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MODELLING AND 3D PRINTING OF 2WHEELER CARBURETOR

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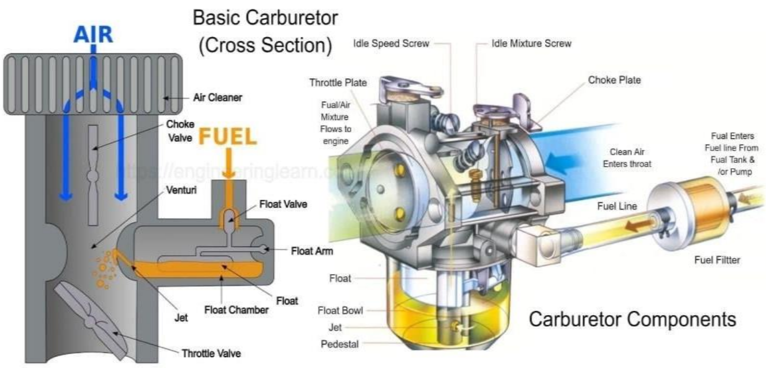
ABSTRACT
Carburetor is a most important component in fuel feed system of spark ignition engines. A carburetor is a device used by a gasoline internal combustion engine to control and mix air and fuel entering the engine. The main structure and largest component of the carburetor is the molded body made from a lightweight alloy or aluminum. This carburetor model is made in a modelling software i.e., SolidWorks and this review examines the use of SolidWorks software for modelling two-wheeler carburetors, exploring its benefits for creating accurate 3D models, simulations, and design communication. It analyzes existing research on modelling various carburetor components and functionalities in SolidWorks, considering factors like detail, design intent, and manufacturability. This study is made for the best 3D model of the carburetor.

Keywords:
Carburetor, spark ignition engines, SolidWorks, 3D models, modelling.

INTRODUCTION
A carburetor is a crucial component in the engine system of two-wheeled vehicles, commonly referred to as 2-wheelers. It plays a fundamental role in the combustion process by mixing air and fuel in the correct proportion for efficient engine operation. This introduction will provide a basic overview of the 2-wheeler carburetor, highlighting its function, components, and significance in the performance of these vehicles.
Function: The primary function of a carburetor in a 2-wheeler is to blend air and fuel in the right ratio to create a combustible mixture that can be efficiently burned in the engine cylinders. This mixture is essential for generating the power needed to propel the vehicle forward. The carburetor regulates the flow of air and fuel into the engine based on various factors such as engine speed, load, and throttle position.
Carburetor:



Carburetor

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Components: A typical 2-wheeler carburetor consists of several key components, each serving a specific purpose:

- **Air Intake:** This is the entry point for air into the carburetor. Air is drawn in through the intake manifold and passes through a filter to remove any contaminants before entering the carburetor.
- **Venturi:** Inside the carburetor, there is a narrowing called the venturi. As air passes through this narrow section, its velocity increases, creating a low-pressure area that draws fuel from the fuel bowl.
- **Fuel Bowl:** The fuel bowl stores gasoline which is supplied to the carburetor. The level of fuel in the bowl is regulated by a float and needle valve mechanism to maintain a consistent fuel-air mixture.
- **Throttle Valve:** The throttle valve, controlled by the throttle grip on the handlebars, regulates the amount of air entering the carburetor. As the throttle is opened or closed, the throttle valve adjusts accordingly to maintain the desired air-to-fuel ratio.
- **Main Jet and Pilot Jet:** These are small openings through which fuel is metered into the airflow. The main jet controls fuel delivery at higher engine speeds, while the pilot jet controls fuel delivery at lower speeds and idle.
- **Choke:** The choke enriches the fuel mixture during cold starts by restricting airflow, allowing for easier ignition in cold conditions.

3D PRINTING:

3D printing, also known as additive manufacturing, is a revolutionary technology that allows the creation of three-dimensional objects from a digital file. Unlike traditional manufacturing methods that involve subtractive processes (removing material from a solid block), 3D printing builds objects layer by layer, adding material where needed. This method offers unprecedented design freedom and customization possibilities.

The process of 3D printing typically involves the following steps:

- **Design:** The process begins with creating a digital 3D model of the object using computeraided design (CAD) software. This can be done from scratch or by modifying existing designs.
- **Slicing:** Once the digital model is ready, specialized software slices it into thin horizontal layers, which serve as instructions for the 3D printer.
- **Printing:** The sliced file is transferred to the 3D printer, which then begins the printing process. The printer deposits material layer by layer according to the sliced file, gradually building up the object.
- **Post-processing:** After printing is complete, some objects may require additional steps such as removing support structures, sanding, painting, or other finishing techniques to achieve the desired final appearance and functionality.

3D printing has found applications across various industries, including:

- **Prototyping:** 3D printing allows rapid prototyping, enabling designers and engineers to quickly iterate and test their designs before mass production.
- **Manufacturing:** In addition to prototyping, 3D printing is increasingly used for smallscale manufacturing of customized or low-volume parts, reducing tooling costs and lead times.
- **Healthcare:** The medical field has embraced 3D printing for producing patient-specific implants, prosthetics, surgical guides, and anatomical models for pre-surgical planning and training.
- **Education:** 3D printing is becoming a valuable tool in education, allowing students to visualize complex concepts, experiment with design, and gain hands-on experience in engineering and manufacturing.
- **Aerospace and automotive:** These industries use 3D printing for creating lightweight components, complex geometries, and customized parts for aircraft, spacecraft, and vehicles.
- **Consumer goods:** 3D printing enables the customization of consumer products, such as jewelry, fashion accessories, and home decor items.

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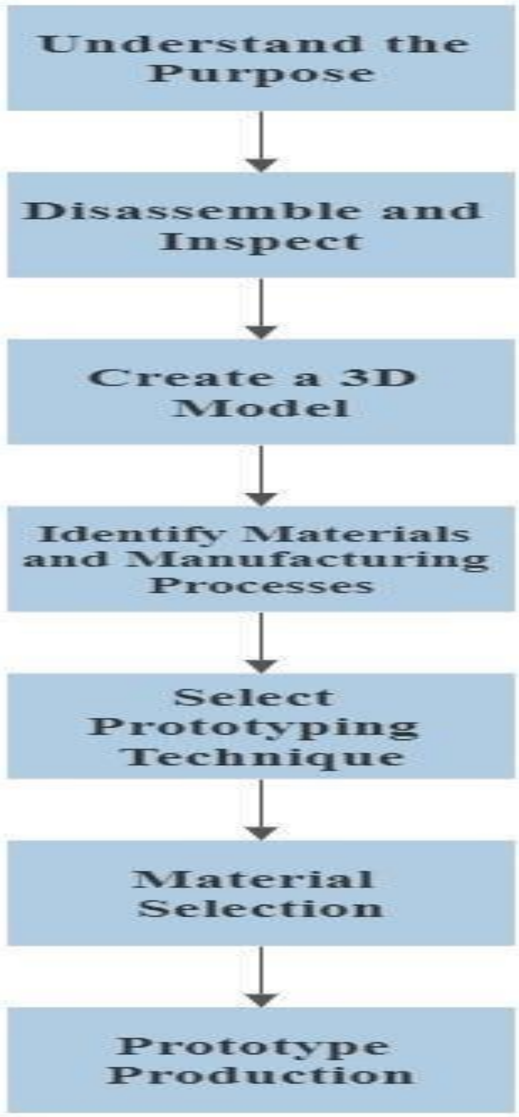
METHODOLOGY



PROBLEM STATEMENT:
Manual production relies on subtracting or shaping materials to form parts using specialized tools and molds, whereas 3D printing builds parts layer by layer from a digital design without the need for tooling. 3D printing excels in producing complex, customized parts efficiently and with minimal setup time, making it ideal for rapid prototyping and low-volume production

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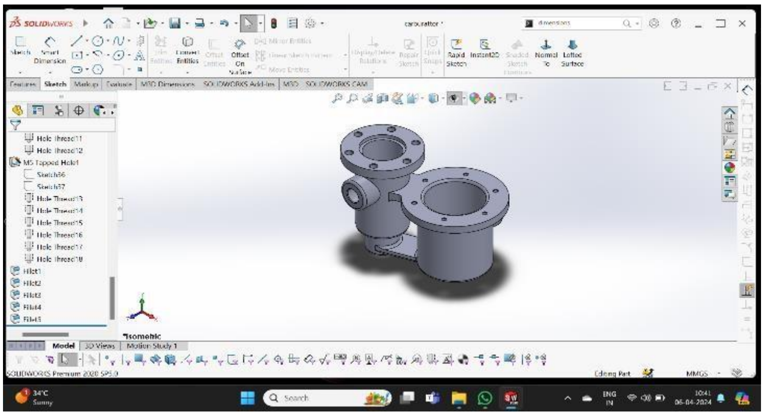
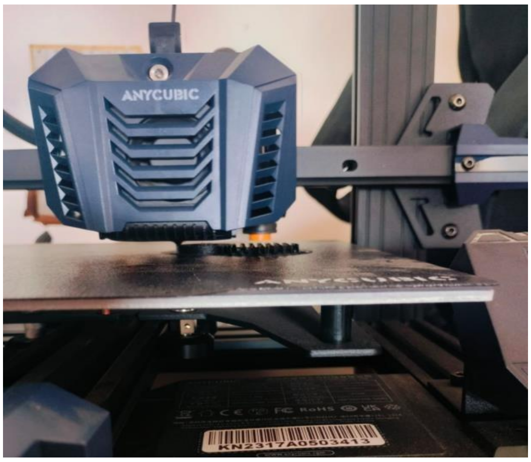


MANUFACTURING

Digital screen of 3D printer indicating



Printing a base of the component

Middle stage of printing the component

Final component

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The literature reviewed provides a comprehensive understanding of the design, analysis, and optimization of carburetor, particularly in the context of two-wheeler vehicles. The studies cover various aspects, including traditional and modern carburetor designs, material choices, manufacturing techniques, and performance evaluations. The findings reveal a continuous effort towards improving carburetor functionality, efficiency, and environmental sustainability. While traditional carburetors remain prevalent due to their simplicity and cost-effectiveness, modern advancements such as computational fluid dynamics (CFD) simulations, rapid prototyping, and additive manufacturing techniques offer opportunities for enhancing performance and addressing environmental concerns. Additionally, studies exploring alternative materials like eco-friendly plastics and ceramic composites highlight the importance of material innovation in carburetor design. Overall, the literature underscores the significance of ongoing research and innovation in optimizing carburetor performance to meet the evolving demands of the automotive industry, balancing efficiency, cost-effectiveness, and environmental considerations.

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