工業技術研究院
Industrial Technology
Research Institute

離岸風電關鍵零組件製造訓練課程

Offshore Wind Farm Components Fabrication Training Course

時間 (Time)：104 年 11 月 26 日至 27 日（四&五）09:00~16:00

地點 (Venue)：台大嚴慶齡工業研究中心

台北市大安區基隆路三段 130 號（捷運公館站 2 號出口）

指導單位 (Advisor)：經濟部能源局（BOE, MOEA）

主辦單位 (Sponsor)：千架海陸風力機計畫推動辦公室（TWTPO）

工業技術研究院（ITRI）

政府已公布「千架海陸風力機」之政策目標，並成立「千架海陸風力機計畫推動辦公室」，全力推動國內風力發電之設置與發展，預計將創造出 5,000 億元之內需商機。為促進離岸風力發電產業之發展，並降低業者開發之風險。經濟部已於去（102）年 10 月 28 日完成風力發電離岸系統示範獎勵案之簽約儀式，正式啟動台灣離岸風力發電之實質開發。將於 2015 年完成國內首座離岸示範風場之開發，後續則透過經濟規模之區塊開發的方式，逐步達成 2030 年離岸裝置容量的目標。

為協助國內有興趣業者投入離岸風場開發，經濟部能源局透過「千架海陸風力機計畫推動辦公室」，規劃一系列相關技術訓練課程。依規劃本次將進行 2 天之「離岸風場製造」訓練課程，本次訓練課程之詳細課程內容可參考議程。

DNV-GL 公司簡介：

DNV-GL 為全球最大之風能產業顧問諮詢暨認證機構，目前約有 17,000 名員工分佈在 100 個國家，其風能部門有超過 400 名專業的能源顧問。除了風能領域外，也跨逐包含太陽能、潮汐能、地熱等再生能源。DNV-GL 目前佔全球陸域與離岸風力發電 70%以上之認證及驗證技術之業務。目前有超過 35 GW 之風力資源評估是由 DNV-GL 執行，超過 500 座測風塔之採購、安裝和營運由 DNV-GL 提供技術支援。為目前市佔率最高之風能顧問和認證公司。

講師簡介:

Mr. Chris Garrett

Senior Offshore Wind Farm Engineer

His Career in construction spans over 30 years, Chris joined DNV GL (then Garrad Hassan) in 2008 and has worked almost entirely in offshore wind for the last seven years.

Experience includes: Engineering Development, QA & QC Manager of the UKs largest building services pre-fabricated pipework manufacturer. Production engineering & automated welding advice to offshore wind foundation manufacturers, and design of an entire jacket serial production facility. Design and fabrication of welded civil engineering structures and construction plant modifications. Also former construction plant manager with experience of working with batching plant, concrete pumps, re-bar and pipe bending equipment, and shuttering formwork, for fabrication of heavy reinforced concrete structures.

Mr. Kay-Uwe Fruhner

Principal Engineer (for Steel Structures at Renewables Certification)

Kay Fruhner has a Civil Engineering background and an additional qualification as an International Welding Engineer.

He has worked for DNV GL since 2008 with a focus on design verification and manufacturing surveillance of support structures for both onshore and offshore wind turbines. Besides this, he is actively contributing to the development of the DNV GL rules/standards and is involved in innovation projects as well as being a project manager.

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議程 / Agenda

日期： 11 月 26 日 (四) / November 26 (Thursday) 09:00~16:00

主題：Introduction to Fabrication of Offshore Wind Farm Components

時間	活動內容 / Content	演講人 / Speakers
08:30~09:00	報到 / Registration	
09:00~09:05	貴賓致詞 Opening Remarks	經濟部能源局 BOE / MOEA
上午 09:05~12:00	1 INTRODUCTION 1.1 Introduction to offshore WTGs and foundations 1.2 General overview of fabrication 1.3 Design influence on fabrication 1.4 Fabrication influence on installation 1.5 Fabrication overview by structure type: 1.5.1 Turbine Towers 1.5.2 Monopile 1.5.3 Jacket 1.5.4 Tripod 1.5.5 Gravity Base 1.5.6 Offshore Substations 1.5.7 Other types DISCUSSION and QUESTIONS + COMFORT BREAK 2 TYPICAL CODES AND STANDARDS USED FOR FABRICATION OF OFFSHORE WIND FARM STRUCTURES 2.1 Design codes and guidelines 2.2 Typical codes and standards for fabrication 2.2.1 Requirements for manufacturers 2.2.2 Quality management 2.2.3 Materials 2.2.4 Production and testing DISCUSSION and QUESTIONS	Chris Garrett & Kay-Uwe Fruhner
12:00~13:00	午餐 / Lunch	
下午 13:00~16:00	3 MATERIALS (STEEL) 3.1 Introduction 3.2 Structural member categories 3.3 Determination of survival and design temperature 3.4 Test temperature for charpy energy 3.5 Example for pre-heating 3.6 Toughness requirements 3.7 Summary DISCUSSION and QUESTIONS + COMFORT BREAK	Chris Garrett & Kay-Uwe Fruhner

	4 Cutting and Rolling 4.1 Equipment and methods - rolling 4.2 Equipment and methods - cutting 4.3 Weld Preparation DISCUSSION and QUESTIONS	

※主辦單位保留調整議程內容之權力

議程 / Agenda

日期: 11 月 27 日 (五) / November 27 (Friday) 09:00~16:00

主題：Introduction to Fabrication of Offshore Wind Farm Components

時間	活動內容 / Content	演講人 / Speakers
08:30~09:00	報到 / Registration	
上午 09:00~12:00	5 Welding 5.1 Welding processes overview 5.2 Types of weld geometry (butt weld, fillet weld etc.) 5.3 Welding equipment 5.4 Positional welding 5.5 Welding procedures 5.6 Welder qualifications 5.7 Welding automation and serial production 5.8 Welding symbols and drawings 5.9 Storage of consumables 5.10 Weld improvement (e.g. Grinding) DISCUSSION and QUESTIONS 6 Casting and Forging 6.1 Casting process 6.2 Forging process 6.3 Jacket joints 6.4 Transition Pieces 6.5 Flanges DISCUSSION and QUESTIONS + COMFORT BREAK 7 Corrosion Protection 7.1 Corrosion introduction 7.2 Coating materials 7.3 Surface preparation 7.4 Surface contamination 7.5 Coating application 7.6 Cathodic protection 7.7 Important standards 7.8 Selected cases of coating failures 7.9 ISO Standards DISCUSSION and QUESTIONS	Chris Garrett & Kay-Uwe Fruhner

12:00~13:00	午餐 / Lunch	
下午 13:00~16:00	8 Quality Assurance and Quality Control 8.1 Definitions of QA and QC 8.2 The QA Significance of "Special Processes" 8.3 Fabrication inspections (inc. dimensional and NDT) 8.4 Certification dring fabrication DISCUSSION and QUESTIONS + COMFORT BREAK 9 Production Engineering 9.1 Unit production 9.2 Batch production 9.3 Serial production 9.4 Serial production facilities (inc. welding automation) 9.5 Mechanical handing systems 9.6 Production modelling DISCUSSION and QUESTIONS 10 QHSE 10.1 Introduction DISCUSSION and QUESTIONS FINAL ROUND UP OF COURSE	Chris Garrett & Kay-Uwe Fruhner

※主辦單位保留調整議程內容之權力

※報名資訊:

1.報名方式：請於 104 年 11 月 23 日前，完成線上報名

- **報名網址：**http://www.beclass.com/rid=1837b41563ac5b9b96ab

2.活動諮詢專線：02-8772-3415 #161 溫郁佳 小姐

3.報名費用:免費

4.名額:限額 70 名，額滿為止 (因現場位置有限，各單位參與人數限 5 人)

5.講義:現場僅提供共計 70 份課程講義，恕不提供電子檔。

參考路線圖

1.公車路線：可搭乘公車1、207、275、275(副)、650、672、673、 905、905(副)、906、907、909、南港軟體園區通勤專車(雙和線)、敦化幹線、棕12至台大公館醫院站下車

2.從台北火車站：

(1)可搭乘252公車至捷運公館站下車，再從公館搭乘650、1、673、907、棕12至台大公館醫院站下車。

(2)可搭乘捷運新店線至公館站下車，再從公館搭乘650、1、673、907、棕12至台大公館醫院站下車。

3.自行開車路線：

(1)國道一號接建國北路快速道路由辛亥路出口下，直行辛亥路右轉基隆路，過長興街後，直行約50公尺。

(2)國道三號木柵交流道往台北方向由辛亥路出口下，直行辛亥路左轉基隆路，過長興街後，直行約50公尺。