CABLING CHOICES SAVE SPACE, WEIGHT AND INCREASE SAFETY IN TOPSIDE APPLICATIONS

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Offshore drilling and production platforms are complex systems, with limited space and round-the-clock operations in often hostile conditions. Platforms continue to become more compact and more sophisticated with an ever-increasing complexity of electronic systems, sensors, communications and safety equipment. More cables are therefore required to fit into more densely populated areas. While performance is paramount, space is always at a premium and weight is always a concern. Tradeoffs in weight mean savings in one area may allow more equipment in another area. Thus, designers and operators are always looking for ways to save space and weight—without compromising mission performance or personnel safety.

Fig.1. As offshore platforms become more sophisticated, the need for efficient use of space increases. (Source: TE Connectivity)

Cabling is sometimes overlooked as a means of saving space and weight. But as the topside becomes more automated and the number of cable runs increase, the sum of all the cables can represent significant size and weight, providing significant impact on the construction and costs of the platform.

Lightweight cables, such as the Raychem C-Lite cable family from TE Connectivity, represent an opportunity to reduce

the size and weight of control, communication, and instrumentation cables—while offering the same or better electrical and mechanical performance than conventional cables. Consider that the cabling on an offshore platform can run to several tonnes. Lightweight cables can save 25% to 30% in a typical application. What's more, their diameter is reduced by 30% to 40%, freeing up valuable space on the platform.

The space and weight reductions of the cable mean additional savings in the cabling infrastructure. Cable trays and other supports can be smaller and lighter. The same holds true for the glands. Tighter bend radii are also a benefit of a reduced-diameter cable, which can simplify pathways and the installation and routing of cable.

With more than 475 km of cabling on a typical large offshore platform, lightweight, thin-wall cable offers potential savings of up to 105 tonnes topside. The total cabling system – including smaller cable glands, trays and transits, can lead to overall weight savings of approximately 165 tonnes and cost savings in excess of 15%.

Smaller, lighter cables are of limited benefit if they offer reduced performance. In the demanding environment of an offshore platform, cables must offer:

- Mechanical robustness to resist abrasion
- Environmental toughness to resist temperatures, seawater, oil, solvents, and petroleum mud
- Safety, which includes low toxicity, low flammability, and circuit continuity in the event of a fire

The key to these size and weight reductions is the use of a unique thin-wall insulation used on the conductors. A typical cable used topside meets the requirements of EN60092 and has an insulation wall thickness of 0.8 mm. Thin-wall insulation, on the other hand, meets the same performance requirements while reducing the thickness to a mere 0.2 to 0.3 mm. The only difference between the traditional cable and the lightweight cable in Figure 2 is the type and thickness of the insulation. The size reduction of thin-wall insulation is dramatically apparent.

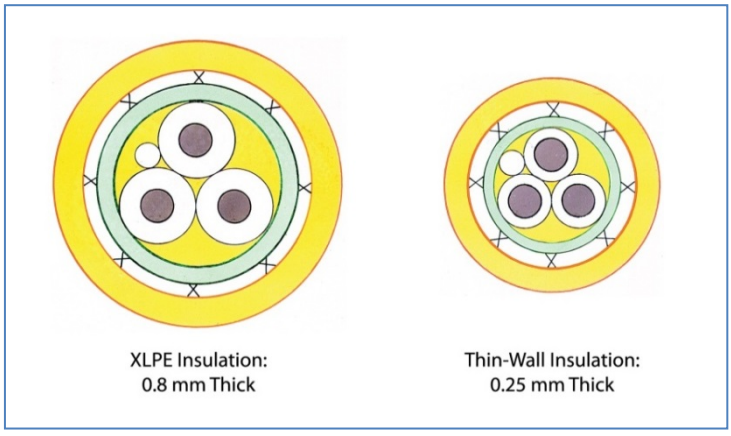

Fig. 2. TE Connectivity's Raychem Thin-Wall Insulations Can Significantly Reduce Cable Size and Weight
(Source: TE Connectivity)

Figure 3 illustrates the cascading effects of the size reduction of a single cable by showing multiple cables in a tray. Reductions of 40% are routine—with the benefits of smaller pathways, lighter-gauge cable trays, and smaller glands and feed-throughs. In retrofit or upgrade applications, thin-wall cables allow more cables in the same existing space. As platforms increase automation and monitoring, the ability to accommodate more cables grows.

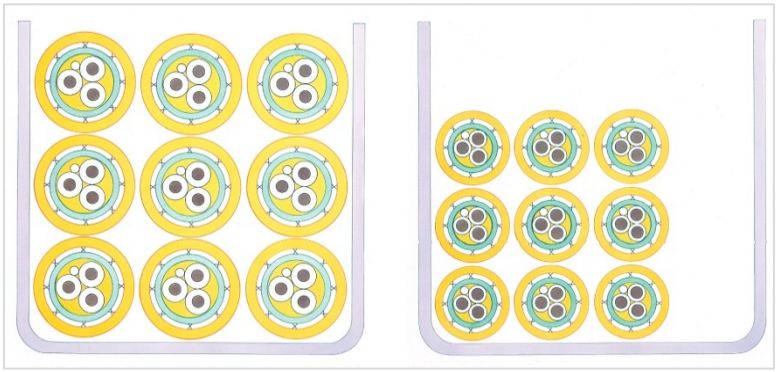

Fig. 3. A Demonstration of the Space-Saving Advantages of Lightweight, Thin-Wall Cables (Source: TE Connectivity)

Mechanical and Environmental Toughness

Cables used in offshore platforms must meet rigorous requirements of standards issued by organizations such as ABS (American Bureau of Shipping), DNV (Det Norske Veritas), GL (Germanischer Lloyd), and the International Electrotechnical Commission (IEC). Most topside cable will either meet IEC60092-359 SHF-1 or SHF-2 requirements for oil resistance in petroleum applications. SHF-1 is a general-purpose specification that includes resistance to common fluids. SHF-2 is more rigorous, addressing resistance to the more demanding petroleum muds used in drilling.

Lightweight cables are gaining recognition from standards-setting organizations, making it easier and more convenient to specify them in offshore applications. Of particular note, TE's C-Lite cables have gained Germanischer Lloyd certification, the first—and at present only—thin-wall lightweight cables to be certified. Such listings underscore the ability of thin-wall cables to perform in the harsh environment of offshore platforms and allow application without additional time-consuming evaluation and testing.

Safety

Safety, especially in a fire, is critical in offshore platforms. Cable jackets are either zero halogen or low-smoke zero halogen (LSZH). Zero-halogen materials emit reduced levels of toxic gases when compared traditional cable materials. Toxic gases are not only a hazard to humans, but they can have a corrosive effect on equipment. Halogen-free materials protect personnel, but may still generate significant smoke that can hamper visibility. LSZH materials allow visibility to be maintained by generating very low amounts of smoke.

Conventional limited-fire-hazard cables offer low combustibility to minimize the growth and spread of a fire. They also produce varying degrees of corrosive gases, carbon monoxide, and smoke and can fail within minutes.

C-Lite FR cables offer a composite conductor insulation that combines limited-fire-hazard performance with fire resistance to allow prolonged operation during firefighting and evacuation. They are an excellent choice for alarms, emergency lighting, and controls. Using a mica wrapping under the main insulation, these cables can continue to operate even as the jacket and insulation materials fail. Mica remains stable at very high temperatures, providing a physical barrier and an electrical insulation under pyrolysis conditions. Such operation can be critical to safety, alarm, and control systems, allowing circuit continuity and preventing short circuits for over 120 minutes at temperatures to 1000°C.

Full Range of Multiconductor Cables

As shown in Figure 4, C-Lite cables are available in common cable configurations needed for offshore and marine use in power, lighting, communications, and instrumentation. Options include

- Conductor sizes from 0.50 mm2 to 10 mm2 (24 to 12 AWG) for both signal and power
- Multiconductor, multipair, multitriple, and multiquad configurations
- Conductor counts ranging to 50 singles, 37 pairs, or 24 triples
- Stranded conductors for flexibility
- Unshielded, foil shielded, braid shielded, or foil/braid shielded
- Armoring
- Ratings of 150/250 V or 600/1000 V

C-Lite is also available as discrete hook-up wire.

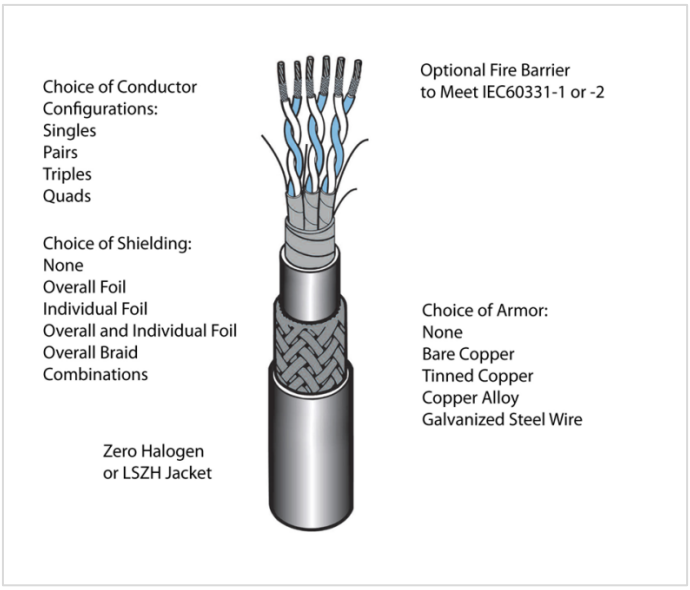

Fig. 4. TE Connectivity's Raychem Lightweight, Thin-Wall Cables Are Available in a Wide Range of Configurations (Source: TE Connectivity)

The cables come in two main families: CL90 and CL105. CL105 cables use a cross-linked LSZH jacket and offer SHF2 resistance to oils, solvents, fuels, and mud. While most marine agencies require an operating temperature range from -15°C to +105°C, CL105 cable offers a more generous range from -30°C to +120°C.

The more economical CL 90 cable meets SHF1 fluid requirements and uses a zero-halogen, low-fire-hazard jacket. Its temperature range is -25°C to +90°C.

The range of available lightweight thin-wall cables provides a comprehensive solution to communication, control, and instrumentation needs on offshore platforms. Platforms that standardize on such cables can save significant weight, reduce the space consumed by cables and cable management hardware, and provide for the safety of personnel through halogen-free and fire-retarded designs. The cable are gaining wider acceptance as platform designers and operators look for innovative ways to save.

Author's Bio

Mark Casselton is Product Manager for Commercial Marine Wire & Cable Products within TE Connectivity, Global Aerospace, Defense & Marine. Mark has more than 23 years' experience in the marine wire and cable industry and has extensive experience in all aspects of product and market development.

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