The Miniature RM08 Encoder: Supporting Autonomous Underwater Systems

CASE STUDY

Customer:

Teledyne Gavia, Iceland

Industry:

Subsea robotics

Challenge:

Ensuring precise and reliable flap control in an autonomous underwater vehicle (AUV) operating in a highly demanding subsea environment.

Solution:

RLS RM08 super-small non-contact rotary encoder

BACKGROUND

Teledyne Gavia is a leading manufacturer of autonomous underwater vehicles (AUVs) for marine operations. Their AUVs are used worldwide for a wide range of applications, including hydrographic surveys, search and recovery, pipeline inspection and defence.

A critical aspect of AUV performance is the precise and reliable control of moving parts, such as flaps, which are essential for steering and maintaining stability and depth in complex marine environments.

The accuracy and durability of every component are critical to the success of an AUV's mission. When developing their next-generation platform, Teledyne Gavia required a position feedback solution for the control flaps that could withstand high pressure, submersion and vibrations, while delivering extremely high accuracy in a very compact form factor.

Teledyne Gavia
Osprey autonomous underwater vehicle

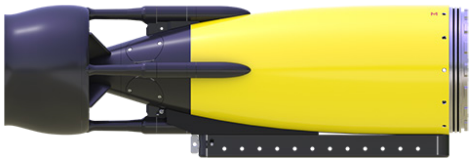
CHALLENGE

Operating conditions for AUVs are exceptionally harsh. Every component must be robust, fully sealed, and resistant to corrosion and high pressure. At the same time, AUV design places great emphasis on size and weight to maximise payload capacity and operational range. As a result, the encoder selected for the system had to be both miniature and lightweight, without sacrificing performance or reliability.

Traditional encoders often fail to meet these combined requirements. Many struggle to deliver high accuracy, contact-free operation and resilience in the subsea environment's unique challenges. Teledyne Gavia therefore needed a solution that could integrate seamlessly into the AUV's compact mechanical assembly and provide continuous, high-resolution position feedback. This would allow precise flap control, ensuring stable navigation and manoeuvring in challenging underwater conditions.

SOLUTION

A decisive breakthrough in Teledyne Gavia's AUV design was the selection of the **RLS RM08 non-contact rotary encoder**. This miniature, high-accuracy encoder offered the ideal combination of performance and reliability to meet the stringent demands of subsea applications. Its magnetic, non-contact sensing technology delivers several key advantages over traditional encoder designs.



Propulsion and actuator module

The RM08's ultra-compact size and low profile made it an excellent fit for the AUV's flap control mechanisms, where space is at an absolute premium.

Its design, featuring an integral magnet, simplifies mechanical integration and reduces both assembly complexity and the overall footprint of the actuator system. Most importantly, the encoder's robust construction is inherently resistant to environmental ingress and contamination, which is a critical feature for a device used in the subsea domain.

With its high measurement accuracy, the RM08 enables precise flap positioning, ensuring smooth and stable movement through the water column.

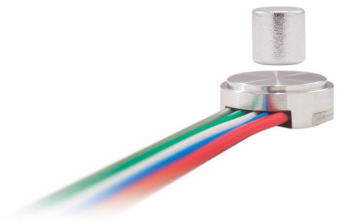
POSITION FEEDBACK BY RM08

The RM08 miniature magnetic encoder is engineered for direct integration into high-volume OEM systems, delivering accurate shaft position feedback in applications where space is extremely limited.

Its compact 8 mm diameter body makes it ideal for integration into miniature mechanisms, while its non-contact two part design eliminates seals and bearings, ensuring long-term reliability and reducing mechanical complexity.

Designed for harsh operating environments, the RM08 offers high-speed performance up to 30,000 rpm and maintains an accuracy of ±0.3°, providing stable and consistent measurement even under demanding conditions.

The encoder supports 3.3 V or 5 V supply versions and offers a wide selection of industry-standard output formats, including analogue sinusoidal, incremental, SSI, and linear voltage, enabling compatibility with a broad range of control systems.



RM08 rotary magnetic encoder

Its frictionless magnetic sensing technology ensures a wear-free measurement system that is resistant to contamination and mechanical degradation. This makes the RM08 a reliable feedback solution for applications such as motor control, industrial automation and compact actuator systems.

RLS also offers OEM-focused integration options, enabling the encoder to be adapted to specific mechanical requirements and incorporated seamlessly into customer designs.

RESULTS

Integrating the RLS RM08 encoder allowed Teledyne Gavia to achieve the ideal balance of performance, durability, and compact design within their AUV platforms.

The encoder's high-resolution position feedback ensures precise control of vehicle attitude and trajectory, improving navigation accuracy and supporting mission success. Its proven reliability in harsh subsea conditions has made the RM08 a trusted component in Teledyne Gavia's AUV fleet.

The collaboration between Teledyne Gavia and RLS illustrates how the careful selection of a single component, even one as small as an encoder, can profoundly influence the performance of a highly sophisticated system.

The RM08's precision and robustness have directly contributed to the operational excellence of Teledyne Gavia's cutting-edge autonomous underwater vehicles.

> *The RLS RM08 was a perfect fit for our application. Its combination of miniature size and high accuracy was exactly what we needed for our subsea AUVs.*
>
> *Helgi Thorgilsson, System Engineer at Teledyne Gavia*

Teledyne Gavia AUV for the Royal Swedish Navy

FUTURE GOALS

Teledyne Marine aims to continue expanding its autonomous underwater solutions, strengthening capabilities in subsea inspection, hydrographic mapping, environmental monitoring and critical infrastructure surveys. The company's goal is to offer one-stop purchasing, global service and the technical expertise needed to solve demanding subsea challenges.

ABOUT TELEDYNE GAVIA

Teledyne Gavia, part of Teledyne Marine, is an Iceland-based specialist in autonomous underwater vehicles. Its modular Gavia AUVs can be tailored for a wide range of missions, from military reconnaissance to commercial surveying.

For more information visit **teledynemarine.com**.

ABOUT RLS

RLS is a Renishaw associate company. RLS produces a range of robust magnetic rotary and linear motion sensors for applications such as industrial automation, metalworking, textiles, packaging, electronic chip and board production, robotics and more.

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