

Design and CFD Analysis of Screw Compressor by using ANSYS Software

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Abstract: This study manages the plan and investigation of screw compressor. The twin-screw compressor is a positive relocation machine utilized for packing air to direct weights. It includes a couple of intermeshing rotors with helical furrows machined on them, contained in a packaging which fits nearly around them. The rotors and packaging are isolated by little clearances. The quick acknowledgment of sink compressors different ventures in the course of recent years is because of their generally high rotational rates contrasted with different sorts of positive uprooting machines which make them conservative, their capacity to keep up high efficiencies over an extensive variety of working weights and stream rates and their long administration life and high unwavering quality. Each time era of various profiles and assesses execution of those profiles by tests is exceptionally troublesome and these are costly and time taking procedure. By utilizing CFD can discover execution of various profiles less demanding. A reasonable strategy for advancement of the screw compressor shape, size, and measurement is depicted here which brings about the most suitable outline. Compressors in this way composed accomplish higher conveyance rates and preferred efficiencies over those utilizing customary methodologies.

Key words: Design, analysis, compressor, CFD and efficiency, conveyance rates, troublesome

INTRODUCTION

Gas compressors are mechanical gadgets utilized for raising the weight of gas or vapor either by bringing down its volume (as on account of positive relocation machines) or by bestowing to it a high dynamic vitality which is changed over into weight in a diffuser (as on account of radiating machines) (Jang *et al.*, 2007). The characterization and utilization of compressors are portrayed in the following area (Merchant, 1999). The determination of compressors for various applications is a vital issue in the process business. It is generally the most costly bit of hardware and has prevailing impact on cycle effectiveness (Merchant *et al.*, 2000). The normal sorts of compressors utilized as a part of industry are responding, twin screw, design and analysis of a high-speed brushless DC motor for centrifugal compressor this study explained by Bonaiuti *et al.* (2002) single screw, radiating and parchment and turning vane. Design and analysis of magnetically-drive actuator applied for linear compressor this study explained by Tsai and Chiang (2010) compressor makers are accustomed to having a huge market potential. Likely, a wide range of compressors can be enhanced over what is accessible in the market today yet the potential return must legitimize the cost of innovative work to accomplish the change. Team compressors of the sort that is utilized simultaneously and gas enterprises are substantial and costly while their proceeding with capacity is normally

basic for continuation of the whole procedure in which they have an impact. The unwavering quality of their operation is in this way in any event as critical as their productivity. In the previous couple of years, noteworthy advances have been made in the outline and fabricate of the fundamental segments of Mechanical and Morphological Properties of PP/MWNT/MMT Hybrid nano composites this paper explained by Selvakumar and Manoharan (2014) machines of this sort, for example, the rotors and the heading, and in addition lesser parts.

MATERIALS AND METHODS

The compressor solid model was created by the Solidworks Software. All dimensions of the gas compressor are taken from the presently used compressor. This method is known as reverse engineering method. The created solid model is converted to the step file for the analyzing. The step file was import to the ANSYS Workbench Software. The boundary condition and material properties of the compressor are entered. Based on the on the result, the conclusion is given in this study.

Modeling: In the wake of performing basic estimation, the displaying has been performed on the Solidworks and afterward after the examination work has been performed on the ANSYS 12.0 adaptation. The compressor 3D Model is clearly showed in Fig. 1.

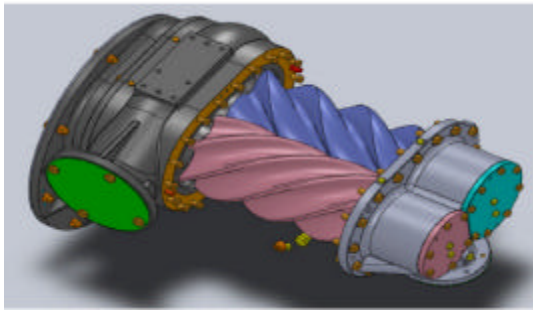


Fig. 1: 3D Model

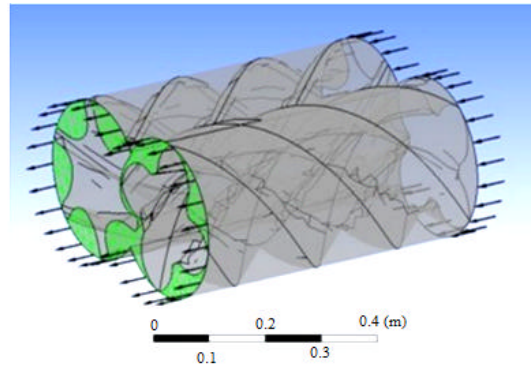


Fig. 3: Flow direction in compressor

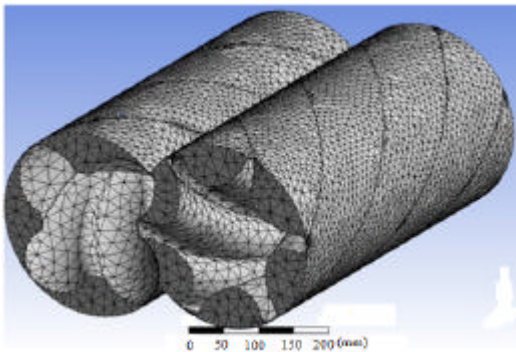


Fig. 2: Meshing model of compressor

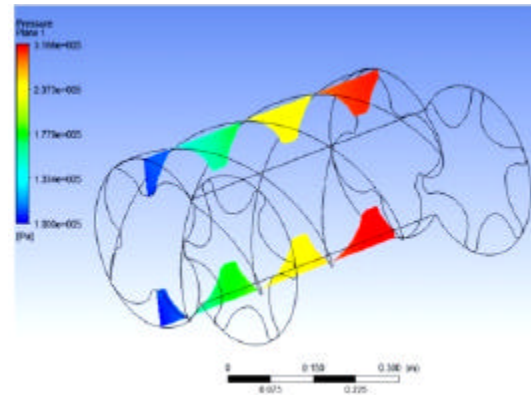


Fig. 4: Pressure counter

CFD analysis: 3D Model of rotary air compressor cavity is produced in Solidworks 2009 according to above given Drawing. Our CFD analysis strategy is cavity patten, so, we need to make cavity model of above rotary air compressor cavity.

Mesh: Meshing is necessary for all type of analysis in ANSYS Workbench. The solid model of the compressor is meshed in the analysis which is shown in Fig. 2. In this study, the fine mesh and high smooth condition is applied on the compressor.

RESULTS AND DISCUSSION

Rotary air compressor cavity model with inlet and outlet are shown in Fig. 3. Figure 4 representing the results of the compressor which is taken from the computational fluid dynamics analysis. The arrow marks are denotes the fluid flow in the compressor.

Pressure counter: The counter pressure value of the compressor is shown in Fig. 4. Pressure value is most important result in the computational fluid dynamics analysis. The maximum and minimum pressure of the

compressor denotes by the red color and yellow color. The minimum pressure counter of the compressor is 1 e5 pa and the maximum pressure counter of the compressor is 3.166 e5 Pa. The average pressure counter of the compressor is 1.779 e5 Pa.

CONCLUSION

The execution of process air screw compressors is exceptionally reliant on their rotor profiles and leeway conveyance. While era of asymmetric “N” profiles comprises of more bends care ought to be that while era of countenances. On the off chance that increasingly the number edges to make screw compressor profile number of appearances are more to make 3-D geometry. We need to decrease number of edges such way that upgrade the geometry. The freedom stream rate is non-directly relative to the weight proportion over the rotor packaging gathering. We have discovered weight variety around the rotors.

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