WHITE PAPER:

More automation in the offshore industry and the maritime sector

Be one step ahead with DNV-GL certification

April 2020

igus®

Guarantee short response times with certified components

The maritime industry - like all other industries - has to face the challenges of automation and digitalisation. Whether in navigation, shipping companies or in the offshore industry with gas and oil, the analogue world is almost history - digital systems are establishing themselves and laying the foundation for automation concepts. Complex solutions transform ships into autonomous factories, pave the way for shipping companies to become fully-fledged logistics providers and support the offshore industry in harvesting the oil and gas fields more efficiently by means of automated production processes. In all areas, the higher the degree of automation and optimisation of these systems, the more cost-effective, sustainable and secure the business operations of companies will be. In order for automation to succeed under these harsh environmental conditions, components and parts have to meet different requirements to those in conventional factory automation. This white paper presents the challenges faced by companies and suppliers alike. The article describes how companies meet the strict test criteria to have components certified by competent institutions such as DNV-GL. The white paper also provides an outlook on the opportunities that arise for suppliers, plant constructors and ultimately for operators of on-board platforms and ships through the use of certified components such as cables.

Whatever moves is being automated - even offshore
Source: igus®

Safety in automation begins with the choice of cable

Pipe-handling gantry being automated
Source: igus®

A glance at the variety of electrical cables available gives an idea of the risk to which maritime companies expose themselves when they equip their processes and systems with cables of average or inferior quality: important functions on a ship can fail and, in the worst case, lead to navigational failure or shipwreck. Spare parts have to be delivered by helicopter at great expense; delivery of goods is delayed, entire supply chains are disrupted. All in all, all costs arising from an operational failure are out of proportion to the manageable additional costs arising from the acquisition of higher-quality cables.

In addition to control cables, data cables and motor cables, bus cables, measuring system cables or servo cables are indispensable components in automation, which are also used on ships and drilling platforms.
The material of these cables is subject to harsh environmental conditions such as salt, humidity or light irradiation and more. Many cables are also constantly in motion. Whether in drilling rigs, ship cranes or sluices, serious statements about the service life of a permanently moving cable can only be made if appropriate tests are carried out and the results confirmed by a qualified external expert.

DNV-GL certificate: endurance test for complex processes

DNV-GL is responsible for the certification of offshore plants, gas and oil pipelines, but also for important onshore areas such as wind, tidal or solar energy. The classification organisation emerged from two heavyweights: the Norwegian company Det Norske Veritas (DNV), which carried out technical inspections on Norwegian merchant ships, and Germanische Lloyd (GL), which was founded in Hamburg in 1867 by 600 shipbuilders, shipowners and insurers. It was not until 2012 that the two merged to form DNV-GL, which, based on a total tonnage (GT) of 265.4 million, now ranks at the top of the list of global ship classification agencies.
Those who have companies from the offshore industry as customers are measured almost exclusively by the safety of their products and thereby contribute to the safety of the end customer.
The variety of applications covered - e.g. for oil recovery - bears witness to the challenge for plant engineers: fixed platforms stand on a base of steel and concrete, whereas so-called tower platforms are anchored to the seabed on one or more steel scaffolding legs. Jack-up drilling platforms in turn stand on scaffolding legs and can be moved vertically. By comparison, a semi-submersible drilling platform has large floats lying deep below the sea surface, on which the platform rests on broad legs with relatively slender columns. Some drilling platforms can only maintain their position by means of a GPS-based and computer-controlled own propulsion system consisting of several thrusters that can be pivoted through 360°. It is often similar for drilling vessels.

DNV·GL

TYPE APPROVAL CERTIFICATE

This is to certify that the undernoted product(s) has/have been tested in accordance with the relevant requirements of the DNV GL Type Approval System.

Certificate No.	**61 935 - 14 HH**
Company	**igus GmbH** **Spicher Str. 1a** **51147 Köln, Germany**
Product Description	**TPE insulated and PUR or TPE sheathed, flame retardant chainflex control cables (unshielded or shielded) for shipboard and offshore applications, especially for e-chain use**
Type	**CF9.UL; CF10.UL** **CF77.UL.D; CF78.UL;**
Environmental Category	**None**
Technical Data / Range of Application	**Rated voltage: 300 / 500 V** **Max. operating conductor temperature: 90 °C (20.000h)** **Conductor: Fine- wired, bare copper strand** **Insulation: TPE** **Inner jacket: TPE for CF10.UL** **PUR for CF78.UL** **Shield: Tinned copper wires for CF10.UL and CF78.UL** **Outer sheath: CF9.UL and CF10.UL: TPE** **CF77.UL.D and CF78.UL: PUR** **Number of cores, cross-sectional area and properties according to specification no.:** **chainflex CF9.UL; CF10.UL; CF77.UL.D; CF78.UL;** **special properties mentioned on page 2 and 3**
Test Standard	**UL 758:2013; UL 1581:2011; IEC 60332-1-2:2004** **UL Style: 10479, 21529, 10258, 21387, 10493, 20233,11323, 21223;**
Documents	**Test report : No.: F1150056040 dated 13.02.2014 + 14.02.2014**
Remarks	**This certificate is issued on the basis of GL Guidelines for the Performance of Type Approvals, Chapter 1 - Procedure (VI-7-1), Edition 2007 and the GL Type Approval Procedure for Shipboard Cables.**

Valid until **2019-05-02**
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File No. **I.N.01**
Hamburg, 2014-11-27

Type Approval Symbol GL

DNV GL

Arne Kaasmann Carsten Hunsalz

Example of a DNV-GL certificate
Source: igus®

In focus: safety in every detail

All these structures have one thing in common: heavy equipment is moved on top of, on and below them. This is often made possible by energy chains in which signal, control or servo cables are guided. These chains guide and protect the sensitive cables even in highly dynamic applications and confined spaces. A key point is that the selected cables must be suitable for use in the energy chain in a maritime environment. Cable manufacturers therefore often invest large sums in research and develop special jacket materials for specific environmental parameters.
Thus, the igus® engineers had to prove to the DNV-GL experts in comprehensive tests in the in-house igus® laboratory that the cables are suitable for the safe and stable operation in e-chains® in/on offshore plants. The chainflex® cables are flexible down to operating temperatures of -40°C and are also UV-resistant. The certificate confirms that there are virtually no limits to the use of cables and energy chains - whether under constant UV sunlight or in persistent cold weather. Besides having seawater resistance, the meticulously tested chainflex® cables also operate reliably under the influence of oil. The cables are resistant according to MUD NEK606, which enables maintenance-free pumping on drilling rigs and also stands for operator safety. The igus® chainflex® cables are designed for highly dynamic movements. Specially designed for constant movement in e-chains®, the cables reliably carry out their tasks there, regardless of the length of the travel or the load to be moved.
The DNV-GL certificate is the only one of its kind in Germany that proves to a cable specialist that its product is suitable for use in maritime environments and energy chains. This offers tangible added value for operators and suppliers in the offshore industry, who also have to equip their plant and components in accordance with the Machinery Directive or/and observe the Product Safety Act or parts of the Maritime Tasks Act or the Ship Safety Act.

igus® outdoor test facility with over 200m travel length
Source: igus®

Certified cables can accelerate automation

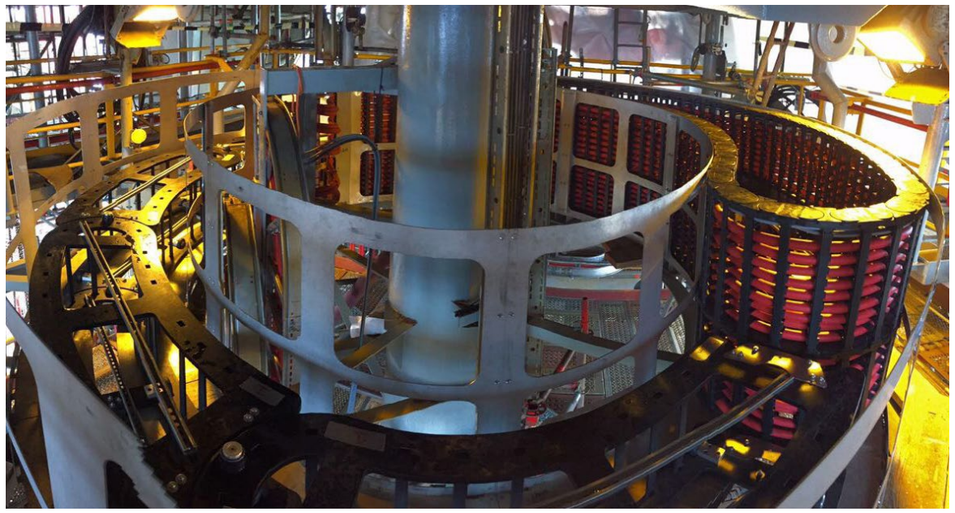
igus® has gone through the complex process of a DNV-GL certification. The chainflex® cables are designed for use in e-chains® and are tested and approved for use in maritime environments. Currently, chainflex® cables are the only cables approved on the market for use in e-chains® in such environments. Shipping companies or operators of drilling platforms, gas production plants, wind farms, port facilities or ship cranes have the guarantee of maximum safety - trouble-free even over a long period of time.

This means that the further automation of processes can be achieved even more efficiently. Oil and gas production plants are usually planned, designed and installed for years of continuous operation. The focus is always on the average operating time or the predicted time until a component fails. The questions about this so-called "Mean Time To Failure - MTTF" are answered by more and more companies with concrete information about service life. For example, igus® offers its customers a virtual service life calculation. The combination of DNV-GL certification and service life statements forms a solid basis for the planning and implementation of automated systems. The artificial lift systems or autonomous navigation are examples. Both depend not only on high-quality components with a long service life, but also on control or data cables that are guaranteed to withstand the stresses of the offshore industry over a long period of time.

DNV-GL handling on pipe-laying ship
Source: igus®

Oil production and shipping: modern systems establish themselves

Artificial lift systems make this clear: the automated and relatively new production processes increasingly use different pumps to convey oil from the wells. Without a high degree of automation and optimisation, companies cannot provide cost-effective and sustainable support, which is the only way to compensate for the natural drop in production output. The operation of all artificial lift systems used, such as pumps, motors, separators, pump lifters, suction rods and many others, depends on a stable power supply just as much as on a safe control system or the recording of valid data.
The situation is similar in unmanned navigation: DNV-GL's industry experts assume that there will be massive changes in shipping by the year 2025, which will not only affect the topic of autonomous navigation. The experts predict that there will be an increased use of additive manufacturing processes and 3D printing applications. For example, spare parts for ships could in future be printed out in any port, at best even from recycled material. The ships of the near future will also be highly automated and dependent on software-based control systems. On the whole, modern shipping - just like industry 4.0 on land - will make use of cyber-physical systems and link machines with information, communication and automation technology or integrate them into higher-level systems.
All this is only possible with the integration of components that meet the demands at sea and whose service life is predictable. Specialists expect the first fully autonomous and unmanned ocean-going vessels to set sail in 2035. In Japan, shipping companies are working with shipbuilders to develop autonomous cargo ships, which are scheduled to go into service in 2025.



Deep sea pumps on oil drilling vessel
Source: igus®

Conclusion

Be it the oil and gas industry or shipping - the maritime environment and offshore industry are also undergoing a transformation similar to Industry 4.0 and the Smart Factory. Consequently, an enormous increase in the degree of automation can also be expected in these industries. Plant constructors and suppliers who want to be part of this development, incorporate parts and components in their planning that meet the high requirements in the field and which at best have DNV-GL certification.

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