

Global design of cables for offshore wind farm project

XU XieJun, CHANG QingSheng, Xu YanLi, Liu XinJie; Hengtong Optic-Electric Co., Ltd., (China), xuxiej@htgd.com.cn, michael.chang@htgd.com.cn, xuyl@htgd.com.cn, liuxj@htgd.com.cn

Qiao YuChang, Chen Kai; Hengtong Submarine Power Cable Co., Ltd., (China), qiaoyuchang@htgd.com.cn, chenkai@htgd.com.cn

☒ Young Researcher (Proved full-time engineering and science university researchers and Ph.D.students under 35 YO)

ABSTRACT

With the continuous development of offshore wind farm project, both in terms of environmental protection and economy, it is constantly promoting the innovation of submarine cable design concepts.

As the direct responsible party of the submarine cable, the submarine cable manufacturer must effectively meet the many requirements of the developer and the renewable energy company, and provide the best design for each project as perfect as possible. This includes electrical performance, thermal performance, mechanical performance, etc. This article will combine the design experience of some projects to fully explain the overall design of submarine cables for offshore wind farm projects.

KEYWORDS

Cable design; offshore wind farm; submarine cable

INTRODUCTION

After the continuous accumulation of offshore wind farm projects, the design of inter array cable, offshore export cable and onshore export cable are constantly updated and iterated.

For the thermal and electrical design. First of all, due to the instability of offshore wind power, it is usually not transmitted at full load, so there will be steady state calculation and dynamic load calculation. For conservative owners only steady-state calculations are required, but for owners seeking cost efficiency, dynamic load calculations are essential. Secondly, there are several installation

conditions have to be considered for both array cable and export cable. It is necessary to ensure that the designed cables could meet the transmission requirements for the entire offshore wind farm conditions. Through the design experience of several projects, the corresponding bottlenecks of different cables have been summarized. These bottlenecks are often the biggest pain points that limit our selection. For example, the CPS unbundled part of inter array cable, the HDD part of offshore export cable, the soil drying calculation of onshore export cable. In addition, some other aspects like the total losses of cable system, 2K criteria and accessory adaptability will also affect the final solution of the project.

For the mechanical design, usually dynamic cables have high requirements for mechanical properties, but static cables should not ignore this aspect of the design. On the one hand, there are many submarine laying companies for offshore wind farm projects, their laying vessels and laying tools are different, resulting in different minimum bend radius and maximum permissible crush load requirements for each cable, so it is necessary to account for the performance of each cable to meet the requirement of different laying vessels. On the other hand, the loading tools of the transport vessel also have certain requirements on the mechanical properties of the cable, such as coiling, maximum stacking, etc. In addition, as offshore wind farms may have multiple channels, the channels are usually Offshore Joint Prohibition Zones, which also affects the design of the cable length and the location of the filed joint.

In general, the design of thermal and electrical is mainly determined by simulation and calculation, and the design

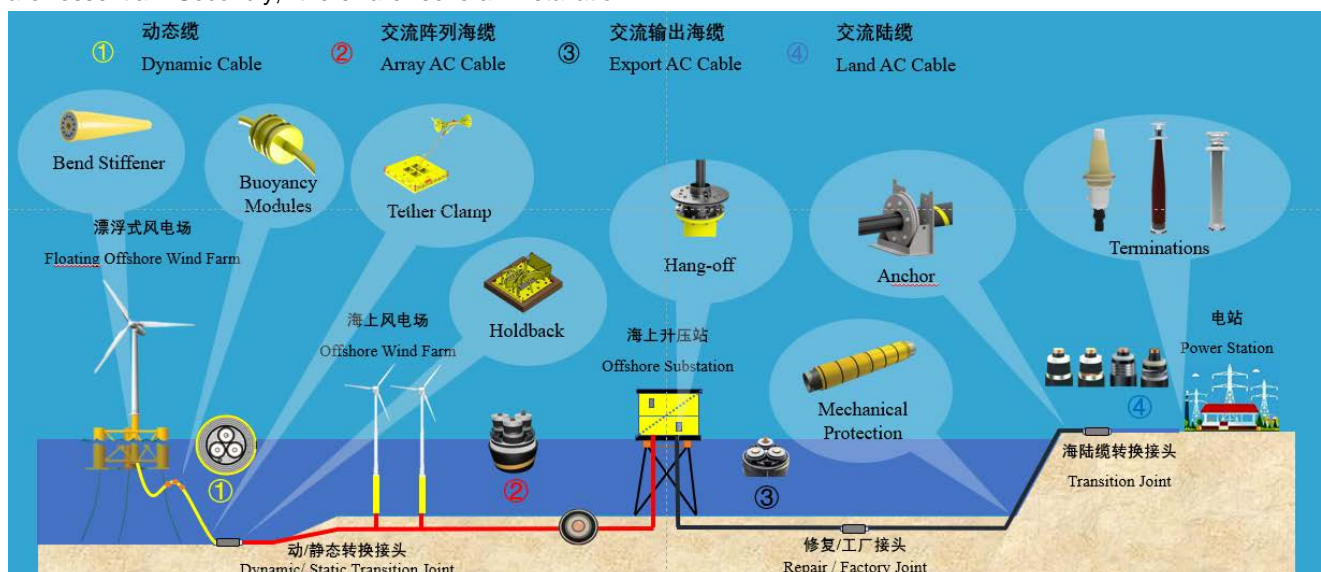


Fig. 1: Overview of offshore wind farm project