



Reliable Motion at 4,000 Meters: IKM and Kollmorgen Advance Deep-Sea Motor Design

Electrical motors operate in extreme environments every day. However, few face conditions like deep-sea deployment, where ambient pressure can reach crushing levels. In these environments, reliability isn't optional. Applications require specialized motor solutions engineered to perform flawlessly during extended deployments without maintenance or access to the equipment.

IKM Subsea Motor Solutions AS has built its reputation in this environment. For more than 25 years, they have designed motors specifically for subsea applications, refining each generation based on field experience and close collaboration with customers. As subsea system architectures began to change, IKM needed a new approach that preserved this hard-earned dependability.

Challenge

Traditional subsea motors are powered from surface vessels through long supply cables. The standard solution has been high-voltage asynchronous motors. However, new system architectures demand a different approach.

As more platforms become battery-powered, the efficiency of low-voltage permanent magnet motors is essential. But this shift is not without constraints. The motor has to be compact and efficient. It has to meet cost targets and support production at relatively high annual volumes. Most importantly, it must operate reliably during extended deployments at depths approaching 4,000 meters, where external pressure reaches roughly 400 bar.

While IKM maintains its own in-house winding design and manufacturing for high-voltage motors, the company sought a partner to help complement its motor architecture for smaller, low-voltage, high-performance motors in subsea applications.

"It was clear to us that the new generation of deep-sea motors had to be compact, efficient and completely reliable. In Kollmorgen, we have found a partner that understands our requirements and can fulfil them perfectly with its technology."

—Tore Aarsland
Technical Manager



**IKM Subsea
Motor Solutions AS**

Solution

IKM engineers worked closely with Kollmorgen engineers to evaluate available motor platforms. Ultimately, the KBM Series frameless direct-drive motors were adapted to serve as the foundation for a new series of permanent magnet-based subsea motors.

The frameless configuration enabled direct integration into the mechanical structure with no gearboxes, belts or couplings to introduce backlash or additional failure points. In addition, the direct load connection improved responsiveness and simplified the mechanical stack-up.

Kollmorgen's high-performance stators and rotors delivered consistent electromagnetic performance and repeatability across production volumes. The KBM platform also enabled targeted modifications without requiring a fully custom design. IKM incorporates the electromagnetic core and a high-resolution feedback device into its field-proven subsea housing. Every motor is then assembled, tested, and approved according to stringent subsea quality standards, ensuring reliability without compromise. The collaborative result is a stainless steel subsea servo motor, ready for subsea motion and other deep-sea applications.



Results

The new motor approach complements IKM's traditional high-voltage portfolio, providing efficient low-voltage operation for battery-powered subsea systems deployed to depths of 4,000 meters under an ambient external pressure of 400 bar.

By building on a proven motor kit with co-engineered adaptations, the team avoided the uncertainty and lead time of a fully custom permanent magnet design. This approach delivered a compact design for tight installation spaces, reliability under extreme pressure and enabled a cost structure for series production. In addition, the architecture supports reduced energy consumption, lowering operational costs over the system's lifecycle.

As subsea systems continue to evolve, this approach provides a clear path forward for delivering reliable motion solutions engineered for the deepest depths.

4,000
meters subsea
deployment

400
bar ambient
pressure

About Kollmorgen

Kollmorgen, a Regal Rexnord Brand, has more than 100 years of motion experience, proven in the industry's highest-performing, most reliable motors, drives, AGV control solutions and automation platforms. We deliver breakthrough solutions that are unmatched in performance, reliability and ease of use, giving machine builders an irrefutable marketplace advantage.