

# 離岸型風力機之關鍵鑄件之鑄造技術研發

執行單位

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計畫主持人

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- 本研究計畫係以研發大型風力發電機之關鍵性零組件之合金設計及製程技術為目標。目前所研發之技術已可應用於大型風力發電機(2.0~3.6MW)之輪轂(Hub)、轉軸(Rotor shaft)、(3.0~5.0MW)機座(Main frame)及齒輪箱元件(Gear box components)等鑄件產品。

## ■ 專利布局/技術效益

1. 輪轂(Hub)、機座(Main frame)、轉軸(Rotor shaft)及齒輪箱元件(Gear box components)等大型風機鑄件之設計及模型製造技術。
2. 流路及冒口系統設計及電腦模擬技術。
3. 最佳合金設計及製程參數條件之技術。



Fig 1. 3.6MW 輪轂(Hub) 鑄件成品(左: 源潤豐; 右: 臺灣正昇)

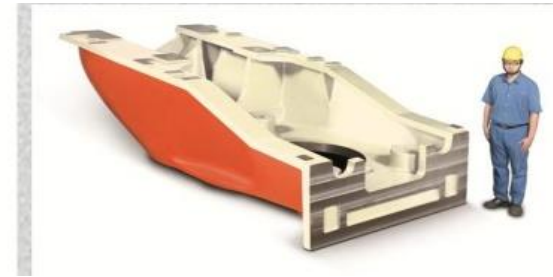


Fig 2. 3.0~5.0MW 機座(Main Frame) 鑄件成品(臺灣正昇)

## ● 計畫簡介:

本研究計畫係以研發大型風力發電機之關鍵性零組件之合金設計及製程技術為目標。研究內容包含: 研發大型風力發電機(3~5MW)之輪轂(Hub)、轉軸(Rotor shaft)、機座(Main frame)及齒輪箱元件(Gear box)之合金設計、球化與接種處理、凝固模擬分析及澆冒口設計技術, 以協助及輔導國內鑄造廠商建立大型風力機之製造技術。

1. 本研究團隊為 **台灣國內首次成功開發** 離岸風力機之關鍵性零組件, 鑄件之機械性質及品質均已符合 歐盟標準EN1563 及超音波檢測(EN 12680-3)之要求。
2. 本研究團隊已協助 穎杰公司、臺灣正昇公司、源潤豐公司 及 益光公司 成功開發 (2.0~3.6)MW 輪轂 (Hub) 鑄件及 (3~5)MW 機座 (Main Frame) 鑄件; 並與 益光機械木型公司 共同進行 3.0MW 以上風機之輪轂、機座等之模具開發, 至今已獲得 丹麥VESTAS、美國奇異GE、西班牙Gamesa 等國際風機大廠之訂單, 成為全球主要供應商之一。

# Technological Development for the Production of Key Casting Components in the Off-shore Wind Turbines

Execution Unit

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Project Director

Professor Yung-Ning Pan

- The aim of this research project is to establish the casting technologies and quality control system for the production of key casting components, i.e., hub and main frame, used in the large-scale off-shore wind turbines (3~5MW).

This research project had established the production technologies for the key casting components (hub, rotor shaft, main frame, gear box, etc.) of large-scale on-land and off-shore wind turbines, including gating and riser systems design and related computer simulations, the optimal alloy design and casting processes.



Fig 1. 3.6MW Hub (Left: YJF源潤豐; Right: TCS臺灣正昇)



Fig 2. 3.0~5.0MW Main Frame (TCS臺灣正昇)

- The objective of the research project is to establish the complete manufacturing technologies and quality control system for successful production of key casting components used in large-scale off-shore wind turbines (3.6MW), and to transfer the technologies developed herein to the Taiwan foundry industry.
- The research team had successfully accomplished the development of key casting components used in the large-scale off-shore wind turbines, those components had conformed to the specifications of mechanical property (EN1563) and Ultrasonic testing (EN12680-3).
- The research team had assisted Ying Chien Foundry Industry Co., Ltd.(穎杰公司), Taiwan Cheng Sheng Metal Co., Ltd.(臺灣正昇公司), Yuan Jun Fong Casting Co., Ltd.(源潤豐公司) and Yih Guang Machine Pattern Maker Co., Ltd.(益光公司) in developing (2.0~3.6)MW Hub and (3~5)MW Main Frame. In addition, the research team had collaborated with Yih Guang Co. on pattern production of Hub, Main frame, etc., and Yih Guang Co. had already acquired orders from VESTAS, GE, Gamesa, etc., and had become a pattern supplier for those companies.