has fully equipped testing facilities which include all mechanical properties like Hardness, UTS, % Elongation, YS and Fatigue. The Metallurgical Testing lab includes a spark emission spectrometer for chemical composition (can detect 29 elements even in traces up to 0.001%) and ability to do microstructure study. All manufacturing plants have their independent receiving inspection and basic testing and gauge calibration facilities.

C. Designing

Amul has the ability to design a connecting rod from engine data. Several qualified and experienced engineers work in the Design Cell. Latest and relevant application software is used by our designers. Amul also has the ability to design and manufacture various fixtures and gauges required in the manufacturing process.

II. INTRODUCTION OF COMPONENTS

A. Connecting Rod

- Weight Range (Kg): 0.3 – 12
- Size Centre Distance (mm): 90 – 320
- Crank End Bore Ø (mm): 30-10
- Piston End Bore Ø (mm): 10-40
- Material: Micro Alloy Steel, Plain Carbon

Fig. 1: Connecting Rod

B. Crankshaft-Automobile

- Weight Range (Kg): 6 – 35
- Crank Pin Ø(mm) : 42 – 70
- Journal Ø (mm): 45 – 90
- Total Length (mm): 285 – 560
- Material: SG Iron, Micro Alloys

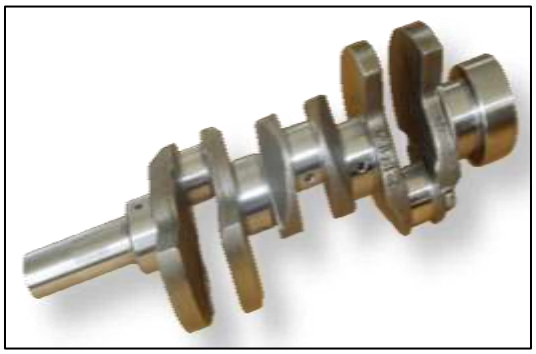

Fig. 2: Shaft

C. Cylinder Blocks

- Weight Range (Kg): 75 – 125
- No. of Cylinders: 2 – 6 Cylinders
- Bore Ø (mm): 80 – 125
- Material: CI Castings

Fig. 3: Cylinder Block

D. Cylinder Head

- Weight Range (Kg) : 80 – 100
- No. of Cylinders: up to 6 Cylinders
- Material: CI, Al

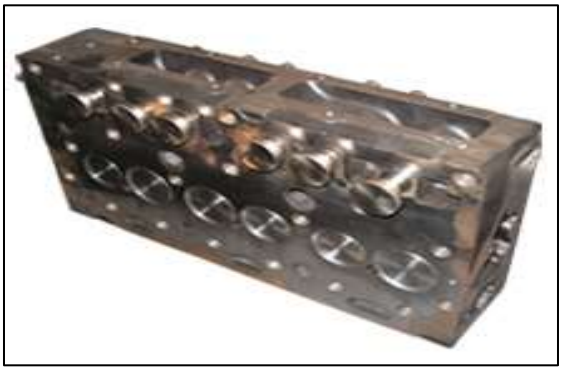

Fig. 4: Cylinder Head

E. Cam Shaft

- No. of Cylinders: up to 2 Cylinders
- Total Length (mm): 235
- Material: Carbon Steel

Fig. 5: Cam Shaft

III. PROBLEM IDENTIFICATION

A. Problem Summary

Variation in actual diameter of crankshaft due to dressing problem in Fortuna angular grinding Machine.

B. Detail Description Problem

The following factor causes the dressing problem in Fortuna angular grinding Machine.

- Templates wear out
- Variation in hydraulic pressure
- Follower burnt
- Misalignment of diamond
- Dressing slide is not work properly
- Mounting of grinding wheel

Due to this dressing problem the diameter of crank shaft is varies during the grinding process in Fortuna angular grinding machine.

IV. CONCLUSION

By observing the machine main part, movement of parts in machine and grinding process is done on crankshaft , we find out some factor that are responsible for dressing problem occur in machine. Two main factors which are responsible for the dressing problem are uneven hydraulic pressure and the type of follower which is currently used.

REFERENCES

[1] Theory of Mechanisms and Machines By C. S. Sharma, Kamlesh Purohit
[2] Theory of Machines by SS Rattan

[3] Altan, T., Oh, S., and Gegel, H. L., 1983, "Metal Forming Fundamentals and Applications," American Society for Metals, Metal Park, OH, USA.
[4] A. Albers N. Leon-Rovira, H. Aguayo, T. Maier "Development of an engine crankshaft in a framework of computer-aided innovation". Institute of Product Development (IPEK), Universitat Karlsruhe (TH), Centre for Innovation in Design & Technology (CIDT), ITESM, Monterrey Campus, Mexico, SAE Technical Paper No. (2009) 604–612.