ISSN No: 2348-4845
International Journal & Magazine of Engineering, Technology, Management and Research
A Peer Reviewed Open Access International Journal

Design and Analysis of Four Cylinder Engine Block by Using F.E.A

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Abstract:
A cylinder block is an integrated structure comprising the cylinder(s) of a reciprocating engine and often some or all of their associated surrounding structures (coolant passages, intake and exhaust passages and ports, and crankcase). The term engine block is often used synonymously with "cylinder block". In the basic terms of machine elements, the various main parts of an engine (such as cylinder(s), cylinder head(s), coolant passages, intake and exhaust passages, and crankcase) are conceptually distinct, and these concepts can all be instantiated as discrete pieces that are bolted together. Such construction was very widespread in the early decades of the commercialization of internal combustion engines (1880s to 1920s), and it is still sometimes used in certain applications where it remains advantageous (especially very large engines, but also some small engines).

However, it is no longer the normal way of building most petrol engines and diesel engines, because for any given engine configuration, there are more efficient ways of designing for manufacture (and also for maintenance and repair). These generally involve integrating multiple machine elements into one discrete part, and doing the making (such as casting, stamping, and machining) for multiple elements in one setup with one machine coordinate system (of a machine tool or other piece of manufacturing machinery). This yields lower unit cost of production (and/or maintenance and repair). Today most engines for cars, trucks, buses, tractors, and so on are built with fairly highly integrated design, so the words "mono block" and "en bloc" are seldom used in describing them; such construction is often implicit.

Thus "engine block", "cylinder block", or simply "block" are the terms likely to be heard in the garage or on the street.

INTRODUCTION:

The first successfully working internal combustion engine used in an automobile was built by Siegfried Marcus in approximately 1864 [1]. It was an upright single-cylinder, two-stroke petroleum-fuelled engine that also utilized a carburetor to deliver fuel to the engine. The engine was placed on a cart with four wheels and successfully ran under its own power. Not only has Marcus produced the first engine that is the direct predecessor to today's engines, he had also built the first automobile in history, some 20 years before Gottlieb Daimler's automobile. Today's engines are an integral component of an automobile that are built in a number of configurations and are considerably more complex than early automotive engines. Technological innovations such as electronic fuel injection, drive-by-wire (i.e., computer-controlled) throttles, and cylinder-deactivation have made engines more efficient and powerful. The use of lighter and stronger engineering materials to manufacture various components of the engine has also had an impact; it has allowed engineers to increase the power-to-weight of the engine, and thus the automobile. Common components found in an engine include pistons, camshafts, timing chains, rocker arms, and other various parts. When fully stripped of all components, the core of the engine can be seen: the cylinder block. The cylinder block (popularly known as the engine block) is the strongest component of an engine that provides much of the housing for the hundreds of parts found in a modern engine.

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Since it is also a relatively large component, it constitutes 20-25% of the total weight of an engine [2]. Thus there is much interest in reducing the block's weight. Each cylinder bank of a V engine (that is, each side of the V) typically comprised one or several cylinder blocks until the 1930s, when mass production methods were developed that allowed the modern form factor of having both banks plus the crankcase entirely integrated. A wet liner cylinder block features cylinder walls that are entirely removable, which fit into the block by means of special gaskets. They are referred to as "wet liners" because their outer sides come in direct contact with the engine's coolant. In other words, the liner is the entire wall, rather than being merely a sleeve.

Wet liner designs are popular with European manufacturers, most notably Renault and Peugeot, who continue to use them to the present. Dry liner designs use either the block's material or a discrete liner inserted into the block to form the backbone of the cylinder wall. Additional sleeves are inserted within, which remain "dry" on their outside, surrounded by the block's material. With either wet or dry liner designs, the liners (or sleeves) can be replaced, potentially allowing overhaul or rebuild without replacement of the block itself; but in reality, they are difficult to remove and install, and for many applications (such as most late-model cars and trucks), an engine will never undergo such a procedure in its working lifespan. It is likelier to be scrapped, with new equipment—engine or entire vehicle—replacing it.

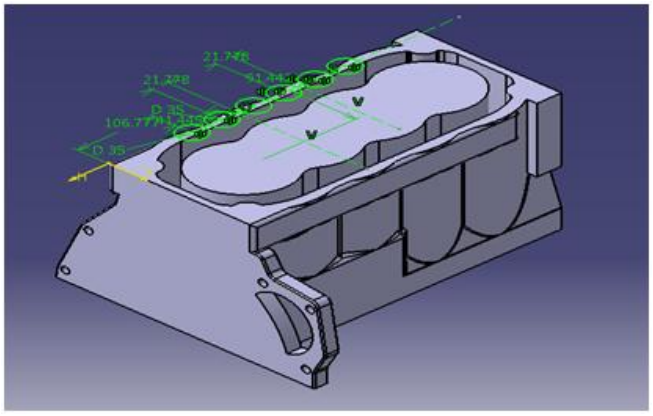
This is sometimes rightfully disparaged as a symptom of a throw-away society, but on the other hand, it is actually sometimes more cost-efficient and even environmentally protective to recycle machinery and build new instances with efficient manufacturing processes (and superior machine performance and emission control) than it is to overvalue old machinery and craft production. Functional Requirements of a Cylinder Block Because engine blocks are a critical component of an engine, it must satisfy a number of functional requirements.

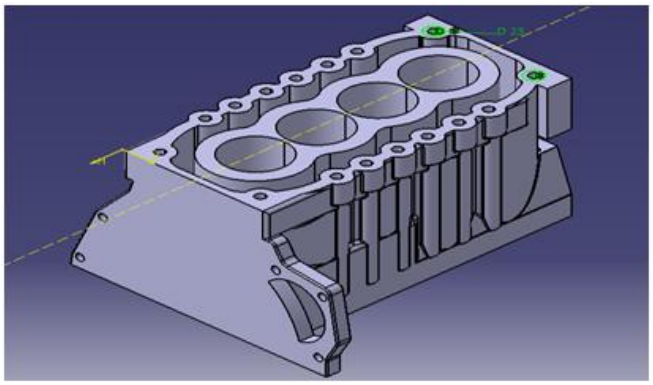
These requirements include lasting the life of the vehicle, housing internal moving parts and fluids, ease of service and maintenance, and withstand pressures created by the combustion process.

MODULES IN CATIA

Sketch module:

Sketcher module enables us to create sections. Sketcher technique is used in many areas of Catia. Using Sketcher mode, we can create geometry without regard to the exact relationships between parts of sketch or the cxact value of dimensions, when we generate the sections, Catia makes explicit assumptions. For example if we draw nearly horizontal line, it becomes exactly horizontal and all these assumptions are displayed graphically.





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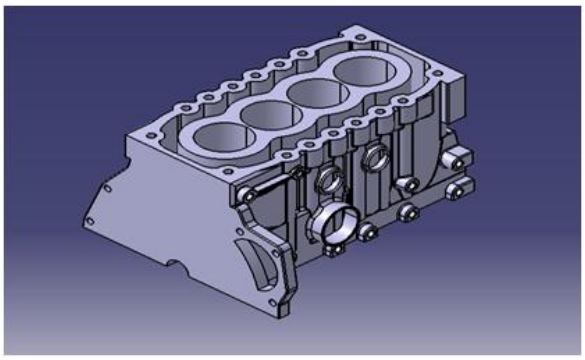
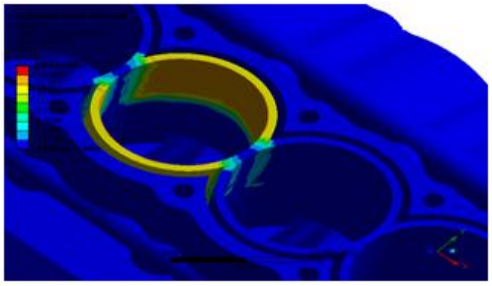
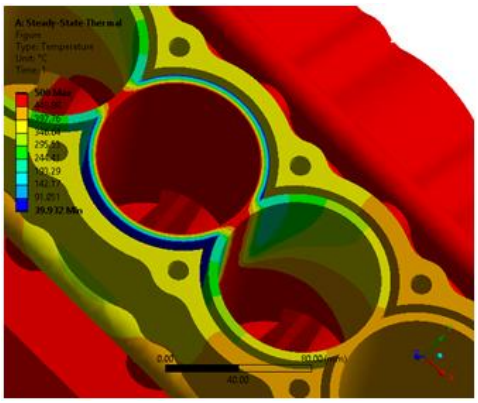
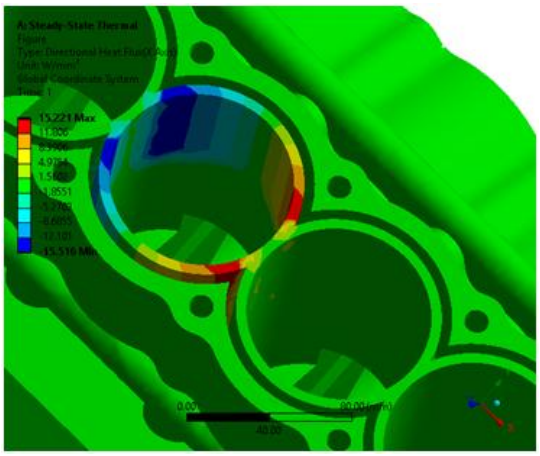


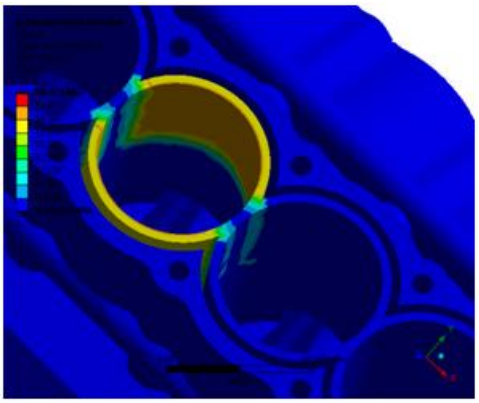


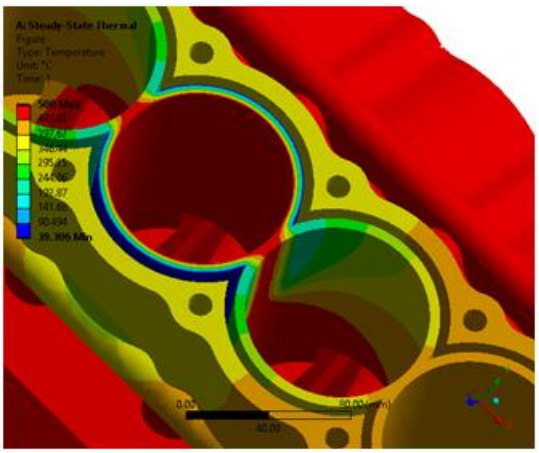


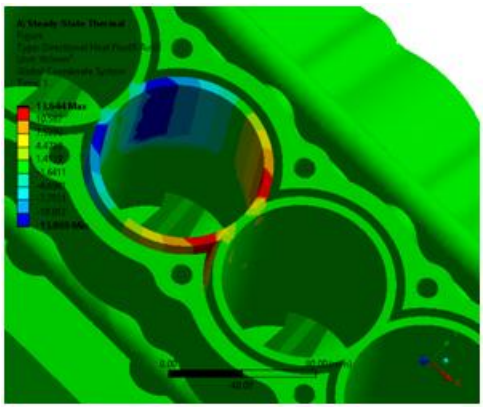
Steady-State Thermal (A5)-Temperature



Steady-State Thermal (A5) -Directional Heat Flux Magnesium Alloy







RESULT

INTIAL TEMPERATER =40^{0}C

TOTAL TEMPERATER =500^{0}C

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1ST MATERIAL		2ND MATERIAL
ALUMINIUM ALLOY		MAGNESIUM ALLOY
TOTAL HEAT FLUX	20.641 W/MM^2	18.473 W/MM^2
X-AXIS HEAT FLUX	15.221	13.644

CONCLUSION:

According to these two materials we undergo the thermal analysis of the four cylinder engine block, we find out the regarding aluminium alloy the magnesium alloy will take low heat flux, so magnesium alloy suitable to four cylinder engine block.

REFERENCES:

1."ASME Landmark: Additional Information on Marcus car," [Online], 20 March 2005-last update, Available: http://www.asme.org/history/attachments/marcus1.html.

2. Keay, Sue: "Diet of Australian metal lightens cars and pollution," Media release, 14 October 2002.

3. Anyalebechi, P.N., Private Communication.

4. "Anatomy of an Engine – the New North star V8," [Online], 7 April 2005-last visited,Available: http://www.autospeed.com/cms/A_1569/article.html.

5. "In Search of Light-Weight Components," [Online], 6 April 2005-last update, Available:

http://www.moderncasting.com/archive/WebOnly/1102/AL1102.asp.