

Latest technologies for submarine cable protection and repair

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Cable protection and repair are the long-time most focused issues, especially for improving the reliability of the submarine cable transmission line. Recently, we have successfully repaired a long distance submarine cable of approx. 45 km at 200 m deep in Japan. Design of submarine cable protection is one of the most essential engineering to construct a highly reliable submarine cable circuit against sea traffic and active trawler fishery. However, a total solution is required upon study of not only the cable protection, but also economical construction cost, environment, safety aspects, maintenance, repairing method and so on. This paper generally introduces the latest technologies for submarine cable protection including high accuracy protection in deep water and repairing technologies based on our field experience.

Generally, it is not realistic to apply numerous divers for the cable protection work at the area of deeper than 30 m deep as well as for the long-distance cables. Cable burying with suitable burying machine, rock dumping, cable laying with polyurethane protection pipes are applied conventionally, based on the site conditions, seabed conditions, construction cost budget, clients requirement and so on. In case the seabed sediment allows applying a burying machine, water jet simultaneous burying and/or post-burying shall be one of the solution for the cable protection. Most appropriate proposals of protection shall be finalized as a study of the total solutions, in consideration of location, environment, safety aspects and cost effectiveness. In particular, rock dumping cost for the long-distance cable is normally very high, therefore, we have developed a cost effective cast iron cover protected laying method, instead of rock dumping and also polyurethane protection pipes.

A pinpoint cable protection is required at deep water, such as 300 m deep, as well as existing cable crossing. Installing concrete mattresses or filter unit filled with gravel and rocks is basic method of the pinpoint protection, however, especially at the deep water, high accuracy of the operation shall be required to minimize the construction cost. This paper introduces our own high accuracy protection method especially for deep water.

If the submarine cable was laid on undulated seabed, the cable free span shall be unavoidable. In order to prevent metal sheath fatigue due to Vortex Induced Vibration at strong current, cable protections to reduce the free span length are required normally. Recently, newly developed cable protective tube with fins has been introduced, attaching with assistance of Remotely Operated Vehicle (ROV), it will prevent the Vortex Induced Vibration. The Cable laying technique to reduce the free span length is progressing year by year, and we also have developed our own unique cable tension control system to reduce the cable free span length during cable laying operation.

Cable repairing method is also developed in-house to reduce the cable repair lengths, repair work duration for considering the impact of the repairing costs and the environment, based on our recent cable repair work for approx. 45 km, at 200 m deep in Japan.