BHGE composite flexible pipe—the elegant solution for deepwater fields

- **20% lower total installed cost**
  vs. conventional flexible pipe

- **30% lighter weight**
  vs. conventional flexible pipe

- **50% stronger**
  vs. conventional flexible pipe

- **Enabling 15 KSI**
  to 3000 m and beyond

- **150°C capability**
In increasing productivity in deeper waters without increasing costs

Low oil prices, along with cost and schedule challenges, continue to weigh on the industry as they seek solutions, providing some of the most difficult challenges in the industry’s history. Meanwhile, global offshore operators are shifting to more remote locations that offer extremely complex and demanding development and production conditions. Vital new business opportunities await offshorebeat, most notably in the Gulf of Mexico, Eastern Canada, East and West Africa, and the Atlantic margin, but technical or commercial barriers impede, or even block the development of new production fields.

Composite flexible pipe

Composite flexible pipe combines multiple layers that perform separate load-bearing functions, and these designs may be heavier than the equivalent steel line. The weight of conventional flexible pipe impacts not only the new material usage, but also the transportation, installation, and the mole infrastructure needed to support them in the water column.

Flexible pipe provide an attractive solution to this area, increased pressure and flow, enabling the use of floating production units, and handling dynamic conditions. But, as production conditions grow more extreme, conventional designs are structurally limited when it comes to moving into deeper waters, higher pressures or larger diameters.

New composite flexible pipe, from Baker Hughes, a GE company (BHGE), dramatically changes that equation. Composite flexible pipe solves this problem by replacing the metallic pressure armor layer with an innovative composite bonded liner. This process unique design incorporates the tensile armor, enabling the use of flexible pipe solutions, and adds the lightweight pipe capability, which is ideal for deeper developments, as well as efficient pressure resistance in all water depths.

The new composite bonded armor makes the pipe 30% lighter than conventional flexible products and increases value throughout the entire supply chain. This pipe can be stranded and transported per reel and, critically, field configurations can be significantly optimized by reducing or eliminating the need for costly ancillary components such as buoyancy, clamps, and tethers.

Taking it further

We are delivering a 15 Ksi capability for flexible transfer lines, jumpers, reams, and flowlines.

Offshore operators now have a cost-effective and reliable way to improve their reach into deeper waters and more challenging environments.

The enabling technology is an innovative high-pressure, high-temperature barrier made from a new grade of copolymer. This is combined with an innovative high-pressure, high-performance metallic pressure armor layer with an innovative composite bonded liner. This game-changing design maintains all of the tried and trusted system benefits of the flexible pipe bonded liner. This enables production infrastructure needed to support them in the water column.

• Designed to exceed all applicable regulations.
• Qualification and completion early in 2019.
• A new dedicated composite manufacturing module at our Newcastle manufacturing facility will be fully operational by the end of 2019.
• 570 nkm* annual production capacity
• 3,500 nkm manufactured to date
• 2 major manufacturing facilities in the UK and Brazil
• 2 dedicated regional support teams worldwide
• 77 dedicated regional support teams worldwide
• 15,000 psi pressure capability
• 3,000 m water depth capability
• 12,000 psi pressure capability
• 2000 psi internal pressure range
• 6,000 m water depth capability
• 15,000 psi pressure capability
• 5400 m water depth capability
• 12,000 psi pressure capability

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[1] Quality is defined by our customers. As they move into deeper water and more remote locations, they rely on our pipes to withstand extreme temperatures, pressures, physical stresses, and increasingly corrosive environments. Everything we design, engineer, and manufacture is customized to meet the specific requirements of each project—tested to the highest standards and meeting all applicable regulations.

BHGE is at the forefront of developing standards and practices for the incorporation of carbon fiber thermoplastic composites into flexible pipe. We have augmented our extensive internal research and installed experience with industry-wide collaborations, including certification agencies such as DNV, ABS, and joint industry projects such as the RIGA project “Qualification of Flexible Fiber-Reinforced Pipe for 10,000-foot Water Depths.”

Design tools have been developed and validated step by step through extensive material characterization, sub-component and component testing, and full-scale testing, including extreme bending fatigue tests of 40,000 cycles.

A new composite manufacturing module at our Newcastle manufacturing facility will be fully operational before the end of 2017, with a range of composite pipe sizes scheduled for qualification and completion early in 2019.

BHGE’s portfolio of flexible pipe solutions draws on over 30 years of research and development, material science, and innovation. Our flexible pipe systems are installed in some of the most extreme conditions across all major oil producing regions, including the Gulf of Mexico, Eastern Canada, East and West Africa, and the Atlantic margin, but technical or commercial barriers impede, or even block the development of new production fields.

We take a comprehensive approach to flexible pipe solutions—providing customers with the right flexible pipe for their specific application and installation and integrity management services to ensure optimized safety, efficiency, and productivity across the full life of the field.

With two Innovation Centers specializing in flexible pipe, we are committed to investing in technology. And, we’re continually moving to only delivering solutions for today’s challenges, but also pushing technological boundaries and driving long-term durability and success for the more extreme challenges yet to come.

BHGE’s global resources for flexible pipe solutions:

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- Conventional
- New composite pipe
- Bonded liner
- Pressure armor
- Insulation
- Tensile armor
- Metallic sheath
- Barrier