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Improvement in Millipore and Implementation of Pneumatic System for Burr Removal

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Abstract: ***Every object or a component which is nature or designed by human has an end period or failure time. We as engineers try very hard to find the life time and make many designs to reduce the failures and increase the life time. Machining is done for screws, Cylinder heads, cylinder blocks, crank cases, cover cases and crank & Main Bearing (MB) caps. Casting is done for cam shafts and engine outer bodies. Each and every component has a unique order of processing. It follows and order of either casting or forging and machining. And because of the contamination in the engine, the engine runs with a lot of problems like wear& tear, Huge noise, Friction, Vibration etc, of internal parts of the engine. These burrs are the major factor for the contamination caused in the engine assembly. Due to this customer dissatisfaction is going high. To contro this certain methodology are followed & maintained.***
Keywords: Casting, Machining, Contamination, Engine, MB

I. INTRODUCTION

The engine block is the main structure of an engine that supports and helps to maintain the alignment of internal and external components. The engine block consists of cylinder block and Crankcase. The cylinder block is one of your engine's central components. It plays a key role in the lubrication, temperature control and stability of the engine and it has to be of highest quality so there will be no failure or contamination. Burrs in the cylinder block are complex and troublesome problems. They require additional finishing operations and complicate assembly as well as risk damage to the part. Apart from the burr formed during machining processes there are different contaminants which decreases the performance of the engine. Hence to evaluate these contaminants Millipore test is carried out. In order to decrease these contaminants on the Main Bearing (MB) caps, a washing machine is used. By using the pneumatic system and introducing special arrangement of the nozzles in washing machine, theses problems can be reduced

Fig. 1: Pneumatic System

Fig. 2: Nozzle Arrangement

II. LITERATURE REVIEW

Hieu Nguyen et al. [1] in manufacturing processes and engineering of materials used in automotive engine blocks have explained that, cast iron and aluminum alloys have been preferred materials used to produce the most diesel and conventional gasoline-powered engine blocks. However, with a greater emphasis on increasing the efficiency of the engine via weight reduction, manufacturers have began to look for alternative alloys, while retaining the necessary strength to withstand the forces of an engineas of late, the new production processes have been developed that created two new alloys suitable for use in an engine block,

magnesium alloy and CGI. In this paper, the functional requirements of the engine block, the processes used to manufacture the part, and the mechanical properties of the alloys will be discussed.

Jan C. Aurich et al. [6] in burrs – analysis, control and removal have explained that, one of the major concerns in deburring technology is centered on how to predict the size and shape of burrs to insure uniform removal and, if this is possible, how to design the process or product in advance to minimize or control the burr size. This paper reviews some of the research done over the past several years on this important topic. The paper includes a discussion of burrs in conventional machining, process planning for burr minimization as well as micromachining applications. MD. Raquibul Hasan et al. [3] in failure investigation report on different components of an automotive engine have explained that, this paper presents an investigation report of different components failure which affect the performance of an automobile engine. The premature breakage of a four cylinder diesel engine block, crankshaft, camshaft, crankshaft bearing, camshaft bush, engine oil pump was reported. It found that the failure of any component with the same reason for his failure as reported by different place. Thus it affected the performance of the vehicle and it is very expensive for the customer to replace the damaged parts for several times. In this paper, we presented a detailed analysis of the causes of failure along prior suggestion to keep the engine to improve performance.

K. Vinoth Kumar et al. [4] in reduction of engine contamination and improvements in engine efficiency have explained that, Engine is an assembly of nearly 186 parts or components either machined or forged or casted. When a component in the final stage requires a lot no. machining operations, leading to the formation of burrs. These burrs get settled deep inside of the components like holes, gaps or underneath of the machining area. When engine is assembled and oil is circulated, they get off from there and move to the moving area like piston & cylinder head & block, Crank case, Cam shaft etc. When engine runs they make the wear & tear of material. Contaminations are the main problems prevalent in recent trends in the automotive industry to reduce this effect and problems, a study was done and the problems are analyzed with appropriate methods. Then several optimal solutions are derived and are implemented for maximum efficiency and productivity of the company.

Pawan Kumar Rai et al. [5] in causes & prevention of defects (burr) have explained that, burr formation is common sheet metal defect and Burr control / deburring is an important issue. It is produced in all mowing& cutting operations. In sheet metal parts burr is usual but after a specified limit it takes a form of defect. This leads to the problem of shooting and a party. Then check out this flaw is the question of quality as well as a study of all the relevant factors is made in this paper, individually. This article describes what are possible causes & how can we prevent it. Except die & punch clearances, there are still many factors which affect the burr formation. This paper also erases what practices can increase tool life & how long we produce “burr free” parts. It includes the selection of the best materials and methods for press tools, tool design review, “machine selection” etc.

III. METHODOLOGY

A. Part 1- Design of Nozzle plate in MB cap washing machine (CREO 3.0)

It was found that, out of the total contaminants present on the surface of the MB caps about 50-70% contaminants were in the inner surface of the bore of the MB caps. Designing of this nozzle plate helps in proper cleaning of the MB caps, which decreases overall contamination in the cylinder block.

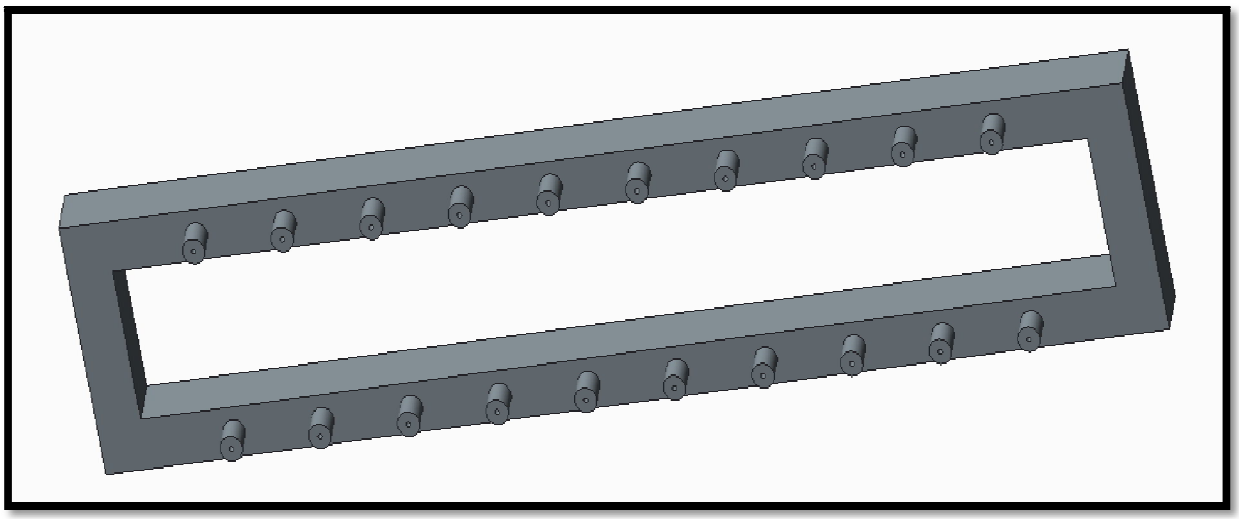

Fig. 3: Design of nozzle plate

B. Part 2- Pneumatic Circuit For Burr Removal In Cylinder Block

The presence of burr in the cylinder block leads to scratching of the inner surfaces of the cylinder bore also due to the friction which arises between the outer surface of piston and the inner surface of the bore damages the piston. Introducing this pneumatic system, removed the burr present in the cylinder block, hence solved the problem.

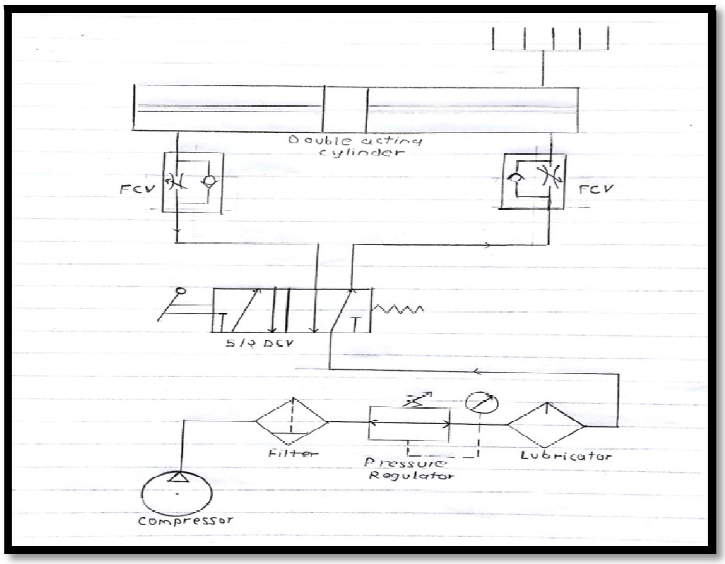

Fig. 4: Pneumatic Circuit

IV. CONCLUSION

We refer all the above papers and we have found main reason behind the decrease in engine performance and efficiency due to the burr and the contaminants. In this project scope is to decrease the contamination and the approach is to increase the efficiency of the cylinder. This can be done by installing a pneumatic system for bur removal and improvement in the MB cap washing machine to decrease the contaminants.

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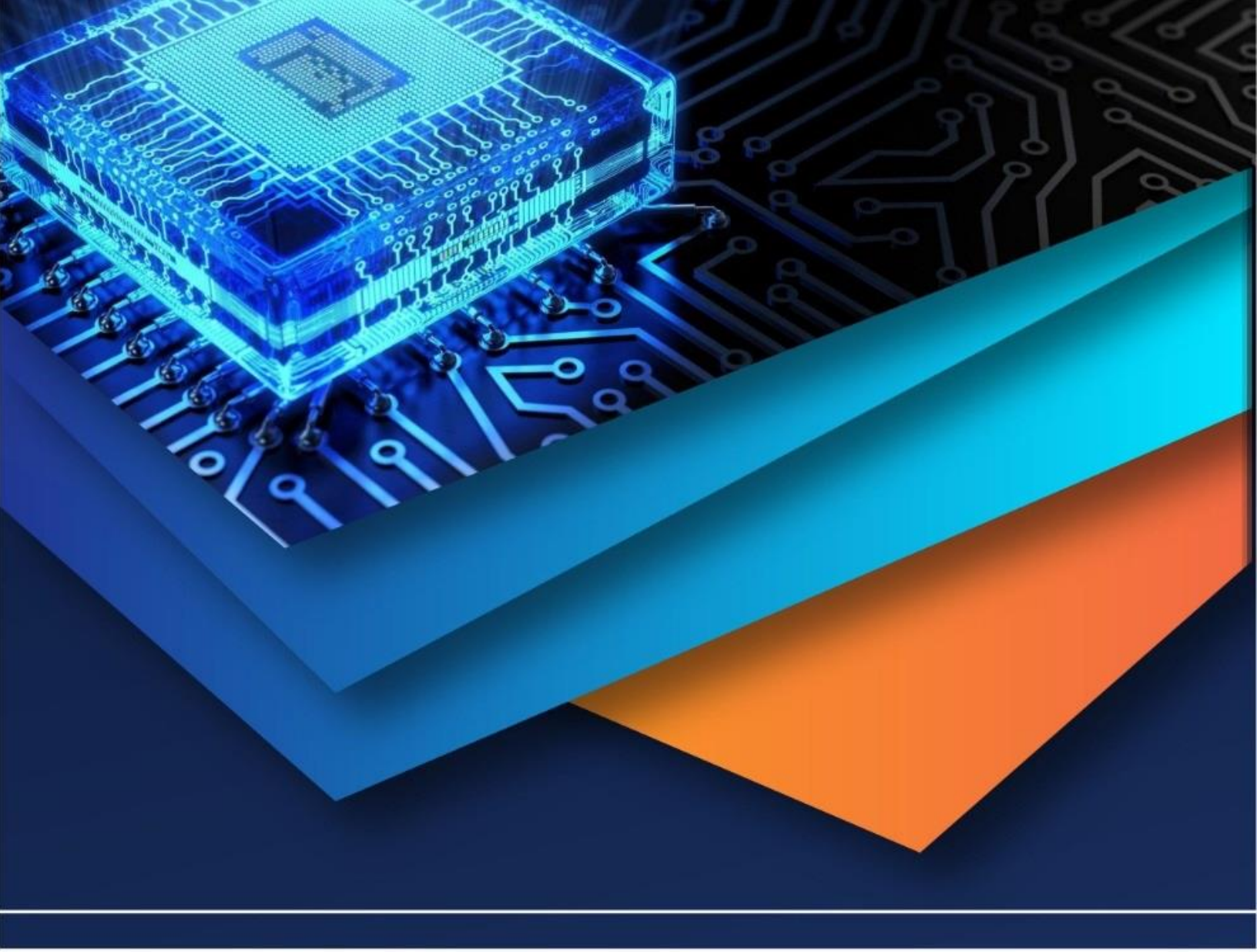

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