# Study on Vacuum Blades Manufactured by Reverse Engineering

# 余安富、李佳言

E-mail: 9706763@mail.dyu.edu.tw

#### **ABSTRACT**

ABSTRACT Cause is skillful in the technology of CAD/CAM in recent years, impel the application that CAD model has in the product development, design and manufacture to become general, make industrial circle examine to three yuans of quantity and reverse engineering have more ardent demands, this report hopes to promote the ability set up of the complicated spare part CAD model with the combination of the detection system and reverse engineering. The reverse engineering means that is examined the technology set up intact CAD model of the materials, suited to only having material object models and application without CAD model by quantity. Three yuans of quantity materials is it through reverse treatment of project, change proper curved surface, curved surface model to take, can just pass to CAD system. Turbine molecule blade, vacuum of pump at the state of shedding at thin molecule of medium, qigong can have steady smoking, can form the vacuum state, can sum up molecular weight in main factor influencing the molecule vacuum pump blade of the turbine to be designed, Blade Angle, Blade Spacing, Blade Chord, Blade Velocity, etc.. Can divide size amount planning and 5- axis machine tool, model rebuilding, route and process four major parts of machine tooling mainly on reverse engineering, this report focuses on doing in fact, have more introductions to process in the 5-axis machine tool of back segment, examine to three yuans of quantity person who examine amount principle and turbine molecule vacuum pump make simple introduction another. Key word: Reverse Engineering, Molecule vacuum pump blade of the turbine, 5-axis machine tool

Keywords: Reverse Engineering, Molecule vacuum pump blade of the turbine, 5-axis machine tool

### Table of Contents

目錄 封面內頁 簽名頁 授權書	iii 中文摘要	iv 英文摘
要v 誌謝	vi 目錄	vii 圖目
錄ix 表目錄	xii 第一章 緒	論 1.1 研究動機1 1.2
研究目的與方法2 1.3 文獻回顧	2 1.4 本文架構.	4 第二章 渦輪分子真
空幫浦之抽氣原理 2.1 渦輪分子真空幫浦簡介	5 2.1.1 渦輪分子真空幫	浦之主要構造7 2.1.2 渦輪分子真空
幫浦之定義10 2.2 渦輪分子真空幫浦之作用	用原理11 第三章 逆向]	L程量測系統原理 3.1 三次元量測
儀19 3.1.1 接觸式量測	20 3.1.2 非接觸式量測	28 第四章 五軸加工機對渦輪分
子真空幫浦葉片之應用 4.1 五軸加工機的定義及種	類32 4.2 渦輪分子真	至幫浦葉片加工前往之準備工作34
4.2.1 素材比較與選定34 4.2.2 葉片幾何	可尺寸量測37 4.2.2.1	量測定位尺寸用之探針40 4.2.2.2量
測幾何尺寸用之探針40 4.2.2.3探針校驗	41 4.2.2.4量測件安裝	42 4.2.2.5工件座標設定程
序42 4.3 葉片於五軸加工機加工結果	44 4.3.1刀具種類與選擇	45 4.3.2加工參數設
定46 4.3.3刀具路徑規劃	46 4.3.4後處理程式	49 4.3.5編輯NC程
式51 第五章 結論與未來展望 5.1 研究結論		
5.2 未來展望67 參考文獻	70	

### **REFERENCES**

參考文獻〔1〕Gaede, V. W. 1913, "Die Molekular Luftpumpe", Annalender Physik ,41,pp.342。〔2〕范光照.章明.姚宏宗.許智欽編著, "逆向工程技術與應用",台北,高立出版社,2000。〔3〕周弘裕, "逆向工程系統簡介",機械工誌,1994,pp.130-136。〔4〕H. T. Yan, S. U. Hangue and C. H. Meng, "Reverse Engineering in the Design of Engine Intake and Exhaust posts",Proceeding of the Symposium on Computer-Controlled Machine for Manufacturing, ASME Winter Annul Meeting, New Orleans,LA,Dec,1993。〔5〕P. N. Chivate, and A. G. Jablookow, "Review of surface representations and fitting for reverse engineering" computer integrated Manufacturing Systems, Volume 8 Number 3,1995。〔6〕李俊賢, "自由曲面掃瞄量測資料之曲面建構與誤差分析研究",大葉大學機械工程研究所,碩士論文,1999。〔7〕D. J. Bollinger, R. Piper and M. Kroneberg, "CAD directed inspection and error analysis using surface" Ann. CIRP, Vol.33, No.1, pp.347-356,1984。〔8〕蔡鴻志,"渦輪分子真空幫浦葉片設計參數分析",國立中山大學機械工程研究所,碩士論文,2000。〔9〕郭宗榮, "渦輪分子真空幫浦葉片幾何之研究",國立中山大學機械工程研究所,碩士論文,2001。〔10〕呂登復,1996年6月,實用真空技術,國興出

版社,台北。 [11] 宋上漢, "CAD/CAM基礎於逆向工程技術之研究",中原大學機械工程研究所,碩士論文,2002。 [12] "鋁合金資料集",啟學出版社, pp.22-25, pp.88-91, pp.114-117,1985。 [13] 張俊智, "以逆向工程製作渦輪葉片之研究",大葉大學機械工程研究所,碩士論文,2007。 [14] 吳英民,劉一守,賴耿陽等譯著, "鋁合金構造設計輯覽",復雄出版社,1979年7月。 [15] 李銘宗, "軸流式葉片五軸粗加工規劃",台灣大學機械工程研究所,碩士論文,2001。 [16] 陳文翔, "五軸加工規劃之整合研究",台灣大學機械工程研究所,碩士論文,2000。 [17] W. B. Thompson, J. C. Owen. H. J. de St Germain, S. R. Stark and T. C. Henderseon, "Feature-Based Reverse Engineering of Mechanical Parts" IEEE Transaction on Robotics and Automation,Vol.5, NO.1,February,1999。