Design for the screws with non-symmetric profiles in screw compressors

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ABSTRACT

This paper relates to the problematic concerning the design, analysis and manufacturing of screw compressors. These problems include the basic geometric, characteristic analysis and the profile of tools. In the section of basic geometric design, adapting the theory of coordinate transformation and the theory of conjure surface, we derive the conjugate profile and the meshing equation of the screw compressors. Screw matrix is applied to the conjugate profile and thus the helical surface of the screw compressors is obtained. Character analysis is divided into two parts—geometric characteristic and performance analysis. Geometric characteristic includes the discharge area, the length of the sealing and the area of the blow hole. Adapting to the first law of thermodynamics on the performance analysis, we analyze the pressure ratio of suction and discharge, temperature distribution and the variability of the mass. The gear theory is applied to focus on the grinding design of the screw rotor. The relevant results of the study may be used as a reference for manufacturers in designing new models or improving on similar compressors.

Keywords : SCREW COMPRESSOR ; PROFILE ; non-symmetric

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