Design and Analysis of Compressor Fins Thermal Distribution

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Abstract : **Most air conditioners are responding piston or rotary or rotary type. Centrifugal Compressors are common in the most important parts such as providing high pressure air to fill the gasoline cylinders, which provide many pressures pneumatic equipment for power purchase. In the hot summer heat it can be made in two ways, generating heat friction and upward air pressure pressure Then this heat turns to the pressure below fur As trainers we pay close attention to them beware of the things which are more than enough to improve the floor plan or the preparation of fog transfer from the surface to the surrounding water. Chun determine the heat transfer rate of the coil, we must first find the temperature distribution the pyramid.**

In this work we modified the different shapes of the fins for unpack and select the cold cluster collection. Finite Element (FEM) is important to the statistics methods used in technical analysis. In this work the rectangular cut is like triangle, triangle, hole, and bulge of aluminum nitride and aluminum alloy A204 best for unpacking. Analyzing similar symbols third - heat transfer rate, fin efficiency and useful in low heat and forced heat transfer method.

Keywords: Fins Optimization , Analysis

I. INTRODUCTION

1.1 INTRODUCTION TO COMPRESSOR

It is the air pressure from the lowest pressure to the highest pressure in the regeneration of the compressor, and the temperature with the highest temperature produced is around 230-250 °C. It is caused by the high temperature inside the new fuel cell cylinder between the leading parts in the transport or welding moving parts. Therefore, reducing the temperature to a safe level means 150-200°C where an efficient compressor is required. The compressor is very efficient. Increasing cooling also reduces heat capacity. Therefore, the main purpose of a refrigeration system is to keep the compressor running at its most efficient operating temperature. It is well known that the compressor does not have accurate measurements when cold and therefore the design prevents cooling until the engine is hot and reaches a very high operating temperature, and then starts up. to cool down, to cool.

1.2 HEAT DISTRIBUTION IN RECIPROCATING COMPRESSOR

About 30-33% of the heat generated is converted into a useful function, meaning the crankshaft function, and about 30-35% of the generated heat energy is conveyed by pressure. The remaining 35 heaters need to be pushed into space by some kind of thermal energy. The temperature of the cylinder reaches 2700K (for an average operating temperature the inner wall of the cylinder block stays between 150 and 200°C) or the compressor material higher than the maximum operating temperature is very causal and if the probability of failure is higher, the probability of failure will be higher. too hot (excessive heat). Heat removal is essential to protect the compressor and compressor oil from overheating failure. On the other hand, it is useful to use a compressor that is as hot as possible to increase the air temperature of the compressor.

1.2.1 Classification of Compressor cooling

There are mainly two types of engine cooling systems:

(i) Air Cooled and
(ii) Water Cooled System.

During operation in the air cooling system, the cylinder area is increased with the help of components. Water

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cooler water system jacket around cylinder and engine head. Cold water circulates through it with the help of a cooling pump and is compact. The heat is transferred by the cold water circulation.

1.2.2 Air Cooling System

Small enough (1.5-10 KW) Auxiliary compressor and aero jet engine mainly use air cooling system Reconditioned air. In this system, the cylinder walls and cylinder head are provided with rails or additional clearances. The heat generated by the compressed air in the compressor cylinder will be for movement to the shafts and this heat will be reduced to the air if air is flowing over the particles. The amount of heat removed from the air depends on:

- Flowing air amount
- Surface area and
- Material Used

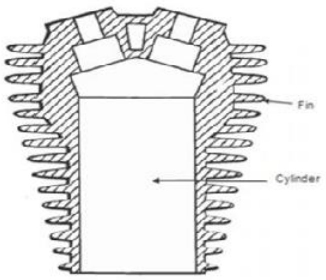


Fig. 1.1 Fins on Compressor Cylinder

Normally air-conditioned motor cars are shown as shown in Figure 1.1 Compared to a water cooling system air cooling system is better in maintenance and performance , it has a system requires less space and requires no radio, cooling fan and pump, so This system is lightweight. Again, this system does not use cold water, later no issues with cold water dripping and freezing.

1.3 FINS

Circuit tubes are widely used in many engineering disciplines such heat stroke. Extreme heat reduction-minimum weight combustion temperature systems that are, important in new applications such as electronic systems, compact heat exchange and the well-known engine and aerospace industry. From the data, the effect of blade geometry so far uneducated and also not all physical thermoforms are considered corresponds to the temperature. In this function, the corresponding laminar heat number is switch in circular pipes with four identical long fins conical lateral profile is made. last three modes angles including different halves (g = 14o, g = 16o and g = 18o) is estimated and also all thermo physical buildings are considered temperature highly dependent on water depending on operating system temperature properties become a function of heat. Such problems are common forms in the manufacture of compact heat exchangers. Usually buildings Substances that take into account the actual temperature of the water and water. The result thus obtained is valid only for the intended location. Temperature corresponds to the actual temperature. A building in this work differentiation is carried out as well as pump length. So this will work it provides a fixed solution to the overheating problem.

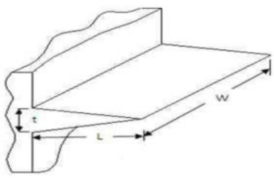
1.3.1 Needs of Fins

The resulting heat is suitable for heating the oil inside the cylinder or for molding or fabrication inside. Passing through walls or borders, the cylinder must always be lowered to it., the environment or area to keep the system in a stable state. It's big the amount of heat must be removed from a small area such as overheating and convection. Between the face and the surrounding air. Can be enlarged with a thin joint stretched metal lines called pins at the top of the cylinder. The second is common area is expanded in this system. If the space available for heating is insufficient provides a significant amount of heat with the current temperature drop and convective heat transfer coefficient increases with surface area adhesion space added. These are called pins. Thus the instruments effectively increase The heat exchange rate and therefore the heat reduction prices have also increased. In there is a search function, the instruments have the same features and the whole side is checked...

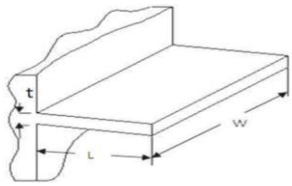
1. Natural convection 2. Forced convection

1.3.2 Theory of Fins

Removal of excess heat from systemic materials is important to prevent the effects of heat or heat. Therefore, the promotion of heat transfer is an important study of thermal engineering. Heat dissipation from the surface can be increased by increasing the amount of heat dissipation between surfaces and surrounding surfaces, by increasing the thermal conductivity of the surface, or both. In most cases, the heat sink area is enhanced by the use of multiple pin-shaped screws attached to walls and areas. Extra fins are commonly used in heat exchange equipment to increase heat exchange between the surface area and the surrounding water. Different types of shapes are used, from light geometry to hard geometry. Some of the most common parallel magnetic angles are shown in the figure.



Triangular Fin



Rectangular fin

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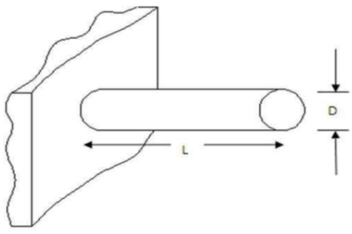
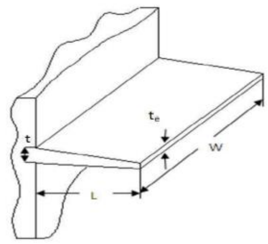
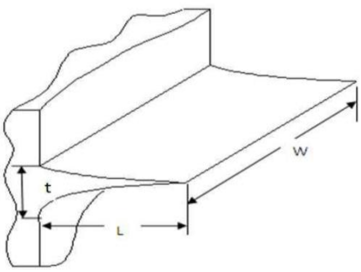


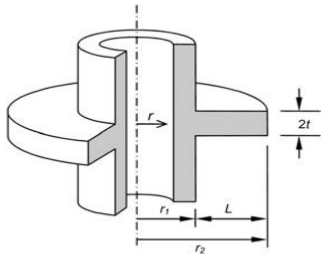
Cylindrical fin



Trapezoidal fin



Parabolic fin



Circular Fin

Fig. 1.2 Different Types of Fins

One of the first goals in the modern design of heating systems, success of a harmonious and effective heat sink. To reduce loss of energy due to inactivity and increased energy heat form has become the most important design systems engineers warming up considering the increase in global energy is necessary. This work requires the use of high-temperature heat and high temperatures. Coefficients of variation and increased compactness of space. Focus selection / design heat exchanger required space or power load selected water is gas. Metals such as heat exchangers for development products Widespread.

Therefore, the wires must be designed to withstand high temperatures. Given the freedom to spend, with less money to spend The design of the final structure. Numerous studies have been done in the preparation of final forms. Consider the distribution of temperature inside fine to choose it to pressures that provide maximum performance. Extended space or rails It is widely used to increase the heat exchange between the solid surface and its surface. many engineers and industries meet water in hide and seek cooling of combustion engines, electrical appliances, many types of heating swaps etc. As a result, more attention was drawn to them. There were lots of lessons about problems and different types of shit till the end has been brought. The most studied topics are long, equal, three sides, trapezoidal wings and a hidden fin when rolled. The heating method recommended in many studies, pure convection or pure radiation. In use where tools work for free if it is created in the convection area, the radiation contribution is equal important and therefore the design must also allow rotation and radiation.

There are a number of available fin types for Gas to Fluid Heat Exchangers, each with their own unique fin design and attachment. Each fin type has advantages and disadvantages in specific applications so the most appropriate fin selection is dependent the environment in which it will be applied.

1.4 CLASSIFICATION OF FINS

According to the geometry of the elements. Instruments can be attached three types .They are

(i) Longitudinal fins
(ii) Annular fins
(iii) Pin- fin or spine fins

Longitudinal fins:

Flat rectangular fin attaches to it an airplane wall. A uniform section or your own the field can vary along its length, three, parabolic or trapezoidal shape.

Spine or pin-fin:

Pin-fin or back is a stretched area very small diameter circular section beyond its length. Pin fins may also be uniform or uniform in cross section.

1.4 ANNULAR FINS

Annular fins are widely used in heating C exchange equipment to increase the heat dissipation rate. Heat or reduce the sauce of a certain temperature difference the temperature difference between the hot spot and it thermal conductivity of the given heat flow measurement. enjoy using shit found in many thermal engineering fields such as air where is cooling, heat exchange and microelectronics, using additional facilities, heat controllers succeeded designs compatible and functional heating systems.

When added to the metal surface, it comes into contact with water. a few factors to consider: greater resistance due to mechanical interactions between the bottom of the last and front part of the exposed area, causing discomfort, there will be heat flow inside the filter and rejecting the heat of the heat that illuminates the film surrounding fluid.

Various solutions to the stability control problem permanent weight in the tenth season these answers are based on assumptions. Circular, perfectly uniform transmission hold onto the final base and may be insulated and/or otherwise modeling for cold maturity account. Two-dimensional solution where the temperature corresponds to it thickness of the lead and the resulting laser path cooling isothermal fin base and other extreme cases. Final success determined and graphically displayed

He opposed the creation of a parliamentary group, including inner and outer tip radius, full blade thickness, temperature behavior and coefficient. The coefficient of the film are considered to be of uniform size and above equal

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in size. Sides and ends. The other geometric is used in parliament. Settings were the last highs to reach the thickness ratio. The bilateral result is compared to the unilateral result. Maximum length-to-thickness ratios. Seen that the result next to them is correct or high there are ten or more thickness ratios and this the two-sided ends of the corner angles are useful assumptions for annular fins, if not wing curvature big. Up to less than ten thick and the annular fins have a large curved shape, filled on both sides. Solution should be used.

1.5 MODES OF HEAT TRANFER INVOLVES IN FINS

Burning heat is the heat energy generated during travel. Due to temperature differences. Heat patterns conversion is conduction, convection and radiation. Finnish

a thin object or object attached to a large body or form. From the cross section, flat fins are of different types, such as rectangular fin, trapezoidal fins on three sides of arch, end marble or cylindrical fin. It can be measured using Finnish performance final operation, heat transfer and capacity. Three cylinders have devices in air cylinders lowered cylinders and compressors, external radiators and atmospheric air systems. A few writers listened to their e-works Railway. He was here in-depth information on additional sites such as boundary conditions and analysis.

Rayleigh number 295214, Ra ≤ 773410, resistivity area, 25 mm ≤S ≤ 100 mm and final height 12.5 mm ≤ L-37.5 mm normal heat flow limit conditions in hot and cold barracks walls. They created empirical the correlation depends on the Nusselt number for several parameter error.

There are three distinct modes of heat transmission

i. Conduction
ii. Convection

These modes transfer heat in the form of heat regulation, heat transfer takes place. Because of the combination of high temperature heating method. Heat is heated from top to bottom the fin is conductive and with convection mode from edge to periphery.

1.5.1 Conduction

Thermal conduction is a method of dissipating heat from the surface circuit. Temperature to the middle lowest temperature range (solid, water or gas) or between different souls in a real connection. Behavior not included It depends on any movement of a small part of the object. Hot energy can be transmitted through freely moving electricity cage condition. And yet, it can be delivered, or otherwise. an incomprehensible power in the form of a room of things. Science is important due to the instability of molecular mobility; the concept is called microform heat transfer and is often referred to as the diffusion of power.

Measurement equation for one side optimum temperature control and direction are defined by the Fourier rule

$$Q = -kA\frac{dT}{dx}$$

1.5.2 Convection

Thermal convection power transmission systems, rotational or mixing with water. Convection is possible only in a liquid medium and It is closely related to the central transportation itself. Macroscopic water particles space travel causes heat dissipation and thus convection creates a macro. form of heat transfer. Success of convection heat transfer, especially in mixing water flow. There are actually two kinds of relationships, these are 'free convection'. and "power convection". Caused by an equal power difference in the selected convection fluid flow Convection water flow caused by the pump.

$$Q = -h\ A\ dT$$

1.6 PARAMETERS INVOLVES IN ANALYSIS OF FINS

The various significant factors in study of fins are,

[1]. Fin length
[2]. Fin material (Conductivity)
[3]. Fin Cross section
[4]. Fin pitch
[5]. Fin thicknesses
[6]. Heat transfer coefficient
[7]. Fin effectiveness and efficiency

1.6.1 Fin Length

The final length of the muzzle decreases with height as the temperature above the fin increases. How long the fin length is practically non-existent due to ultimate performance loss and length error. Fin, shorter length tools are used.

1.6.2 Fin Material

These things have good protective oil and power and less the weight required for the design purpose.

1.6.3 Fin Cross Section

The cross section of the playground works in heat exchange, the final cross section. The change in the changed wing surface occurs more dramatically than the temperature changes. Price: % p.

1.6.4 Fin pitch

The last pin is also known assembly to burn heat prices. If the fin tube is greater than the fine number per unit area which reduces the heat area and ultimately reduces heat reduction prices and vice versa when the poles are different. It was clear from the records that he was there. Will be the preferred pouring position for all free convection and forced convection.

a certain format.

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1.6.5 Fin Thickness

Heat reduction prices worsen with reduction in wing oil, but demand the ultimate and creative power of the material is placed on the surface of the minimum thickness for the final purpose 2.5 mm final thickness is taken from the engine.

1.6.6 Heat transfer coefficient

The heat exchanger coefficient is defined as the heat dissipation per unit temperature. Difference by conjunction over the position of unit time. HTC's value,

- Thermal properties
- Types of flow
- Fluid properties
- Surface geometry
- Atmospheric conditions etc.

II. LITERATURE REVIEW

Using the available CFD tool Ansys Fluent, Magarajan et al calculated the heat output of the cooling pins of a six-pin IC motor cylinder with a pump. The temperature emitted from the cylinder, calculated numerically, was confirmed by the test results. With the help of common components, the design of the IC engine cooling fins can be modified to increase heat output and efficiency.

Barhatte and colleagues examined the final flats, which were repaired by removing the middle fin section and cutting three notches. The thesis reference provides a measure of the results of the results over the height of the elevations and the degree of heat dissipation. An attempt was made to make a comparison between the test results and the results obtained using CFD software.

Charan et.al. examined additional fields commonly used to promote convection heat reduction in a wide variety of engineering applications. The idea of bringing windows to the finishing area is to effectively promote heat reduction efficiency. It is clear from the research that the temperature of the small end of the aluminum dried as a triangle by three, and the heating temperature is about three times the one-third of the aluminum material. From the research, it appears that the Nusselt number is increased with the perforated fin compared to the non-perforated fin. Therefore, it was concluded that the most suitable for end use is aluminum folded three to three times later.

Sangaj. et. al. experiment tested the temperature distribution inside the end pin made of different material and geometry and made a stable conditional heat transfer switch using the limited element software ANSYS to test and verify the results. The main purpose of the work is to adjust the heating properties by changing the geometry of the pins, their material and thickness. The current work is successfully carried out by comparing different parameters (shape, geometry, objects) of the pin-fin. Different shapes and types of materials are selected for comparison. Surveys conducted within ANSYS. From the top of the two cases, it was found that the copper round pin end and the copper rectangular pin fin were the best pins.

Beldar et.al. Performed stable heat treatment using CFD software. Air Flow, forced drop examinations were performed. The notch size varies between 10%, 20% and 30%, and the heat dissipation ranges between 25 watts, 45 watts and 65 watts. In an unpaid wing array, even the area of existence shrinks as the temperature rises. With a coating charge, the fin central heating elements are exposed to cold air cooler, furthermore the heating temperature is observed to increase. After a notch is introduced into the middle part of the wing, it causes a change in the flow of natural air flow, an increase in air velocity across the duct, a difference in air pressure across the duct, and an increase in air temperature. Cylindrical heating sink.

Rajesh et.al. investigated different geometries, materials (Cu and Al alloy 6082), distance between pins and thickness of cylinder fins and heating conditions. Fin mods are made by changing geometric circles, as well as changing the size of fractions of all geometries. 3D modeling software Pro / Engineer & Uni Graphics was used. Temperature analysis was performed on the cylinder fins to detect differences in temperature distribution over time. Analysis was done using ANSYS. It has been concluded that it is beneficial to determine the temperature in the cylinder by making a heat exchanger on the engine cylinder fins.

Jain et.al. studied the thermal conductivity of oil by changing its geometry. The parametric pin mode is set to estimate the temperature of the heat character. Here, models are made with elongation with geometric variations such as rectangular, circular, triangular and fins. Modeling software CREO Parametric 2.0 was used. Analysis was performed using ANSYS 14.5. It is argued that these materials used in the manufacture of the fuselage blade are generally Aluminum Alloy 204 with an electrical temperature of 110-150W/m-ºC. After setting up the material, the third step is the section, partial, length, thickness, etc., which takes us to different geometry and geometry types. It is to increase the temperature of the system by changing the geometric parameters such as

Kummitha et.al. studied the temperature of the cylinder block. Temperature testing was done with various alloys to find the best materials that keep the engine in a safe working environment and at the same time provide the highest temperature with great strength and lightness. In this study, the need for a professional bicycle roller was

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considered and directed with the use of the GAMBIT software and also the temperature detection using the ANSYS software. Therefore, in this study, some special alloys for thermal conductivity are also discussed and the overall results of the best are compared. The A380 is estimated to have a better heat transfer rate and more power compared to other visible alloys.

Ravikumar et al. discussed the geometric design and design of the heating system to improve the performance of the experiment. This project uses temperature analysis to detect the cooling response of a computer computer using a 5 W CPU. The design cooled the case with a heated sink attached to the CPU, which was enough to cool the entire machine. This function examined the circular cylindrical pin fins and side plate’s heat sink fin design and aluminum base plate and control CPU heat sink systems. An example of an electric heating element is designed to increase heat dissipation. A factor defined in the ANYSS was analyzed and the resultant of normal conditions and post-temperature temperatures were measured.

Arefin introduced a modified pin design pin for heating the sink where the pins are extended. After that, the heat exchanger of the common pin is the after cooler, and the heat exchanger with the tuned pin is numerically made to the natural convection of circular shape sequentially, considering the steady state. The replaced pin after cooler was found to perform better than normal. For this temperature, the test number was used with the help of Solid work. The selected mode of the modified pin after cooler was created in a specific area. The standard pin mode for the after cooler is also designed to the same standard. Thermal analysis of common mode and modified mode was done and compared successfully.

Balendra et.al. conducted a case-control study and comparison of unstable angles and those stabilized at different temperature loads. Subsequent authors then worked on various forms of permanent reverse notched fins. All of the above results, temperature distribution, velocity vector plot, Nusselt no. Considering the thermal conductivity coefficient and the thermal conductivity coefficient, it was concluded that the thermal conductivity increased continuously in all cases, but the inverted triangle notched fin provided the maximum thermal conductivity. The inverted trapezoidal notched fin providing a heat dissipation coefficient of 6.08 W/m2°k is better than the inverted rectangular notched fin providing a heat dissipation of 5.67 W/m2°k. As a result, it is estimated that the temperature change in the inverted triangular notched fin increases by 50.51% compared to an unknown length.

Congress et.al. examined the geometrical variation, cylinder fin thicknesses and temperature distribution using the ANSYS machine. By performing the test run on a set of hardened pins of solid Vs square and circle perforation; Nusselt's number of solids and broken fines increases with an increase in the Reynolds number. Also, with the same sized painting side holes, it provides slightly higher success improvements in the surrounding equal holes. Thus, the authors conclude that although attempts have been made to change a few parameters related to the increase in HT expansion, there is still significant design optimization.

L. Natrayan et.al. studied those who burned buildings by differentiating the geometry of cylinder pins using the ANSYS machine. The 3D geometry mode was developed using SOLIDWORKS 2016 and temperature circuits were tested using ANSYS workbench 2016. As in the cold, the temperature difference over time is interesting in many models. The actual temperature sensor may allow a certain design parameter to be displayed for a better lifetime. The material currently used to make the final cylinder body is Aluminum Alloy AA 6061 with an electrical temperature of 160 - 170 W/mk.

Sandeep Gamble. et.al. The heat release rate study from the heat exchanger is an IC engine up to the maximum heat detection made in a particular Bajaj design that achieves a 125 CC single cylinder engine. For short-term heating, the temperature was made real and adjusted to the design of the engine cylinder to adjust the geometric parameter and increase the heat output from the IC engine. The results show that the IC engine design has better performance and the temperature range from the heat exchanger in the CI engine, so it was found that the result of the current study focused more on this and also replaced with a new design. Temporary heat detection has been made on the real design and also in two different geometric designs at an ambient temperature of 25°C.

Mogaji et.al. Realized a significant increase in the number of thermal temperatures between the rectangular bifacial temperature and without taking into account the radiation temperature. The consequences of physical condition include:

III. METHODOLOGY

A statistical analysis is performed to evaluate the ability and temperature distribution of dead blades of different profiles (constantly changing middle part) when placed in the same temperature and multiple motion modes. Differences in temperature and humidity drive thermal energy and density; respectively the results are in the temperature distribution over the surface area in addition

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to the dual temperature for both wet and slightly wet surfaces. The results are similar to the results of previous studies. One of the measures of the relationship between temperature and temperature has been found to be reasonable assumptions. The receiver's arm receives solar energy, which is then transferred to the carrier to be transmitted as useful energy. During this process, the temperature of the handle plate increases, and therefore the thermo body parameter is included to determine if the operating temperature of the absorber plate is different from the temperature of the plate. This study shows that the activity of the inlet plate is analytically determined, as well as the temperature corresponding to both the heat dissipation and the total heat loss. The decay path is considered the answer path. Extreme design is also done. A comparative study was conducted between the present results and those found in the published study, and a significant difference was obtained in the results. Contrary to the recently published work, a parliamentary session on sports and design was observed.

3.1 PROBLEM DEFINITION

Currently, there is an investigation of combustion problems in the restoration of the weapons made. Inspection brings the characteristics of heat and humidity due to the extreme temperature in the container of the chamber. ANSYS workbench is used for analysis. An analysis of the current dates of the different types of receipts being sold is made and a comparison is made between them. Also, material modified to have a better heat dissipation rate can be obtained.

Different profiles (Rectangular, Triangular) compressor blades are made with Aluminum nitride and Aluminum alloy A204 from different and different materials. Effectively calculate the heat reduction rate over the last cooperation to achieve success through a free and forced convection heating system and reading controlling the amount of heat dissipation in different profiles.

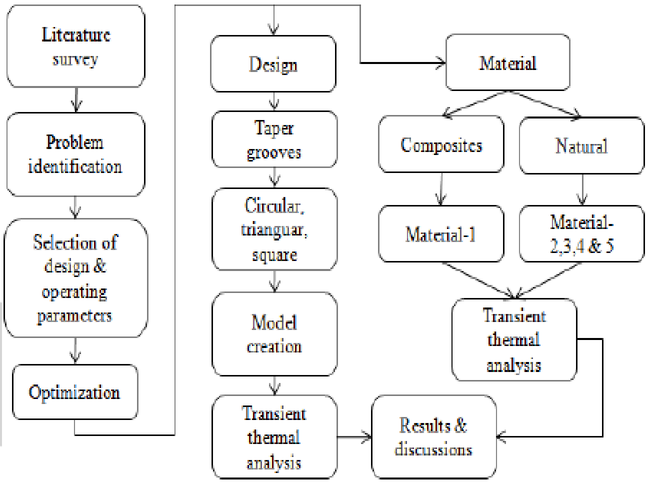
Reducing cost, weight and stiffness in manufacturing I used air cooling system instead of water cooling system. Word constant various conditions such as heat transfer coefficient of full acquisition and ambient air velocity response in cold weather systems. I likened the heat to the heat actual condition cooled the air and the rest of the search business types. I understood the consequences of the change in categories with the help of thermal analysis and repair on fins Shape the fins to get the full effect.

3.2 OBJECTIVES

To execute my problem or work fallowing objectives are made to make conclude or justifies the problem

- Determine the amount of heat transfer and amount of heat which we need to extract from the compressor cylinder using mathematical empirical relation.
- Select appropriate shapes such as rectangular and triangular for comparison of heat extraction from compressor cylinder.
- Select materials form analyzing the problem.
- Development of 3D model using CATIA computer aided software.

3.3 PROJECT APROCH



3.4 MATHEMATICAL MODELING

Metals are parts added to the compressor fins for increased heat reduction. Like hot compressor during operation and overheating will cause the motor to overheat. Thus, for the first time, components are fed into the engine cylinder. In fact, the more the metal heats up, the lower the volume and the more it does. Available circuit for convection contact.

3.4.1 Heat Transfer through Rectangular Fin

The absolute length of the last four corners is L, e.g. thickness of the latter and W is the width of the entity and it estimates it heat flow is unidirectional and is related to length and this heat dissipation coefficient on water (h) this remains.

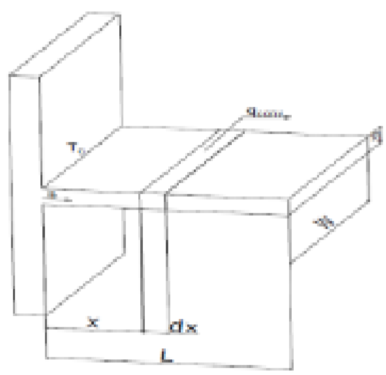


Fig. 3.1 Rectangular Fin

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Heat lost through fin is

$$Q_r = \sqrt{\frac{hP}{kA_c}}$$

Where

k Thermal conductivity of fin material w/mk

h convective heat transfer coefficient $w/m^2 k$

P Perimeter of fin (2W+4 δ)

m_r Mass of Rectangular Fin = 2 δ × ρ × L

ρ density of fin material kg/m^3

θ_0 Difference in temperature

Rate of heat transfer flow per unit mass through rectangular fin

$$q_r = \frac{K\, A_c m\theta_0 \frac{h\cos(hmL)+km\sin(hmL)}{km\, Cos\,(hmL)+h\sin(hmL)}}{2\times\delta\times\rho\times L}$$

Efficiency of Rectangular Fin (η_r) =

$$\frac{Heat\ Transfer\ or\ Heat\ Flow\ with\ fin}{Heat\ Transfer\ or\ Heat\ Flow\ without\ fin}$$

If the fin is located at room temperature

$$= \frac{K\, A_c m\theta_0 \frac{h\cos(hmL)+km\sin(hmL)}{km\, Cos\,(hmL)+h\sin(hmL)}}{2WLh\theta_0}$$

Effectiveness fin (ϵ_x) = $\frac{Heat\ loss\ with\ fin}{heat\ loss\ through\ fin}$

$$= \frac{K\, A_c m\theta_0 \frac{h\cos(hmL)+km\sin(hmL)}{km\, Cos\,(hmL)+h\sin(hmL)}}{2\times A_c\times\theta_0}$$

3.4.2 Heat Transfer through Triangular Fin

The triangular fin represents the length of the last L, thickness, 2δ and steel width, W and thermal conductivity flow is unidirectional and accompanied by length and temperature if the second, change the coefficient (h) above the floor this remains.

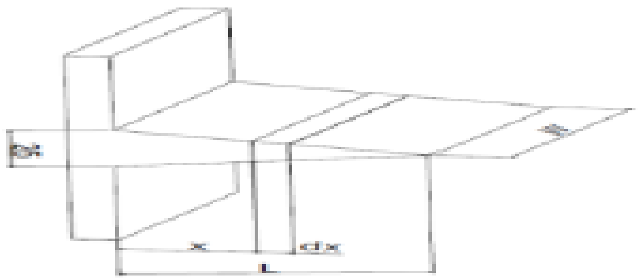


Fig. 3.2 Triangular fin attached to cylinder

Heat transfer through triangular fin

$$Q = 2\,W\,\theta_0 \sqrt{\left(\frac{hL}{k\delta}\right)} \left[\frac{I_1(2B\sqrt{L})}{I_0(2B\sqrt{L})}\right]$$

Where

θ_0 – Temperature difference

k- Thermal conductivity w/mk

B –Fin parameter

I_1-function of Bessel first kind

I_0-function of Bessel first kind

Mass of triangular fin $\frac{1}{2}$ × 2 δ × L × W × ρ

P density of fin material kg/m^3

Rate of heat transfer per unit mass (q) =

$$\frac{Heat\ loss\ with\ fin}{mass\ of\ fin}$$

$$= \frac{2\,W\sqrt{hk\delta\theta_0\left[\frac{I_1(2B\sqrt{L})}{I_0(2B\sqrt{L})}\right]}}{\frac{1}{2}\times 2\delta\times L\times W\times P}$$

Efficiency of triangular fin =

$$\frac{2\,W\sqrt{hk\delta\theta_0\left[\frac{I_1(2B\sqrt{L})}{I_0(2B\sqrt{L})}\right]}}{2\times W\times L\times h\times\theta_0}$$

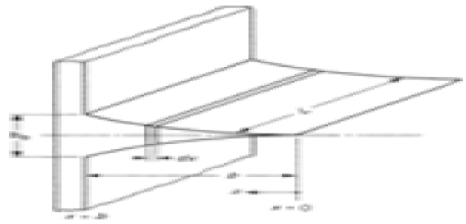
Effectiveness of triangular fin (ϵ_T) =

$$\frac{2\,W\sqrt{hk\delta\theta_0\left[\frac{I_1(2B\sqrt{L})}{I_0(2B\sqrt{L})}\right]}}{h\,A_b\theta_0}$$

Ab – base area of triangular fin (W × 2 δ) m^2

Heat Transfer through Parabolic Fin:

A concave parabolic profile has a longitudinal fin. shown under the fig tree, apparently a reference to it general fin history of the equation Provides the geometry or n =∞. This will be the function of the fin.



General profile equation of parabolic system

$$f_2(x) = \frac{\delta_b}{2}\left(\frac{x}{b}\right)^{(1-2n)/1-n}$$

$$f_2(x) = \frac{\delta_b}{2}\left(\frac{x}{b}\right)^2$$

And

$$\frac{d f_2(x)}{dx} = \frac{\delta_b}{b}\frac{x}{b}$$

Substitute above equation in parabolic profile with boundary condition

$$\theta\,(x) = T_x - T_s$$

$$x^2\frac{d^2\theta}{dx^2} + 2x\frac{d\theta}{dx} - m^2 b^2\theta = 0 \quad (a)$$

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$$m = (2h/k\delta)\ 1/2$$

Above equation is an ordinary second – order differential equation with variable coefficients. It's call as a Euler equation and its general solution is obtained by making the transformation x = eV or v = lnx then

$$\frac{d\theta}{dx} = \frac{d\theta}{dv}\frac{dv}{dx} = \frac{1}{x}\frac{d\theta}{dv}$$

and

$$\frac{d^2\theta}{dx^2} = \frac{d[(1/x)(d\theta/dv)]}{dx}$$

$$= -\frac{1}{x^2}\frac{d\theta}{dv} + \frac{1}{x}\frac{d(d\theta/dv)}{dx}$$

After modification above equation

$$\frac{d^2\theta}{dx^2} = -\frac{1}{x^2}\frac{d\theta}{dv} + \frac{1}{x^2}\frac{d^2\theta}{dv^2}$$

Transferring the equation a

$$x^2\left(\frac{1}{x^2}\frac{d^2\theta}{dv^2} - \frac{1}{x^2}\frac{d\theta}{dv}\right) + 2x\left(\frac{1}{x}\frac{d\theta}{dv}\right) - m^2 b^2\theta = 0$$

Modify the above equation by considering common terms

$$\frac{d^2\theta}{dv^2} + \frac{d\theta}{dv} +- m^2 b^2\theta = 0$$

Solutions of above equation

$$\theta = C_1 e^{\alpha v} + C_2 e^{ß v}$$

or in terms of variable x

$$\theta = C_1 x^{\alpha} + C_2 x^{ß}$$

Where

$$\alpha, ß = -\frac{1}{2} \pm \frac{1}{2}\sqrt{(1 + 4m^2 b^2)}$$

General equation written by

$$\theta(x) = C_1 x^{\alpha} + \frac{C_2}{x^{1/ß}}$$

Here the boundary conditions are x = 0, the excess temperature is T - T_s and C_2=0

Then

$$\theta(x) = C_1 x^{\alpha}$$

by assumptions made from the fundamentals temperature excess at fin base

x = b

Applying boundary conditions and finalized solution to the above equation, fallowing equation is obtained as

$$\theta(x) = \theta_b\left(\left(\frac{x}{b}\right)^{\alpha}\right)$$

Heat flow through from base fin is obtained by differentiate the general equation and substitute the boundary conditions at x=b. parameter of fin is δbL, the heat flux through fin is

$$q_b = kA\frac{d\theta}{dx}\Big|_{x=b} = \frac{k\delta_b L\theta_b\,\alpha}{b}$$

$$q_b = \frac{k\delta_b L\theta_b}{2b}\left[-1+\sqrt{1+(2mb)^2}\right]$$

Efficiency of fin

$$\eta = \frac{k\delta_b L\theta_b}{2b\ 2hbL\theta_b}\left[-1+\sqrt{1+(2mb)^2}\right]$$

Modifying the above equation

$$\eta = \frac{2}{1+\sqrt{1+(2mb)^2}}$$

from the above equation I can said efficiency of fin is function of mb

IV. FINITE ELEMENT ANALYSIS AND MODELING

FEM codes based on number algorithms are capable of solving quantitative problems. All commercially available FEM commercial packages have three key features that divide a comprehensive analysis of the number of attempts to be made on a given area or geometry. Three important things

- Pre processor
- Solver
- Post processor

Structure of Finite element analysis shown below

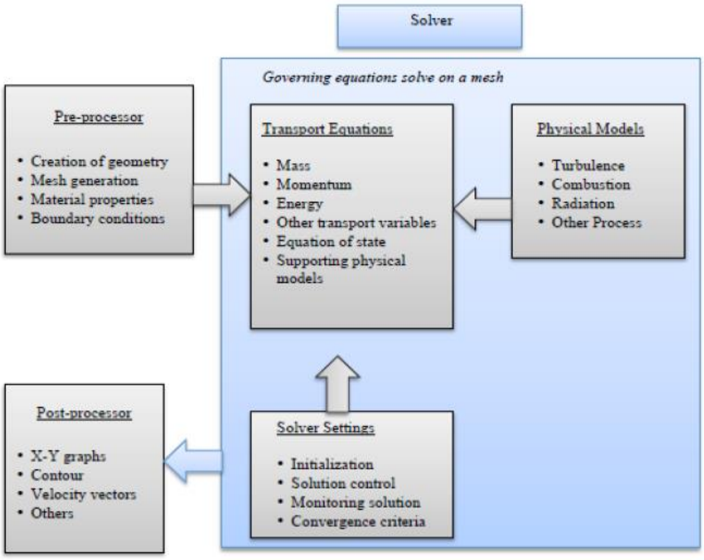

Fig. Solving method

4.1 PRE PROCESSOR

The preprocessor sets up the flow problem using a user-friendly interface and follow the setup of this setup to make the form suitable for use with the solution. The preprocessor is the link between the user and the solver.

4.1.1 Creation of geometry

These applications include computer aided design (CAD) software from CATIA, Solid Works, Pro-E, and

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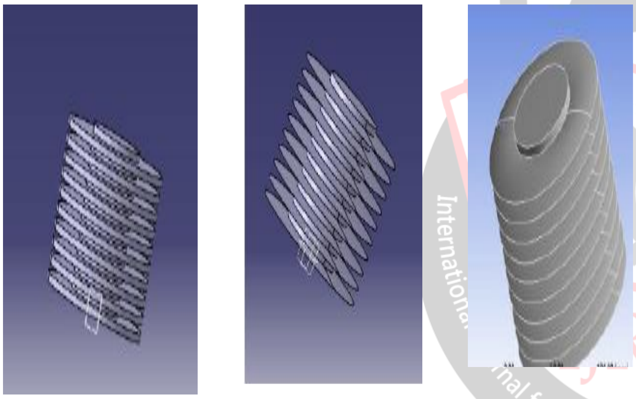
more. The help of CAD software describes the topology of the flow area of interest. This software plays an important role in designing and optimizing systems in search engine optimization.

Fins increase heat transfer in two ways. One way creating a circulation flow through the electrical geometry that reduces heat exchanger (reverse heat exchanger) coefficient) or through a static film the flowing liquid is equal to the hard surface. The second method is increasing the final volume which improves heat dissipation the area where it meets the liquid. Finnish geometries and densities that create circulation flow and adjust function it also increases the pressure drop, which is a serious requirement very high usage. This is excellent fin geometry and blade density include instant agreement functionality, drop pressure, weight and size. fit-of-fit The comparison is based on performance, pressure drop, weight and The size among the most common types of the latter is described in the "Cold Wind" section. Compact Heat Exchanger Design of Electric Cooling. " Parameters such as thickness, height other than the final geometry, wax and spacing can also be adjusted to improve performance.



Rectangular Fin **Triangular Fin** **Parabolic Fin**

Fig. 3D Model of Fins

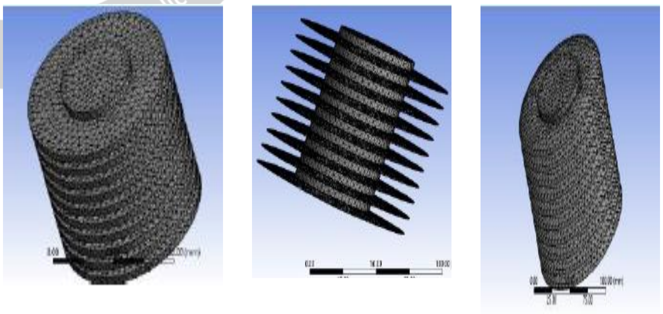
4.1.2 Mesh generation

Mesh Creation creates one of the most important step-by-step processing steps after defining the domain geometry. FEM requires space allocation to several small, non-overlapping cells to adjust the physics flow within the developed space geometry; this results in the generation of a cell message (or grid) (objects or control volumes) covering the entire dome geometry. The critical flow currents defined in each of these cells are usually statistically adjusted so that selected measurements of flow properties such as velocity, pressure, temperature, and +other operating parameters of the flow are defined. This provides a FEM solution to the streaming problem under consideration. The actual FEM response is driven by the number of cells in the mesh within the compute area. In general, supplying a large number of cells elicits a specific response. Therefore, the order of the answers is highly dependent on the set values governed by the calculation price and the count times. Below figure shows the mesh models of present work

Compressor blade modules are tested using ANSYS Workbench Version 14.5 as described in Chapter 2.0. Modes are deployed networks using ANSYS default path sets according to a volume of 0.5 on a scale of -100 to 100. The resulting network is shown in Figure 4.2. Therefore, emphasizing the value of the mesh on a high face improves the network to 185237 nodes and 95422 elements, potentially tripling the number of mesh nodes. Although the selected network parameter is acceptable, the advanced network optimization table does not have the properties of different object types. Parameters are used where possible to obtain a clear result. Convection cooling testing includes mounting fins, complex mode geometry, and computer resources that require modules to be reduced to one quarter of the original geometry. This is acceptable due to the demo symmetrical nature of IC engine Fins-assemblies. The mod is securely fixed so that the quarter geometry has a slightly cooler surface over the four possible quadrants. Figure 8 shows the visual sequence of the braided quarter-quarter module modes. In all cases of ASSS, the mode starts networking, boundary conditions are determined and further analysis is performed.

4.1.3 Definition of Material properties

Each area or water tank has its own standalone. The properties of materials used in the field of FEM are described in the current FEM process. In present problem I considered three materials such as Aluminuum Nitride and Aluminium alloy A204 are considered.



Rectangular Fin **Triangular Fin** **Parabolic Fin**

Fig. 4.2 Meshed Model

4.1.4 FEA model inputs

The FEA mode boundary condition is calculated on the empirical basis. The aim is to simulate the boundary conditions faced by Compressor Blades during the normal planting season. It is important to note that the heat transfer coefficients are calculated. (1) External Pressure maintaining areas, (2) External Pressure Maintaining areas

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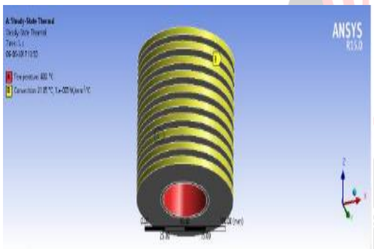
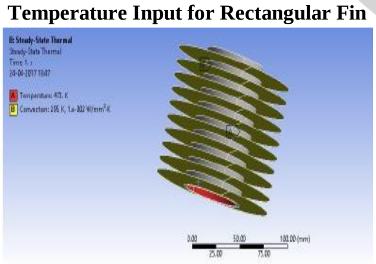
below the Compressor Fins, (3) External compressor Fins outer areas, and (4) External Pressure Maintaining areas in the Compressor compartments. The compressor fins heat exchange coefficient is calculated by treating the compressor components as a flat plate; therefore all four compressor blade faces have the same heat dissipation coefficient. In addition, test and operating data showed an estimated 210K temperature rise in air temperature as it passed over the length of the Engine Blades. This increase in temperature of 50°F is thought to have occurred narrowly enough to be included in increments of 10°F on the evening of the FEA.

4.1.5 Boundary conditions

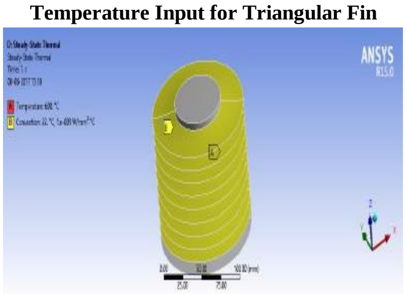
The uncertainty of the wide variety of flow models has important implications for these boundary conditions imposed on the flow problem. The FEM user should identify suitable conditions that mimic the real representation of fluid flow as a potential problem for the FEM. Each set of different FEM fields must have the first one covered by the standard setting. The FEM code usually has this field to define the boundary conditions of the FEM problem where standard measurements are given to each cell in a given limit. In my work, I considered temperature is boundary condition for considered problem it's varies from lower temperature to higher temperature boundary conditions are shown below.



Temperature Input for Rectangular Fin



Temperature Input for Triangular Fin



Temperature Input for Parabolic Fin

Fig. 4.3 Boundary Condition of Fins as Temperature

4.2 SOLVER

Correct use of on-premises or commercial FEM code requires an understanding of the minimum number of caches in the FEM solver. This section focuses on the processing of the solvent element.

In the current market, developers often use three different methods to calculate results, they are final variance, final product method and full volume method. The boundary difference and the final approach to the material are usually worth worrying about and examining the structure. On the other hand, the limit volume method is the most suitable method for FEM methods.

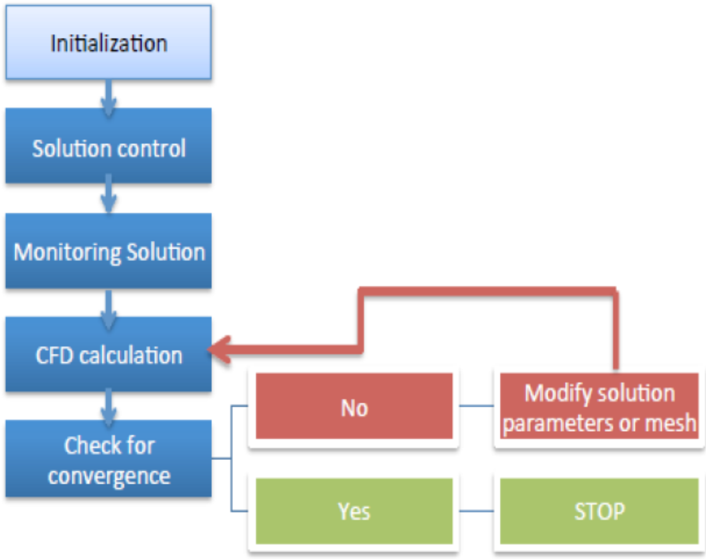


Fig. 4.4 An overview of the solution procedure

As the name suggests, the end-of-volume method is a calculation method that involves the use of standard volume cells. The steps for this solution are usually done as follows:

- ➢ Systematic integration of control equations of water flow over all control volumes or full volume solution volume.
- ➢ Conversion of a compound form of equations into an algebraic system of equations.
- ➢ Calculation of algebraic equations by iterative method.

4.3 POST PROCESSOR

Commercial FEM codes such as ANSYS often include attractive visualizations of the use of tools in their user-friendly GUI, which allows users to clearly see the results of the FEM calculation at the end of the computational simulation. Visual cables use the FEM solver to detect the following results for comparison.

a. Domain geometry and Grid display.

B. vector plans

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C. Line and shade of dirt d. 2D and 3D facing areas e. Particle tracking f. XY plans and finish charts

V. RESULTS AND DISCUSSION

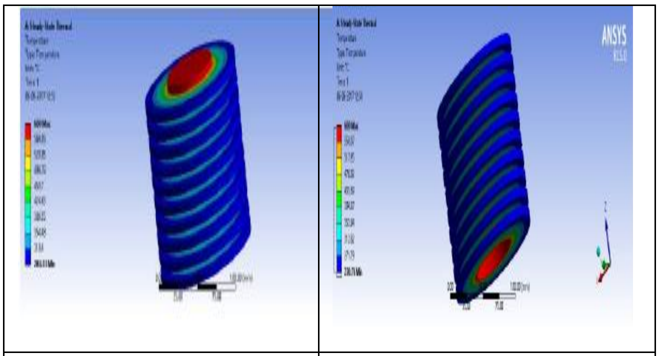
Cold conditions studies are performed by first installing the heat exchanger in the Pressure Housing and compressor fins sections. Thus, instead of applying refrigerant convection loads to the Pressure Housing and compressor exteriors, stationary compressor fins faces are made with different materials such as Aluminium A204, Aluminium Nitrate and at different temperatures from 500 to 600°C. Properties of considered materials are defined in below table, touching the face at a variable temperature mimics the means of removing heat from the compressor Components. The most common air component is usually found at 150°C to 200°C instead of the nominal value, but the value of the air temperature in this study was estimated at 45 percent, so it can bear the load of cooling air as it passes through fixed construction equipment to individual compressor Components. The flow of the air element is considered sufficient to keep the cooling system at room temperature, although it may cause excessive heat. The heat exchanger of the individual compressor fins is a material that forms a separate system of internal grooves defined in relation to the heat exchanger. Regarding conservatism, all hot flashes are based on the maximum allowable temperature of 600°C.

Table-1 Material Properties

Material	Thermal Conductivity (w/mk)
Aluminium Alloy A204	120
Aluminium Nitride	321

5.1 TEMPERATURE FLOW ANALYSIS

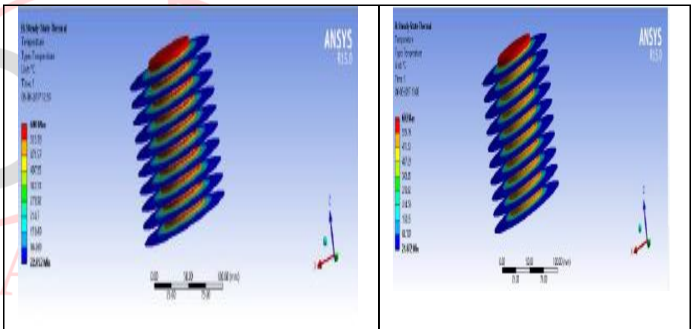
Conductive cooling Case 1 assumes that only the rectangular of the compressor Fins is made with Aluminium Nitrate and Aluminium alloy204A. which correlates to a straight-sided apparatus that could be utilized on existing compressor Fins. Figure 5.1 shows the typical areas (highlighted in dark green) of the compressor Fins housings which are selected within the FEA model for temperature flow analysis of conductive cooling for Aluminium Nitrate material, which shown maximum temperature of rectangular fin with Aluminium Nitrate is 565°C, similarly temperature of rectangular fin with Aluminium Alloy A204 is 284°C.



Temperature flow in Rectangular fin with Aluminium Nitarte.	Temperature flow in Rectangular fin with Aluminium Alloy A 204

Fig. 5.1 Temperature flow in Rectangular fin

Case 2 assumes angled surfaces of the compressor Fins housings are in triangular shape conductively cooled. This correlates to an apparatus which is profiled to both the flat sides and the inward-angled surfaces of the compressor Fins. This profiled apparatus could be utilized on existing compressor Fins. Figure 5.2 shows the typical areas (highlighted in dark green) of the compressor Fins housing which are selected within the FEA model for this analysis, which shows that maximum temperature of rectangular fin with Aluminium Nitrate is 600°C, similarly temperature of rectangular fin with Aluminium Alloy A204 is 22°C.



Temperature flow in Rectangular fin with Aluminium Nitarte	Temperature flow in Rectangular fin with Aluminium Alloy A 204

Fig. 5.2 Temperature flow in Triangular fin

Case 3 assumes angled surfaces with curvature of the compressor Fins housings are in parabolic shape (convex mode) conductively cooled. This correlates to an apparatus which is profiled to both the flat sides and the inward-angled surfaces of the compressor Fins. This profiled apparatus could be utilized on existing compressor Fins. Figure 5.2 shows the typical areas (highlighted in dark green) of the compressor Fins housing which are selected within the FEA model for this analysis, which shows that maximum temperature of paraboilc fin with Aluminium Nitrate is 600°C, similarly temperature of rectangular fin with Aluminium Alloy A204 is 553°C.

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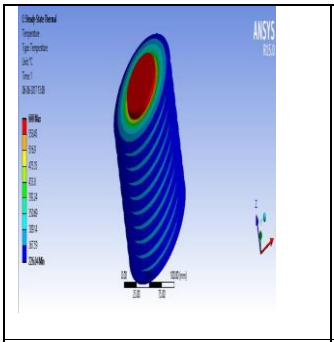
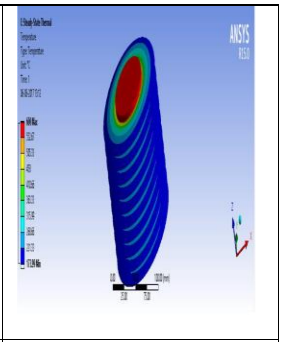


Temperature flow in Parabolic fin with Aluminium Nitarte



Temperature flow in Parabolic fin with Aluminium Alloy A 204

Fig. 5.3 Temperature flow in Triangular fin

Below table shows the comparison of maximum temperature (°C) flow in different shapes of fins with different material with different shapes.

Shape of Fin	Aluminium Nitrate	Aluminium Alloy A204
Rectangular Fin	565	559
Triangular Fin	600	600
Parabolic Fin	600	553

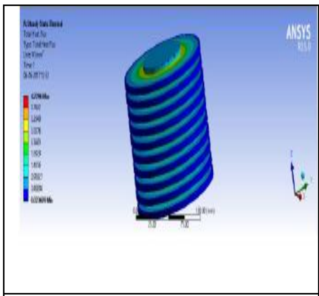
Below table shows the comparison of minimum temperature (°C) flow in different shapes of fins with different material with different shapes.

Shape of Fin	Aluminium Nitrate	Aluminium Alloy A204
Rectangular Fin	284	231
Triangular Fin	220	220
Parabolic Fin	226	173

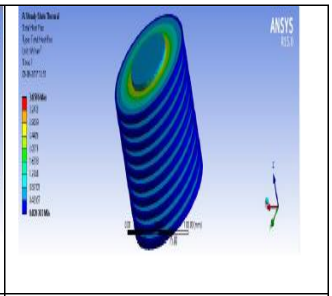
5.2 HEAT FLUX ANALYSIS

The cooling of the compressor's final cooling effect is done by mounting the carrier and carrier cooler, including the motor pins attached to the fourth component ANSYS module Pressure Housing and the compressor blades that make up it. Since the amount of cooling temperature is applied to the surface area, it is expected that the heat generating cooling system will increase as the area expands due to increasing engine speeds. Increasing cooling temperatures cause a drop in compressor Fins component temperature. Engine of final size and range is shown in Figure 5.3 and 5.4. Cold air flowing through the External Pressure Housing and Engine Fins area will be a hassle. Airflow is assumed to occur across all external compressor blades.

Case1 compressor fins are considered as rectangular fins with aluminium nitrate and aluminium A204 material, for this FEM analysis was conducted using ANSYS software. From this analysis I got the result as a maximum heat floe rate through fins per considered constant area is 3.7662 w/mm^2 and minimum is 0.0236w/mm^2.



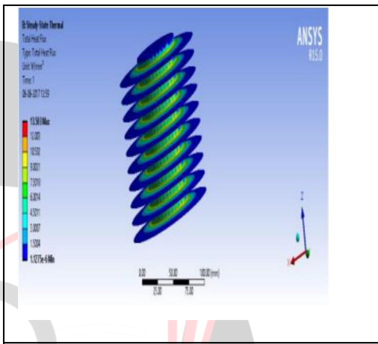
Heat Flux Rate in Rectangular fin with Aluminium Nitarte



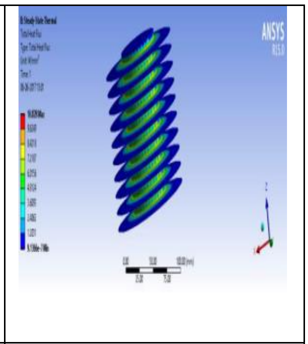
Heat Flux in Rectangular fin with Aluminium Alloy A 204

Fig. 5.3 Heat Flux Rate in Rectangular fin

Case2 compressor fins are considered as Triangular fins with aluminium nitrate and aluminium A204 material, for this FEM analysis was conducted using ANSYS software. From this analysis I got the result as a maximum heat floe rate through fins per considered constant area is 5.01 w/mm^2 and minimum is 0.00000048w/mm^2.



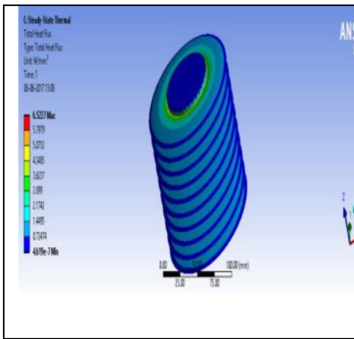
Heat Flux Rate in Triangular fin with Aluminium Nitarte



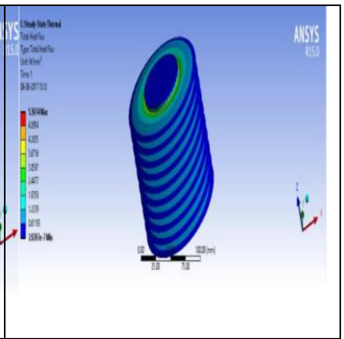
Heat Flux in Triangular fin with Aluminium Alloy A 204

Fig. 5.4 Heat Flux Rate in Rectangular fin

Case3 compressor fins are considered as parabolic fins with aluminium nitrate and aluminium A204 material, for this FEM analysis was conducted using ANSYS software. From this analysis I got the result as a maximum heat floe rate through fins per considered constant area is 6.5 w/mm^2 and minimum is 0.0000004w/mm^2.



Heat Flux Rate in Triangular fin with Aluminium Nitarte



Heat Flux in Triangular fin with Aluminium Alloy A 204

Fig. 5.4 Heat Flux Rate in Rectangular fin

Below table shows the comparison of maximum heat flux rate (w/mm^2) in different shapes of fins with different material with different shapes.

Shape of Fin	Aluminium Nitrate	Aluminium Alloy

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		A204
Rectangular Fin	4.23	3.66
Triangular Fin	13.5	10.8
Parabolic Fin	6.5	5.5

Below table shows the comparison of minimum heat flux rate (w/mm^2) in different shapes of fins with different material with different shapes.

Shape of Fin	Aluminium Nitrate	Aluminium Alloy A204
Rectangular Fin	0.024	0.02
Triangular Fin	0.0000012	0.00000091
Parabolic Fin	0.0000004	0.0000004

VI. CONCLUSIONS

Compressor fins connect upright slots inside the reactor core and are essential for central air to work. A significant amount of heat must be removed from the compressor connections to ensure reliable operation of the compressor blade system. This study examined a set of formulas that have the potential to improve heat dissipation methods. Compressor blades using ANSYS limit element testing software. First, an initial analysis was performed to evaluate the FEA mode and the boundary condition was calculated. Next, cooling technologies were tested by keeping fixed positions at a variable temperature in FEA mode. The cooling recovery process was carried out in two cases: foam tools based on recessed areas of the wall panels and the second case where the containers were aligned with the outer masonry walls and fences. Next, advanced convective cooling tests were performed to determine the results of different types of final forms and straight fin arrays at fin coil temperature.

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