# Recent and Future Developments in Jointing Technology in the Undersea Telecommunications Industry

*The introduction of the Universal Joint (UJ) made a huge impact on the undersea telecommunications industry when it was first introduced in 1990. As the demand for undersea cables continues to grow and cable maintenance becomes ever more complex, the role of the Universal Jointing Consortium (UJC) has never been more crucial to the industry.*

## The History of the Universal Joint

The philosophy of Universal Jointing for fibre optic cables was conceived in the late 1980's. In November 1990, the American Telephone and Telegraph Company, BT (Marine) Ltd., and Les Cables de Lyon, formed a consortium in contemplation of jointly entering into an agreement with the TAT9 fibre optic cable system purchasers to supply a Universal Joint and Universal Coupling (UJ/UC), for installation and maintenance. This new jointing approach (and technology) was aimed at allowing cable owners to avoid the need and expense of having to use a variety of manufacturer-specific cable jointing equipment.

The Universal Joint (UJ) is allowing manufacturers and cable owners alike, the freedom to install and purchase various underwater telecommunications cable types from different suppliers for the construction and maintenance of their networks. The standard UJ joint offers cable-specific components designed to fit together with a set of common piece parts using common tools for assembly.

The Universal Joint / Universal Coupling (UJ/UC) Consortium—which originally introduced the UJ/UC technology platform—has now grown into the Universal Jointing Consortium (UJC) with four members consisting of Alcatel Submarine Networks in France, Global Marine in the UK, KDDI Cableships & Subsea Engineering Inc. in Japan, and SubCom LLC in the USA. In addition to UJ/UC products, the UJC supports and maintains the Universal Quick Joint (UQJ) product platform. Consortium members each have specific responsibilities and work together to provide UJ, UC, and UQJ technology to worldwide cable operators, cable manufacturers, and maintenance contractors. It is testament to the effectiveness of the Consortium that these jointing technologies and standards have been adopted by the majority of optical undersea telecommunication cable maintenance authorities worldwide.

Generally, the UJ (provides a connection between cables) and UC (provides a connection between a cable and an optical housing, such as repeaters, branching units, etc.) are used in long-haul networks which are typically over 400 kilometres in length such as across Atlantic or Pacific routes. Networks of this length require the installation of repeaters or amplifiers at regular intervals along the cable to boost the optical signal as it travels down the fibre. In contrast, the UQJ was developed to meet the needs of the unpowered, non-repeatered, short-haul cable market.

## Meeting Industry Requirements

The development of the UJ/UC/UQJ technologies and introduction into the undersea market


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has positioned the UJC firmly at the forefront of undersea technological innovation. This position gives the Consortium a vantage point from which to gain insight into cable qualification needs and to raise industry standards. As part of its mission, the Consortium has initiated a program of enhancements designed to address changes within the industry.

New joint designs as well as improvements to existing joint designs are created to be compatible with the UJC baseline designs and jointing equipment. This ensures that advancements in the Consortium's product lines do not force existing systems and kits to become obsolete.

## Capacity

In its drive to improve productivity and efficiency, the Consortium promotes enhancements to the technology. These include satisfying the needs of a number of manufacturers producing cables with loose tube structures and high fibre counts. For these reasons a new fibre storage system has been engineered to allow for fibre movement and an increased fibre handling capacity from 60 to 96 fibres.

## Value Engineering

The Consortium is also championing value engineering of its jointing technologies. Through continual improvement of its products the Consortium has reduced complexity and manufacturing costs. This strategy is allied to industry drives aimed at (a) reducing time for cable jointing processes, (b) promoting shorter supply cycles, (c) reducing costs, and (d) shortening the time required for cable qualification.

To gain qualification status with the UJC, a cable to cable joint or cable to repeater coupling must pass stringent and thorough tests to determine the success of its jointing and handling characteristics. Research and development in the area of undersea cable compatibility has given the Consortium a unique insight into cable behavior. As well as collating pre-qualification and actual qualification information, the results of specific tests are stored and collated in a substantial database containing several hundred test reports. This, in turn, greatly helps to accurately identify the degree of compatibility between different cable types.

## A Centre for Excellence

The Consortium places great emphasis and importance on Qualification Test Specifications (QTSs) based on the simulation of a number of different marine environments and installation & recovery conditions. QTSs are regularly reviewed and agreed with the Consortium Members and are thus considered an international reference. The modular qualification approach means that it is not always necessary to complete the full battery of qualification tests for a new cable combination—thus reducing qualification costs and time to market for a new product.

## Conclusion

By directly addressing issues such as fiber movement, joint capacity, and value engineering, the


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Consortium is setting a global course for the industry. The Consortium has taken the lead in addressing these needs by pursuing enhancements of the jointing system while increasing value and tackling underlying cost issues. Part of this overall enhancement strategy includes closer liaison with cable manufacturers and system purchasers. This cooperation is an integral part in determining the minimum scope of testing thus increasing the value of the jointing products and decreasing the expenses to the customer.

Developments in jointing continue in an effort to constantly and consistently improve the benefits to telecommunications customers. These include further initiatives to reduce the cost to the user—both in real terms through reduced component and equipment cost—and by implementing new technology to reduce on-board jointing times.

The Consortium welcomes any comments or ideas that can help to improve UJ/UC/UQJ products and services. In addition, if you experience difficulties with any of the Universal Jointing products, we would be grateful if you could inform the Consortium Co-ordinator or any of the UJC members so that these can be resolved.

## Presentations

If your organisation would like further information or be given a presentation on the benefits of the UJ Consortium please use the feedback form on this website to contact us, giving details of your request.


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