
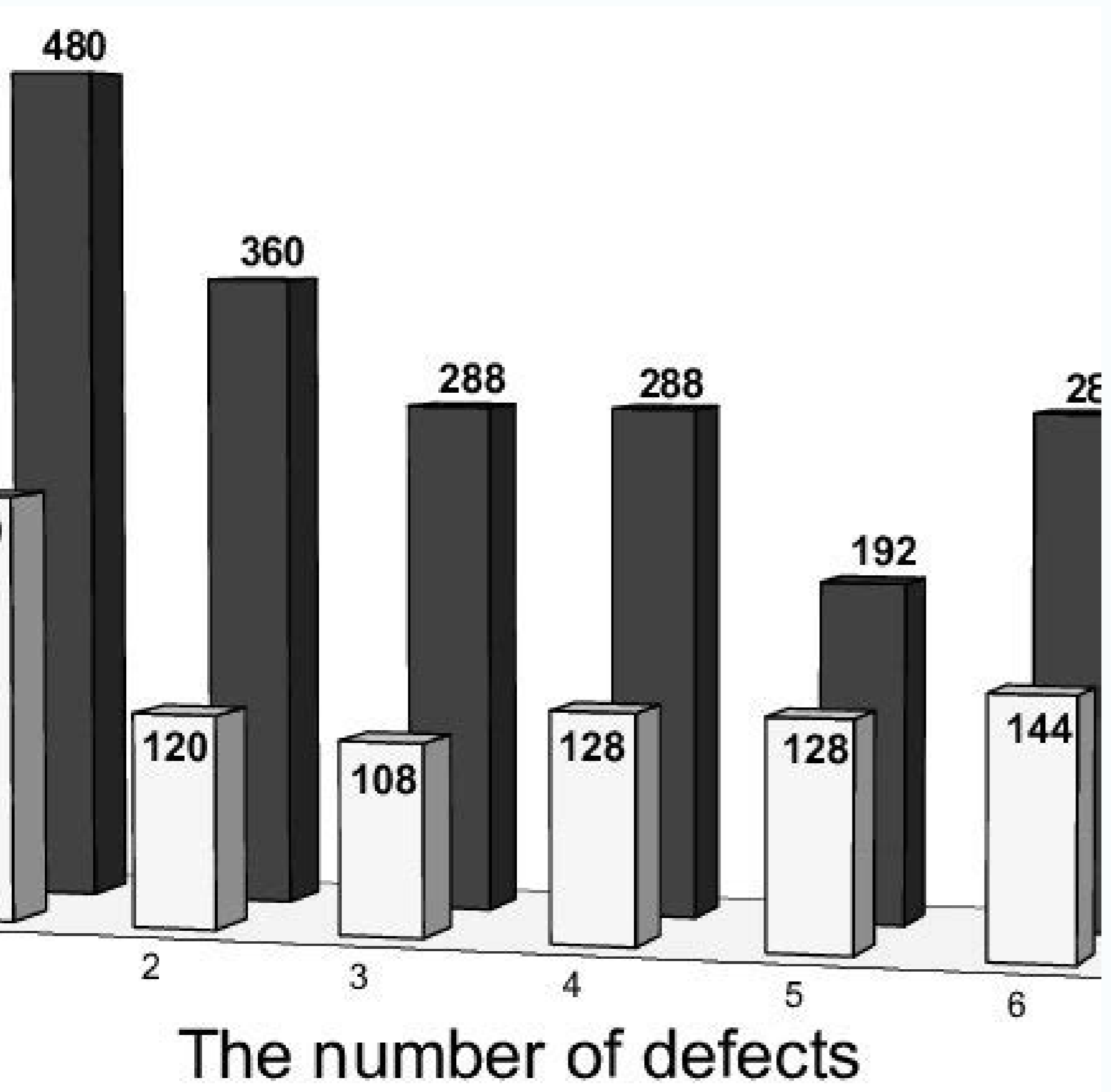
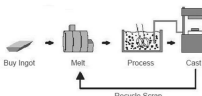


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MATEC Web of Conferences 31, 03004 (2015)
DOI: 10.1051/mateconf/20153103004
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Die Casting Mold Design for Aluminum Alloy Shell of Instrument

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Abstract. This paper is about die casting mold design for aluminum alloy shell of instrument. Three-dimensional model of the casting and mold are designed by using Pro/Engineer and AutoCAD which can analyze forming quality. Digital design and theoretical calculation can greatly shorten product development cycle and mold design cycle, improve the accuracy of product design and mold design, and reduce the cost of mold design.

1 Introduction

Die casting mold is one of the main tools for die casting forming. The level of quality, precision, manufacturing cycle and production efficiency affects the quality, costs and upgrade of products directly. With the appearance of new varieties of alloy and the high request structure of products, mold design process is becoming more and more complex. Using die casting mold CAD/CAM technology in this paper, which fundamentally change the traditional way of product development and mold processing, greatly improve the quality of the product, shorten the development cycle, reduce the production cost.

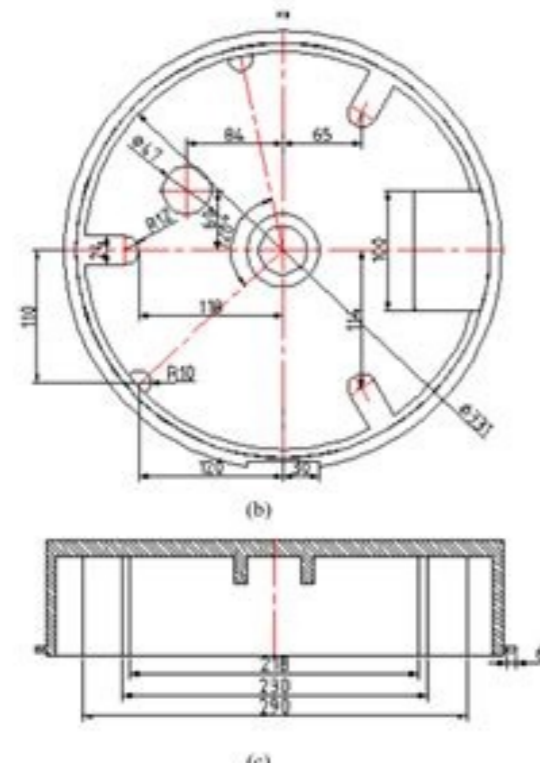
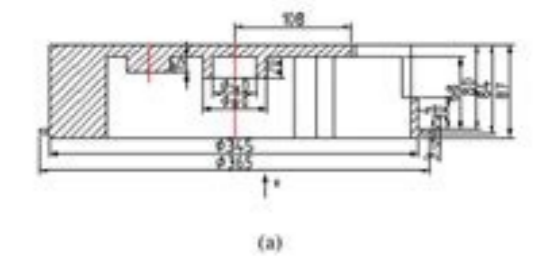


Figure 1. The two-dimensional diagram for shell of instrument.

2 Surveying and mapping of casting

The casting for aluminum alloy shell which is made of ZL101 is Surveyed and mapped by vernier caliper. The two-dimensional diagram for shell of instrument is shown in Figure 1.



3 Selection of the die casting machine

Using J1113G die casting machine, the parameters are as follows:

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Thermal and Static analysis of an IC Engine Piston

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Abstract – In an Internal Combustion Engine, Piston is one of the major parts of the combustion cycle. In the Process of increasing efficiency and power of the engine, thermal and static loads on the piston increases resulting in reliability issues and breakdown of component before the completion of its life cycle. Pistons need to be light in weight so that we don't have to use a lot of counter weight on the crank shaft to balance it and so, keep the engine weight to minimum. Also, a heavier piston will generate lot more vibrations than a lighter one. One more factor to be considered is the Thermal Expansion of the material, since to improve efficiency the tolerance space between the cylinder wall and piston should be minimal. But at the same time, we need to ensure that the piston is thermally sound and strong enough to withstand the loads. This paper discusses about the thermal loads and static stress applied on the piston during the power stroke using four different materials chosen on the basis of strength, density, Thermal Conductivity. The parameters for the simulation are combustion cylinder pressure, temperature and material properties of piston. Analysis is performed using Autodesk Fusion 360. The results are used to develop a trade-off between the material selected for piston.

Key Words: Piston, Deformation, Thermal stresses, Static-stress, Autodesk Fusion 360, Titanium, Aluminium 7075, Aluminium 6061, Grey Cast Iron A48 Grade 40.

1. INTRODUCTION

An An Internal Combustion Engine is that kind of prime mover that converts chemical energy to mechanical energy. To increase the efficiency and power of the engine, new manufacturing techniques have been developed with accurate tolerance to the parts. With all this new innovation, parts get subjected to even more thermal and static loads and have to be complaint in order to function as intended.

1.1 Piston

Piston is a component in reciprocating engines. It is the two and for moving component that is contained by a cylinder and is made gas tight by piston rings. Its purpose is to transfer force from expanding gas to the crankshaft via a connecting rod.

The piston design on the picture is widely used in diesel engines. Maximum pressure in the combustion chamber can reach 7MPa and maximum temperature of the piston surface can exceed 900 ° C. Therefore, it is important to improve the cooling of the piston Gas sealing is achieved by use of piston rings.



Fig -1: CAD model of piston

These are a number of narrow iron rings, fitted loosely into grooves in the piston, just below the crown. The rings are split at a point in the rim, allowing them to press against the cylinder with a light spring pressure. Two types of ring are used: the upper rings have solid faces and provide gas sealing; lower rings have narrow edges and a U-shaped profile, to act as oil scrapers. For our study, Piston in an IC engine must have

- Good resistance to distortion under heavy forces and high temperatures.
- High heat dissipating rate.
- Minimum weight but enough strength to resist the pressure

2 STUDY MATERIALS

The materials chosen for this work are Aluminum 7075, Aluminum 6061, Gray Cast Iron A48 Grade 40, Titanium. The relevant mechanical and thermal properties of these materials and alloys are listed in the tables below.

2.1 Aluminum 7075

Aluminum 7075Has the least yield, ultimate strength and

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Grey cast iron has an excellent capacity for damping because it observes the energy and turns it into heat. It is called after the gray color of the fracture that forms, which is due to the presence of Graphite. Mantharan, 2019, Design and analyze Piston's head by using computer software, JOURNAL INTERNATIONAL DE INGENIERING RESEARCH " TECHNOLOGY (IJERT) ETEDM, Open Access Total Downloads : 97 Authors : S. Drawing software is defined as a computer program to create art on the computer. The design of the piston is carried out using SOLID WORKS and CREO software, the thermal analysis is performed by means of the analysis of finite elements (FEA). We have been selected for piston analysis and created a piston head 13.65 Mpa and 19.649 N in these two materials. In 1900, the steam engines were used to power rail ships and locomotives; today two and four-stroke diesel engines are used. Before 1950, the aircraft depended almost exclusively on the piston engines. According to the editor, more than a million engineers and designers from over 165,000They were using solid works. CREO aluminum alloy principle In this course, you will learn basic modeling skills and will quickly be competent with Creo Parametric 4.0. Items included##### I mean, I don't know. stresses, strains, length, diameter of piston and hole, thicknesses, etc., parameters are taken into consideration Design Considerations for a Piston. After completing the course, you will be well prepared to work effectively on product design projects using Creo Parametric 4.0.At the end of each module, you will complete a set of review questions to reinforce critical topics from that module. Solid works is a solid modeler, and utilizes a parametric feature based approach which was initially developed by PTC (creo /pro engineer) to create models and assemblies. Gopuraj, R. The course also includes a comprehensive design project that enables you to practice your new skills by creating realistic parts, assemblies, and drawings. Skip to content DOI : 10.17577/IJERTCONV7IS060642 Download Full-Text PDF Cite this Publication S. Jibhakate, Thermal Analysis and Optimization of I.C. Engine Piston Using Finite ElementMethod, International Journal of Modern Engineering Research (IJMER), Vol.2, Issue-4, pp.2919-2921, 2012. INTRODUCTION An internal combustion engine is defined as an engine in which the chemical energy of the fuel is released inside the engine and used directly for mechanical work, as opposed to an external combustion engine in which a separate combustor is used to burn the fuel. M. Drawing software are the computer assisted drawing programs used by engineers. The software uses the Finite Element Method FEM is a numerical technique for analyzing engineering designs. The microstructure solver computes the evolution of different phases and predicts local density variations, which provide more realistic porosity results. Piston Design The piston is designed according to the procedure and specification which are given in the dimensions are calculated in terms of SI Units. The part it plays in our everyday life is such that it is difficult to realise that a century ago the metal was still a comparativelymity. 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Cylinder head porting refers to the process of modifying the intake and exhaust ports of an internal combustion engine to improve their air flow. Cylinder heads, as manufactured, are usually suboptimal for racing applications due to being designed for maximum durability Ports can be modified for maximum power, minimum fuel consumption, or a combination of the two, and . Cold forging is a metal shaping & manufacturing process in which bar stock is inserted into a die and squeezed into a second closed die. The process, completed is at room temperature or below the metal's austenite temperature, to form a metal into a desired shape or configuration. 01/04/2001 . This was the same casting that was used in the SOHC 4.0L for '97 and '98, so the cranks from both engines can be interchanged, in spite of the fact that Ford gave them different part numbers. 1999-2000. The XL2E-BA casting that was introduced in '99 was used up through 2000 when the OHV engine was discontinued. It is an 'I' shape structure whose one end is connected to piston and other one to crankshaft. The piston side end of connecting rod has hole in it. And we have also got a hole in piston's cylindrical structure just beneath the piston rings. So we align this hole with connecting rods hole and put a wrist pin through it. This two-step process is beneficial in that lower pressure velocities are created by the dual pressure drops, which is important with slurry applications. The flow rate of a full-port valve is determined by the decreasing flow area of the ball's hole as the valve moves through the quarter-turn motion, providing an inherent equal-percentage characteristic with a true circular opening. 29/05/2022 . Price: \$44.99 Quantity: 60 CBD type: Full-spectrum Dosage: 15 milligrams (mg) Better Business Bureau rating: A+ Trustpilot rating: 1.9 out of 5 stars Charlotte's Web Daily Wellness CBD Gummies ... 07/06/2022 . Welcome to CNCTimes. We are an online portal for the CNC machine industry and manufacturing domain. Our aim is to bring knowledge, information and success stories of people from this industry. With a full-factory racing look and high-tech in-mold application, sponsor logos and graphic design elements are sure to stay put - even after a full season of hard racing. Decals There is no mistaking the KTM 250 SX-F FACTORY EDITION for anything else at the starting gate. These are used to maintain a pressure-tight seal between the piston and cylinder walls and also it transfers the heat from the piston head to cylinder walls. These rings are fitted in grooves that have been cut in the piston. They are split at one end so they can expand or slipped over the end of the piston. Function of Piston rings: 1.

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