Vol-08 Issue 04, April -2024 ISSN: 2456-9348
Impact Factor: 7.936

iJETRM
International Journal of Engineering Technology Research & Management

MODELLING AND 3D PRINTING OF 4-WHEELER CRANKSHAFT

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ABSTRACT
This project aims to revolutionize automotive component manufacturing by utilizing 3D printing technology to fabricate crankshafts, crucial components in internal combustion engines, as power from the burnt gases in the combustion chamber is delivered to the crankshaft through the piston, piston pin and connecting rod. The crankshaft changes reciprocating motion of the piston in cylinder to the rotary motion of the flywheel. Crankshaftis designed for multi cylinder engine and its 3D model is created using modeling software SOLIDWORKS. Firstly, the required product/ Object can be designed in a CAD software with our required dimensions with the help of commands like (line, circle, curves, etc..). The completed design of a product can be imported to the STL format. The STL file is transferred to the FDM machine by connecting USD data card the PLA filament is fed into the heat extruder where it melts. The melted material is then extruded through a nozzle and to a built platform. The printer moves the nozzle in the X, Y, and Z axis depositing the material layer by layer according to the designed 3D model in the cad software. The applications of 3D printing are ever increasing and it's proving to be a very exciting technology like such as Bio-Medical industries, Medical Equipment's and Laboratory machines, etc

Keywords:
Modelling, Fabrication, Properties, Applications.

INTRODUCTION

The history of additive manufacturing, commonly referred to as 3D printing, dates back to the 1980s. Charles Hull is credited with developing stereolithography, the first 3D printing method, in 1983. In order to create a three-dimensional object, tiny layers of liquid resin were solidified using UV radiation.
A number of 3D printing processes have been developed over time, including fused deposition modelling (FDM), which Scott Crump invented in the late 1980s. FDM builds models layer by layer by layering molten plastic. This technology played a crucial role in making 3D printing more widely available.
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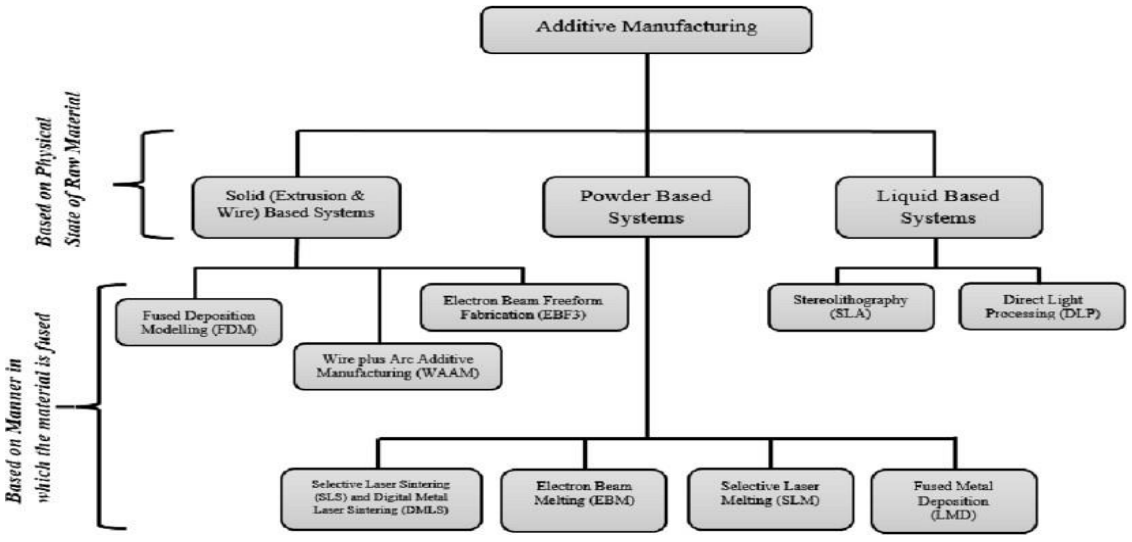

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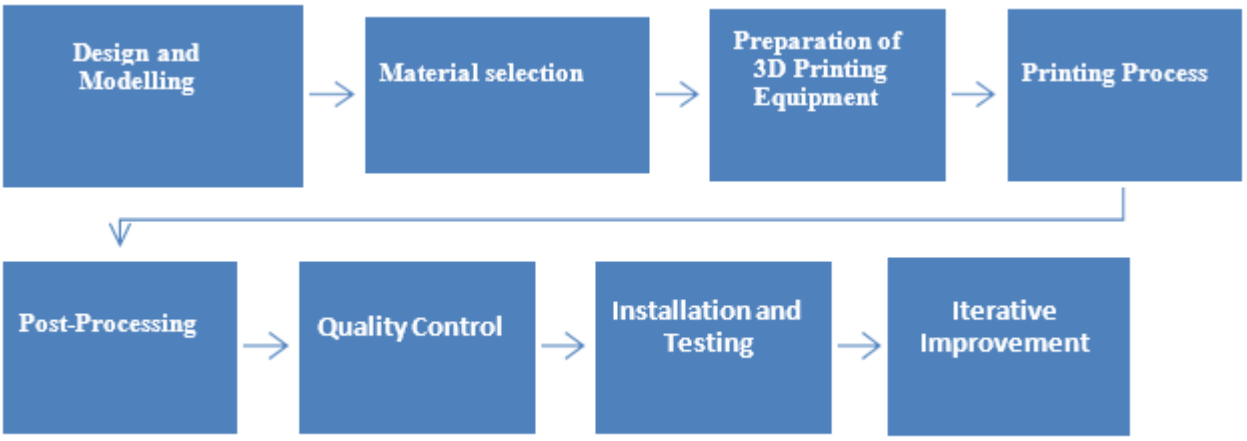
Because of the way that 3D printing is transforming industrial production lines, some observers have dubbed the introduction of 3D printers the "second industrial revolution." The medical industry also uses 3D printing extensively. ranging from digital dentistry to prosthetics and bionics. This will undoubtedly improve and revolutionise every facet of healthcare. Even though the majority of the study is still in the exploratory stage, experts think that using 3D printing as a tool would completely transform healthcare in the future.

METHODOLOGY

With the use of 3D scanners or CATIA design software, 3D printable models can be produced. Method sculpting is comparable to the hand modelling procedure used to prepare geometric data for 3D computer graphics. The process of examining and gathering information about the form and look of an object is known as 3D modelling. 3D models of the scanned object can be created using this data. For the typical customer, creating 3D printed objects can be quite challenging, both manually and automatically. For this reason, a number of marketplaces have appeared globally in recent years. Shape ways, Thing poems, My Mini Factory, and Threading are the most well-liked ones. Producing A 3D model from a.STL file needs to be processed by a piece of software before it can be printed called a "slicer" that takes a 3D model and slices it into small layers, creating a G-code file from an STL file that contains printing instructions. There are numerous open-source slicer applications available, such as Cura, KIS Slicer, and Slic3r. In order to create a model from a succession of cross-sections of a model, the 3D printer lays down successive layers of liquid, powder, or sheet material in accordance with the G-code instructions. The final shape of a model is created by joining or fusing these layers, which match the virtual cross sections from the CAD model.



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MODELLING OF CRANKSHAFT:

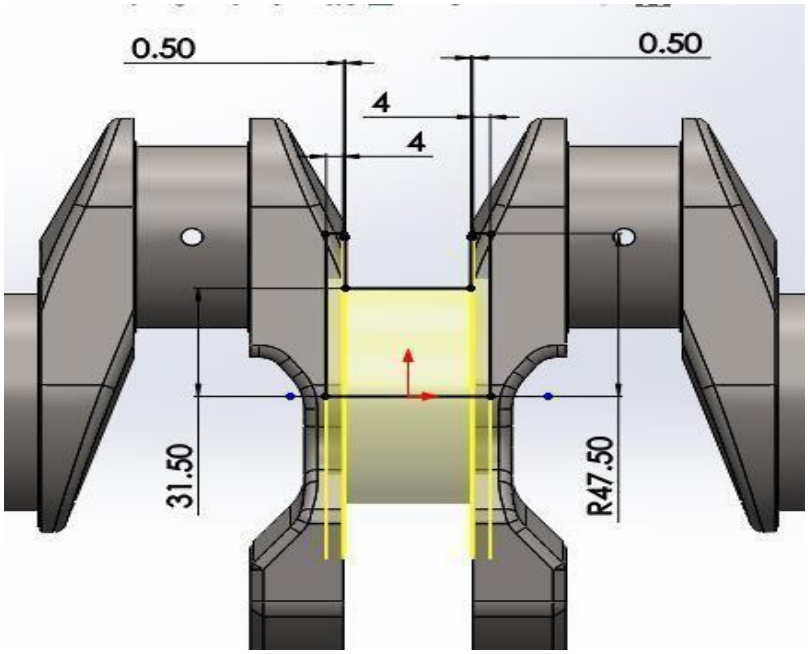

Figure 1.1: Creating Main Journal

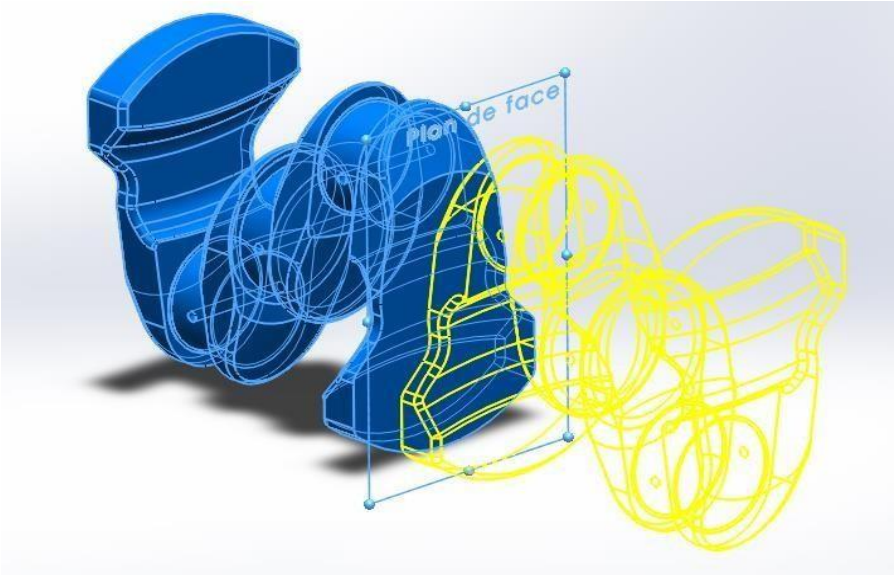

Figure 1.2: Creating Third and Forth Journals using Symmetry Operation.

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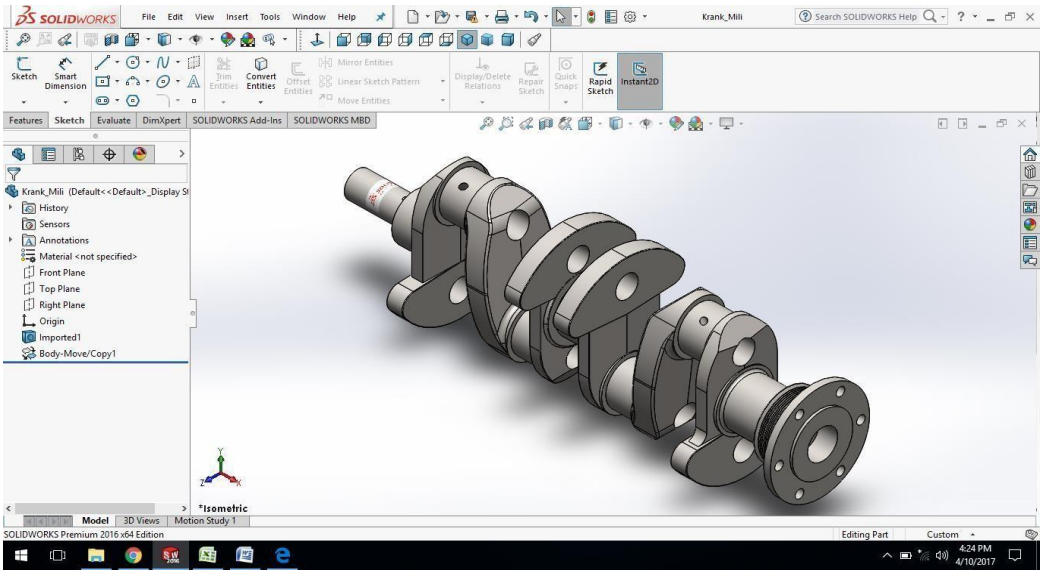

Figure 1.2: Crankshaft in Solidworks

All components can be drawn in Solidworks. Convert it to STL format and save it on your PC or computer.

RESULTS AND DISCUSSION:

The efficiency of FDM-based 3D printing technology was investigated using PLA material in the FDM machine. PLA filament, which is utilised in FDM, has a number of attributes. Because of its characteristics, PLA may change from a solid to a semi-liquid state in the print head with ease. The temperature range that FDM 3D printers can produce is restricted to 160 °C to 260 °C. Shear rate range for FDM processing in order to guarantee process stability during 3D printing. The wear resistance of PLA is mostly attributed to its hardness, which makes the material generally quite hard. PLA has a comparatively low glass transmission temperature. Even more sophisticated work technology is installed in FDM machines. With these printers, you may create and produce a range of 3D items in non-economical contexts in the modern world.

Figure 1.3: Input of a Component

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Figure 1.4: Output of a components

CONCLUSION

At the moment, the mechanical engineering sector is responsible for 3D printing procedures. It benefits the industry in various ways. Thus, more information is expected to promote this process and increase the level of adoption of 3D printing techniques. More information on 3D printing techniques will assist businesses in updating and enhancing their framework for 3D printing innovation. Consequently, an overview of his 3D printing manufacturing processes, materials, and many application kinds across several sectors are given in this article. This page will support scientists, researchers, and academics in their detailed study of 3D printing manufacturing processes and materials appropriate for certain uses. In relation to the filament material composition, extrusion processing parameters (e.g., B. extrusion speed and temperature), the kind of filament polymer, the specifications of the FDM machine, and his FDM working parameters.

ACKNOWLEDGEMENT

We wish to express our sincere thanks to Dr. H.S SAINI, Managing Director**,** Guru Nanak Institutions and Dr. KODUGANTI VENKATA RAO, Director**,** Guru Nanak Institutions Technical Campus, School of Engineering and Technology, for providing us with all the necessary facilities and their support.
We place on record, our sincere thanks to Dr. A. RAJ KUMAR, Professor and Head of the Department, Mechanical Engineering for their wholehearted co- operation,providing excellent lab facility, constant encouragement and unfailing inspiration.
We would like to say sincere thanks to Mr. G. Hazi Basha, Assistant Professor**.** Department of Mechanical Engineering for coordinating Projects.
We would like to say sincere thanks to our guide Mr. G. Hazi Basha Assistant professor, Department of Mechanical Engineering for Coordinating Projects for the suggestions and constant guidance in every stage of the project, we also like to thank all our lecturers helping us in every possible way. On a more personal note. we thank our beloved parents and friends for their moral support during our project.

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