

Technical Insight: UJ Molding Qualification

International submarine telecoms cable systems span huge distances and are laid on the seabed at great depths and ploughed into the seabed in shallower waters. For cables to run great distances, there is a need for optical signals to be regenerated by inline repeaters, all requiring electrical energy. This energy is delivered by the cable itself, necessitating a high voltage feed on the cable's center conductor. The tensions required to recover cable from great depth and when ploughed into the seabed can be many tonnes force.

Consequently, the Universal Joints that are used in the installation and maintenance of submarine cables have been designed and qualified for operation at up to 8000 metres water depth, under great tension and twist and at up to 15,000 volts for the cable systems' design life of typically 25 years.

The UJ Consortium members all apply common test standards, each standard devised to ensure that the Universal Joint product will survive the design life of the cable system at the maximum operating depth of the cable and the maximum system operating voltage. One UJC qualification testing standard specifically covers the laboratory testing of the Universal Joint core molding. The testing regime includes:

- Accelerated high voltage testing to ensure that the core insulation can withstand maximum system voltage for 25 years
- Flex testing to ensure the complete amalgamation of the molded interfaces between the parent cable and the joint sleeve with the injected polyethylene.
- Tensile testing of extremely thin sections of the molded interfaces, again ensuring complete amalgamation at the interfaces.

- Heat shrinkage tests to ensure that there is no significant stress built into the molded joint, avoiding the risk of cracking later in the joint lifetime.

The successful completion of this qualification work, in conjunction with employment of trained, qualified personnel, the correct equipment and tooling, using the correct construction process and parts all combine to form a UJ. Miss out any of these elements and the product that is deployed to the sea bed looks like a UJ but may not perform like one.

