Design of twin screw rotors of air compressors

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ABSTRACT

Application of the types of air compressors are reciprocating, centrifugal, screw, vacuum pump, liquid pump and heterogeneity, but the screw of air compressors are better than other. The twin screw of air compressors are constituted to parallel of two axis and the same of the lead and meshing and opposite of the Spiral direction of the rotors. The rotor can class with male rotor and female rotor. The rotor tooth is outside the circle call male rotor, and the rotor tooth is inside the circle call male rotor. In design the rotor, we have to increase to seal the air, and promote efficiency in the twin screw of air compressors. So we must research to design the rotor and find out the characteristic of the rotor. In the CFD analysis, I use the software, CFDesign, to simulate flow in the twin screw of air compressors., and to observe flow field in different of outline rotor. To design better rotor, and receive better efficiency in the twin screw of air compressors.

Keywords : the twin screw of air compressors、male rotor、female rotor

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參考文獻 [1] Singh, P. J. and Schwartz, P. R.,“ Exact Analytical Representation of Screw Compressor Rotor Geometry,” Proceedings of the 1990 International Compressor Engineering Conference at Purdue, West Lafayette, pp. 925-937, 1990 . [2] Litvin F. Theory of Gearing; 1989(In USA). [3] Singh, P. J. and Onuschak, A. D.,“ A Comprehensive, Computerized Method for Twin-screw Rotor Profile Generation and Analysis,” Proceedings of the 1984 International Compressor Engineering Conference at Purdue,West Lafayette, pp. 18-23, 1984. [4] 張慧隆，正齒輪與傘齒輪參數化齒形之研究，國立中山大學 機械工程研究所博士論文，1991。 [5] Chang, H. L. and Tsai, Y. C.,“ A Mathematical Model of Parametric Tooth Profiles for Spur Gears,” ASME Journal of Mechanisms, Transmissions and Automation in Design, Vol 114, pp. 8-16, 1992. [6] Zhang L, Hamilton J. Main Geometric Characteristics of the Twin Screw

Compressor, Proceedings of the International Compressor Engineering Conference at Purdue, USA, pp. 449-456, 1992. [7] Tsai, Y. C. and Chin P. C.,“ Tranmissions and Automation in Design, ” Journal of Mechanisms, Vol. 109, pp. 443-449, 1987. [8] 朱鉉道，“ 哈華特心新齒形的探討 ”，機械月刊，第二十二 卷，第九期，第271~279 頁，1996。 [9] 蔡潔雯，“ 利用作用線推導螺旋式壓縮機轉子之齒形數學模 式 ”，國立中正大學機械工程研究所碩士論文，1999。 [10] 蘇士豪，“ 螺旋式壓縮機轉子之設計與製造分析 ”，國立交 通大學機械工程研究所博士論文，1999。 [11] 邢子文，“ 螺桿壓縮機－理論、設計及應用 ”，機械工業出 版社，北京，2000。 [12] 吳召信，“ 利用曲線型作用線推導三維螺旋轉子之共軛齒形 數學模式與設計研究 ”，2002。 [13] 高志宏，“ 利用作用線推導雙螺桿壓縮機齒形數學模式與性 能研究 ”，2004。 [14] 謝金育，“ 基於田口法之雙螺桿壓縮機性能影響參數分析 ”， 2007。 [15] 謝家駿，“ 雙螺旋式真空幫浦轉子幾何研究 ”，2008。 [16] 林志軒，“ 雙螺旋式壓縮機轉子流場分析 ”，2009。 [17] Ahmed Kovacevic, Nikola Stosic, I.K. Smith,“ Numerical Simulation of Fluid Flow and Solid Structure in screw Compressors ”, 2002。 [18] 愛發股份有限公司。

REFERENCES

參考文獻 [1] Singh, P. J. and Schwartz, P. R.,“ Exact Analytical Representation of Screw Compressor Rotor Geometry, ” Proceedings of the 1990 International Compressor Engineering Conference at Purdue, West Lafayette, pp. 925-937, 1990 .
[2] Litvin F. Theory of Gearing; 1989(In USA).
[3] Singh, P. J. and Onuschak, A. D.,“ A Comprehensive, Computerized Method for Twin-screw Rotor Profile Generation and Analysis, ” Proceedings of the 1984 International Compressor Engineering Conference at Purdue,West Lafayette, pp. 18-23, 1984.
[4] 張慧隆，正齒輪與傘齒輪參數化齒形之研究，國立中山大學 機械工程研究所博士論文，1991。
[5] Chang, H. L. and Tsai, Y. C.,“ A Mathematical Model of Parametric Tooth Profiles for Spur Gears, ” ASME Journal of Mechanisms, Transmissions and Automation in Design, Vol 114, pp. 8-16, 1992.
[6] Zhang L, Hamilton J. Main Geometric Characteristics of the Twin Screw Compressor, Proceedings of the International Compressor Engineering Conference at Purdue, USA, pp. 449-456, 1992.
[7] Tsai, Y. C. and Chin P. C.,“ Tranmissions and Automation in Design, ” Journal of Mechanisms, Vol. 109, pp. 443-449, 1987.
[8] 朱鉉道，“ 哈華特心新齒形的探討 ”，機械月刊，第二十二 卷，第九期，第271~279 頁，1996。
[9] 蔡潔雯，“ 利用作用線推導螺旋式壓縮機轉子之齒形數學模 式 ”，國立中正大學機械工程研究所碩士論文，1999。
[10] 蘇士豪，“ 螺旋式壓縮機轉子之設計與製造分析 ”，國立交 通大學機械工程研究所博士論文，1999。
[11] 邢子文，“ 螺桿壓縮機－理論、設計及應用 ”，機械工業出 版社，北京，2000。
[12] 吳召信，“ 利用曲線型作用線推導三維螺旋轉子之共軛齒形 數學模式與設計研究 ”，2002。
[13] 高志宏，“ 利用作用線推導雙螺桿壓縮機齒形數學模式與性 能研究 ”，2004。
[14] 謝金育，“ 基於田口法之雙螺桿壓縮機性能影響參數分析 ”， 2007。
[15] 謝家駿，“ 雙螺旋式真空幫浦轉子幾何研究 ”，2008。
[16] 林志軒，“ 雙螺旋式壓縮機轉子流場分析 ”，2009。
[17] Ahmed Kovacevic, Nikola Stosic, I.K. Smith,“ Numerical Simulation of Fluid Flow and Solid Structure in screw Compressors ”, 2002。
[18] 愛發股份有限公司。