

Time, the Key to Success

The Importance of Schedule Control for Wind Power Project Management

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c o l u m n i s t

Wind Power Project Management – Schedule

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Time, the Key to Success

“Time is our greatest enemy”, the iconic line from Top Gun: Maverick, perfectly encapsulates one of the critical factors and the biggest threat in determining the success of offshore wind power projects in Taiwan. Every player in the industry is racing against time because time directly translates into money and profit. If the industry fails to generate the profit as anticipated, developers, suppliers and contractors may quickly abandon their involvement. It is a fact that the government must recognize and prioritize the best interests of the industry.

This article will delve into the challenges and risks associated with schedule control in the context of offshore wind power projects, emphasizing the need for effective schedule management practices.

Challenges in Schedule Management:

1. Localization requirement: Limited capacity in domestic Jacket fabrication

2. Government penalty to delayed completion
3. Offshore installation constraints: Unpredictable weather in winter resulting in a tight construction window for offshore scope.
4. Seabed instability: Lead to risks such as pile run and prolonged soil settlement for jacket and wind turbine installation.
5. Insufficient supply of offshore construction and transportation vessels.
6. Limited choice of fabrication and offshore installation contractors results in a tremendous amount to be paid for the scope.

The aim of an offshore wind project is to have the electricity generated on time. Failing to achieve this goal could result in significant losses for the project, including:

1. No electricity, no revenue.
2. Expenses to maintain offshore operations (vessel,

fuel, labour, etc.), the cost could go up to millions of Taiwanese dollars daily.

3. Additional budget claims from onshore fabricators.
4. Developer's expenditures on manpower and other maintenance.

The Priority in Offshore Wind Project Management- Construction

So, how can we ensure the electricity can be generated on time? Schedule control will be one pillar to achieve the goal, and the function of the PMO team plays a crucial role. Apart from the weekly and monthly report preparation, PMO team also gathers and consolidates the progress updates from all packages, analyzing all types of information, and simulating various scenarios as materials for senior management in their decision making.

For example, the work for a 30-40-month offshore wind project construction could be classified as follow:

1. Categorized by work scope:
 - 1.1 Foundation Supply – Fabrication of pin pile and jacket, transportation, mobilization of vessels/crews and offshore construction.
 - 1.2 Subsea cable supply – Fabrication, transportation, mobilization of vessels/crews and cable laying (including trenching, burying, and pulling).
 - 1.3 Wind Turbine supply – Including Tower, nacelle and blade fabrication, transportation, mobilization of vessels/crews and offshore construction.
 - 1.4 Onshore substation
 - 1.5 Grid Connection

Project Management Cycle

Source: Mao-Cheng Chang



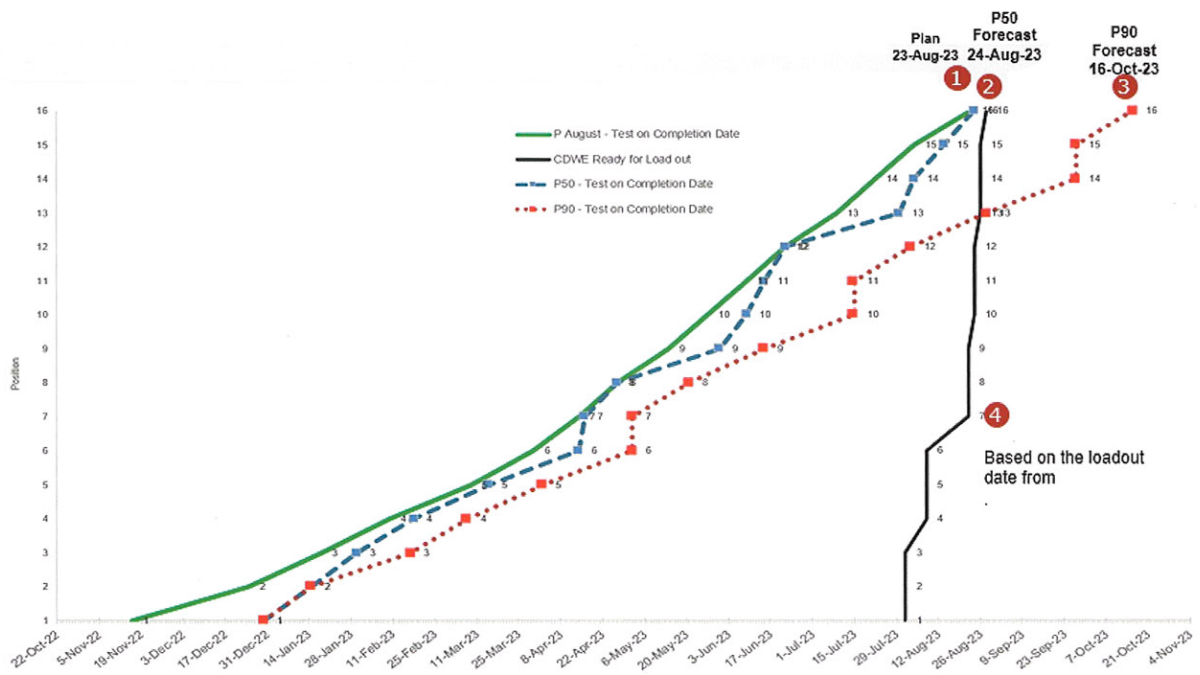
Onshore Manufacturing

Source: Mao-Cheng, Chang

2. Divided by onshore/offshore location
 - 2.1 Onshore manufacturing and transportation:
 - Driven by production lines and shop capacity, stands a better chance of risk mitigation and progress catching up when work is delayed.
 - 2.2 Offshore Transportation and Construction:

The unpredictable winter conditions in Taiwan have limited the construction window for marine operation. Additionally, the scarcity of specialized offshore vessels further exacerbates the risks of construction delay. Impacts of adverse weather, vessel availability, and other related factors sum up as significant challenges to expedite progress in offshore construction.

Schedule control becomes extremely crucial in the current development of foundation:



Confidence Level Forecast

Source: Mao-Cheng Chang

fabrication. The increased size and height in the latest Jacket designs have led to a significant extension in the time required for building these structures. The expansion poses challenges as the existing facilities, including assembly yards, coating workshops, and cranes, are no longer suitable to handle the larger Jackets anymore. As a result, fabrication of Jacket foundation has then emerged as the biggest bottleneck and risk in the project.

Schedule management, how?

Schedule forecast and simulating confidence

level for work completion are two crucial techniques in offshore wind project management.

High probability of schedule delay could lead to a catastrophic impact in financial losses. Therefore, conducting regular schedule assessment including confidence level simulation of (P50/70/90) for expedition or backup plans becomes essential. Indeed, it is impossible to predict every outcome with certainty, but having a contingency plan in place will significantly reduce the risk exposure of a project.



Source: Mao-Cheng, Chang



Offshore Transportation and Construction Source: Mao-Cheng, Chang

Four different approaches to be used for schedule management in onshore/offshore settings:

- 1). Critical Path Analysis
- 2). Earned Value Analysis
- 3). Resource Leveling Technique
- 4). Production Capacity Utilization

Implementing these techniques can assess the feasibility and impact of the forecast completion for pin piles, Jackets, sea cables, wind turbine components such as towers, nacelles, and blades, as well as onshore substation and offshore construction. These assessments allow us to evaluate the likelihood of meeting the estimated completion time and help us determine the need of a catch-up plan or back up plan to expedite the schedule if any delays are anticipated.

Taking foundation Jacket as an example:

1) Ripple effects: Few months delay in fabrication will impact the offshore installation schedule. Installation work that cannot be finished during summer this year will be extended to spring next year and resulted in tremendous cost expenditures to complete the scope. To mitigate this situation, it is essential to develop a robust improvement plan for Jacket fabrication.

2) Fabrication Challenge:

- i. Technical barriers and lack of manpower: most jacket components require full penetration in welding with maximum thickness up to 85mm. The welding process encompasses different positions, demanding welders to be exceptionally skillful and qualified by reputable certification bodies such as DNV and SGS. It will require at least 150-200 welders work simultaneously to achieve the requirement of 1.5 – 2 sets of Jackets per month.
- ii. Lack of schedule management personnel - With a complex supply chain and huge number of components (approximately 10,000 pcs/31

Jackets) interconnected, the availability of critical components is crucial for successful assembly. Any shortages in key components can hinder the assembly process, requiring constant monitoring and adjustment of the supply chain's delivery status. Adequate attention and coordination are necessary to ensure a smooth flow of materials and timely delivery of all required components.

iii. Production Improvement: It is necessary to enhance the production line with efficient planning; the number of workers involved in fabrication (welding), and the layout of the production process.

3. Actions for Team improvement:

- 3.1 Technical guidance on welding and welding sequence
- 3.2 Deformation control – transition piece, nodes, and boat landings
- 3.3 Implementation of schedule management
- 3.4 Schedule improvement and bottleneck management



Action for Team Improvement Source: Mao-Cheng, Chang

The concept of completion forecast:

1. The "We shall never surrender" forecast: This represents the unwavering determination and courage of the project team to complete the mission at all costs. It is a common mindset among Taiwanese companies to boost morale and foster a strong sense of commitment to project accomplishment. However, focusing

solely on this mindset without proper risk control and contingency planning may result in missed opportunities for recovery when faced with unexpected challenges or delays.

2. The "Confidence Level forecast": This approach involves evaluating confidence levels such as P50, P70, and P90 to estimate project completion. It is a core principle in project management and widely employed by foreign companies. In this approach, the decision to increase budget is made based on a comprehensive estimation considering different confidence levels. Backup plans are developed and implemented according to the specific confidence level, encompassing factors such as manpower, machinery, vessels, and other resources to ensure the project stays on track and minimize risks.

Seize the moment and shape the future

In the realm of schedule management, the pursuit of shaping the future and achieving project success should go beyond mere rhetoric or vague theories. It involves actively identifying issues at an early stage and implementing effective solutions to steer the project towards its intended goal. Taiwan has exemplified its prowess in schedule management through the successful integration of over twenty suppliers within the supply chain, leading to the early completion of 16 M.I.T Jackets with excellent quality. These accomplishments are a testament to Taiwan's capability in effective schedule management.

The vital role of PMO team

The geographical specificity in Taiwan highlights the crucial role of the PMO team in offshore wind projects. The PMO team is responsible for various functions such as integrating interfaces, risk mitigation, schedule management and providing early warning to senior management ensuring timely decision making.



Source: Mao-Cheng, Chang

The mentioned project challenges faced by developers in Taiwan, compared to Europe, can be significant and may result in extended delays, business transfer or even capital withdrawal. In this context, the expertise and dedication of the PMO team become indispensable in successfully executing offshore wind projects in Taiwan and ensuring positive outcomes.



Mao-Cheng Chang

Achievement

1. Schedule control of project management, production line capacity, on-site construction schedule control, cost and progress control system development.
2. The overall schedule planning and progress control of refinery project design, procurement, construction, and test run.
3. Training of schedule personnel and establishment of progress control system
4. Confidence assessment of project completion

Focus

Refining and petrochemical plants, schedule control of offshore wind power and capacity integration management of Jacket manufacturing experience.

Background

- LAUTEC Renewable Energy Project -Senior Planning Consultant (Senior Planning)
- CTCI Refining and Petrochemical - Leader Planner