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A REVIEW ON DESIGN AND OPTIMIZATION OF FLANGE OF (B5) FLANGE MOUNTING MOTOR

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ABSTRACT:
The paper discusses brief review of literature on design and optimization of flange of B5 mounting motor. The main objective of the review is to provide base to problem identification and to find out recent developments in design and optimization of flange of B5 flange mounting motor. The inputs provided by the sponsoring industry are critically studied and relevant literature has been identified and summarized in relation with the problem.

INTRODUCTION:

Motors are the main and widely used as prime movers in various industries. Motors are widely used because of it gives uniform motion and also the control of speed and the direction is very easy as compared to other prime movers like engines. Motors used in industry are classified on basis of their mounting methods.
Some of them are as follows:

1. B 3- Foot mounting motor
2. B 5- Flange mounting
3. B 14-face mounting
4. B 34-Foot cum face mounting
5. B 35-foot cum flange mounting

FLANGE-MOUNTED MOTOR:

Flange-mounted motor is a motor type with tapped holes in the flanged end shield. In B5 type of motor the flange is bolted to the wall on which whole motor assembly is mounted. This is because entire weight of a motor should act on flange. The advantage of using this type of mechanism is that it will act like a cantilever beam. This type of motor is used at in overhead cranes, and machines etc.

Fig no. 1: Typical B5 Flange Mounted Motor

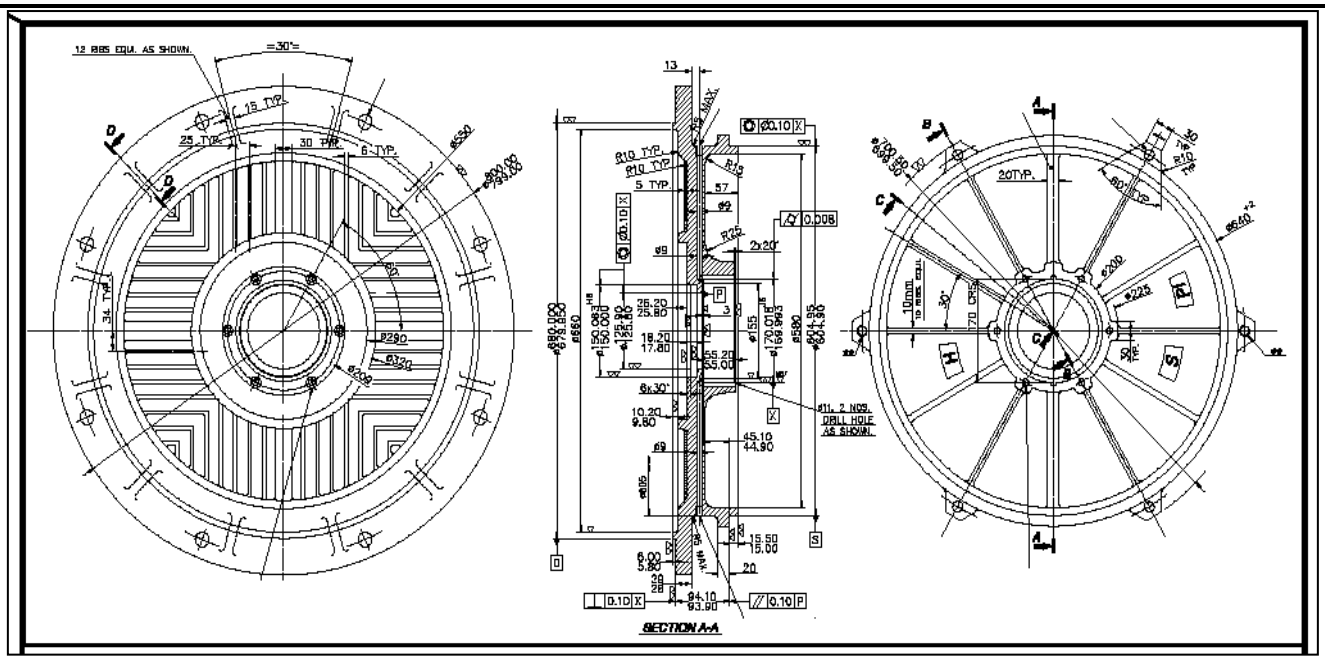

Fig No.1 Drawing provided by Sponsoring Industry

LITERATURE REVIEW:

Karel Matous et al discussed the detail procedure to reduce stress concentrations at the leading edges of flange assemblies. They carried out total design and analysis for evaluating the prestress forces that will reduce or eliminate stress concentrations caused by tension stresses or bending applied they concluded that the failure of the joint originates initially in the tapered flange end, and propagates along ply interfaces. And finally reaches to the adhesive layer.

P. M. Desai et al has carried out analysis and optimization of body flange & cover flange by using Finite Element Method. They concluded that Numerical Simulation techniques are one of the best methods for analysis of ring type flange. They analyzed various thicknesses of flanges. They proposed a new design of flange which are having optimum thickness of Cover Flange of 48 mm and Body Flange of 90 mm respectively.

M. Abid et al recommended the best flange dimensions for 'no leak' conditions from the joint. They have made a parametric study of the behavior of metal-to-metal contact flanges having different surface profiles. Also they compared the results for the flange geometry with no taper angle on the flange surface by using appropriate sections of the ASME codes.

Takuya Sato et al conducted axi-symmetric analyses by considering the sequence of initial bolting, non-uniform temperature distribution and internal pressure. They concluded that Flange size affects the contact pressure reduction due to internal pressure; however, it does not affect the contact pressure due to thermal load.

Guoquan Tao et al studied carbon fiber flange connection joints and concluded that composite flange joints have better mechanical properties as compared with flanges made by aviation aluminum alloy. Also they suggested that to increase mechanical properties; braiding process, forming process and the physical dimension should be enhanced.

Shivaji G. Chavan studied and presented theoretical model and an analysis of flange and bolted joints deformation. They considered flange and Nut-Bolts force and contact stiffness factor as parameters that are influencing the joint deformation also they concluded that bolted joint should be designed to always force the failure in the bolt shank and not in the thread and therefore, also they suggested that a larger number of

engaged threads will improve the performance of the joint as the stresses are distributed over a larger area reducing the resulting local Stress concentrations.

Bhale Pritish P et al carried out static analysis of flange of flange mounted motor by using FEA software. The load variation applied in range of 490 to 500 on bearing recess, with the downward axes along and flange length. The results concluded that the maximum stresses are developed at the rib region of about 1.20 Mpa. And the maximum deformation occurs at the bottom of the bearings.

SUMMARY:

Overall literature review has revealed interesting facts and findings that are used for problem formulation. Such as, Static & Dynamic analysis of Flange has not yet been reported significantly. Hence it is important to do so; Very few researchers attempted the design optimization of B5 flange, Material optimization of Flange is also important to reduce failure of the flange. The data provided by the sponsoring company has been related with the literature and further extended for work.

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