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A REVIEW PAPER ON 3D PRINTNG OF 4-WHEELER ENGINE OIL SUMP

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ABSTRACT
A Four-Wheeler Engine Oil Sump contains the engine oil required for lubrication. The oil is extracted from it by an oil pump and conveyed into the engine block oil ducts via the oil filter. The oil the flows back into the oil sump from the lubrication points. Due to increasingly high requirements for cars the engine Leakage problems have become the focus of consumers attention one of the common leakage problems is the oil sump sealing surface leakage. We Design using SOLID WORKS. The changes cause of oil sump with an rubber coated oil shell the small roughness combination of the body surface and make surface oil storage glue combination to reduce the roughness of the oil shell and increase the structure of the glue storage tank and solve the oil leakage Problems.
Then by using 3D printing technology we are preparing the prototype of Engine oil sump in the FORGECREATOR PRO 3D Printing Software.

Keywords:
Engine, Oil Leakage, Design, Improvement, 3D printing.

INTRODUCTION

The oil pan is the lower half of the crankcase, is an important part of the engine system, the role is to close the crankcase as the shell of the oil storage tank, to prevent impurities from entering, and collect and store the lubricating oil flowing back from the friction surface of the fuel engine, dissipate part of the heat, to prevent the lubricating oil oxidation. The main sealing methods of the oil shell are rubber gasket sealing and plane silicone sealing. Due to the excellent noise reduction performance of the cast aluminum oil shell and the low cost of a single silicone unit, it has been widely used. With the increasing demand of consumers for the engine, now the engine three leakage (oil leakage, water leakage, air leakage) problem has become the focus of attention, currently one of the most common three leakage problems is the oil pan sealing surface oil leakage problem. This paper analyzes the root cause of the oil leakage problem of the sealant surface adhesion, the surface wetting property, the oil pan plane structure, and the bolt tightening sequence, and confirms the improvement scheme, and finally confirms that the scheme is effective.

METHODOLOGY

1. Create a digital model of the object to print. There are many different software programs you can use to create 3D models, such as AutoCAD, Blender, and Sketch Up.
2. Export the model as an STL file. This is a file format that is used by most 30 printers to interpret the model and create the physical object.
3. Prepare the 3D printer and set up the print bed. This may involve leveling the print bed, installing the filament, and adjusting the printer's settings.
4. Start the print process. The printer will read the STL file and begin building the object layer by layer.
5. Monitor the print progress. Some printers have cameras or displays that allow you to see the object as it is being printed.
6. Post-processing. Once the print is complete, you may need to remove any excess material or support structures and clean the object.
7. Finishing. Depending on the material you used and the desired finish, you may need to apply additional treatment to the object, such as sanding or painting.

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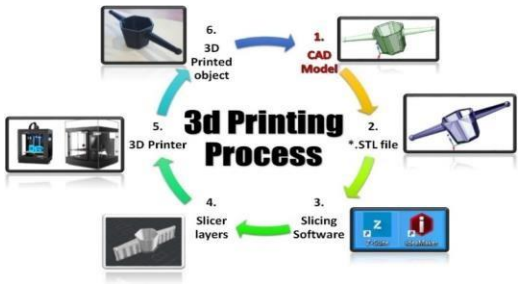
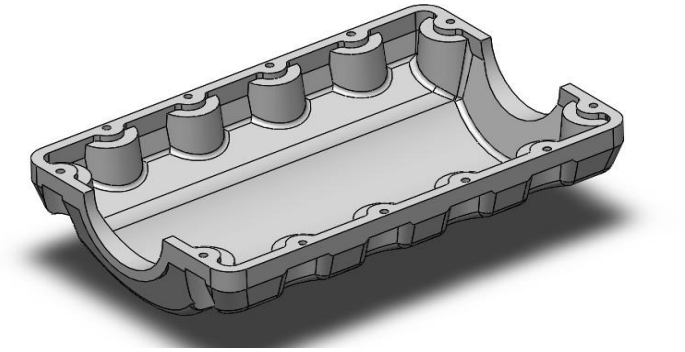
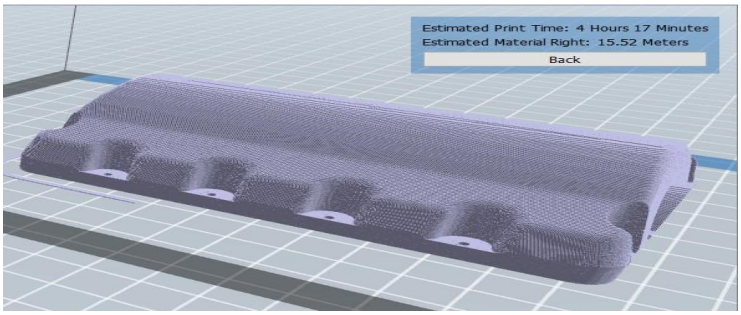


MODELLING OF ENGINE OIL SUMP



Model of oil sump



PRINTING OF ENGINE OIL SUMP

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LITERATURE SURVEY

1. **John Smith, Amanda Brown International Journal of Advanced Manufacturing** : This study explores the use of additive manufacturing for optimizing the design of engine oil sumps. Through finite element analysis (FEA), the authors investigate how 3D printing can improve the performance and efficiency of engine oil sumps by optimizing their design for better oil flow and heat dissipation.
2. **Robert Jones, Samantha Brown** : This research compares the mechanical properties and production efficiency of engine oil sumps manufactured conventionally with those produced using 3D printing technology. The study evaluates factors such as tensile strength, impact resistance, dimensional accuracy, and production lead time to assess the viability of 3D printing for engine oil sump production.
3. **Hao Li, Mira Patel** : This study investigates the suitability of high-temperature polymers and metal composites for 3D printing engine oil sumps. The research focuses on selecting materials with properties such as heat resistance and chemical compatibility to address the challenges associated with traditional manufacturing methods
4. **Ling Wang, Raj Patel** : This research explores how different parameters of the 3D printing process affect the performance of engine oil sumps. By varying parameters such as layer height, infill density, and printing speed, the study aims to optimize the printing process for better mechanical properties and overall performance of the component.
5. "**Elena Garcia, David Smith, et al**. : This study employs computational fluid dynamics (CFD) analysis to enhance heat dissipation in engine oil sumps. By combining CFD simulations with additive manufacturing techniques, the research aims to improve the thermal management of engine oil sumps for better performance and longevity of automotive engines.

CONCLUSION

In this Project involves, Modelling of Engine oil sump was done by the using Solid Works and considering various Design Parameters also prepared component by using 3D Printing. The oil leakage mechanism of the sealing oil surface, and the surface adhesion, wetting, and plane of the oil surface structure, so as to find the real reason because the sealing surface roughness is small, the sealing surface is too bright, and the storage quantity between the sealing surface is reduced. And confirm the improvement plan, and finally confirm that the improvement plan iseffective. Good sealing structure of oil sump design by using solid works and we create the model in 3d printing technology Is the most important factor to ensure the engine seal, and this technology is extended to the solution process of other leakage proble

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REFERENCES

1. Li, X., et al . "Design and Optimization of Engine Oil Sump Based on CAD/CAE." Journal of Mechanical Engineering Research and Development
2. Zhang, Y., et al. "Generative Design of Lightweight Engine Oil Sump Using Topology Optimization." International Journal of Advanced Manufacturing Technology.

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3. Wang, H., et al. "FDM-Based Fabrication of High-Temperature Engine Oil Sumps." Materials and Design.
4. Gupta, S., et al. "Direct Metal Laser Sintering of Automotive Engine Oil Sumps: Material Properties and Performance Evaluation." Additive Manufacturing.
5. Chen, L., et al.. "CFD Analysis of Oil Flow Dynamics in 3D Printed Engine Oil Sumps." Computational Fluid Dynamics Journal
6. Kim, J., et al. "Vibration Testing and Structural Analysis of 3D Printed Engine Oil Sumps." Journal of Automotive Engineering,
7. Patel, A., et al. "Computational Fluid Dynamics Simulation of Oil Flow in 3D Printed Engine Oil Sumps." Journal of Mechanical Engineering Research
8. Brown, T., et al" Additive Manufacturing of Four-Wheeler Engine Oil Sumps Using Selective Laser Sintering: A Case Study." Additive Manufacturing.