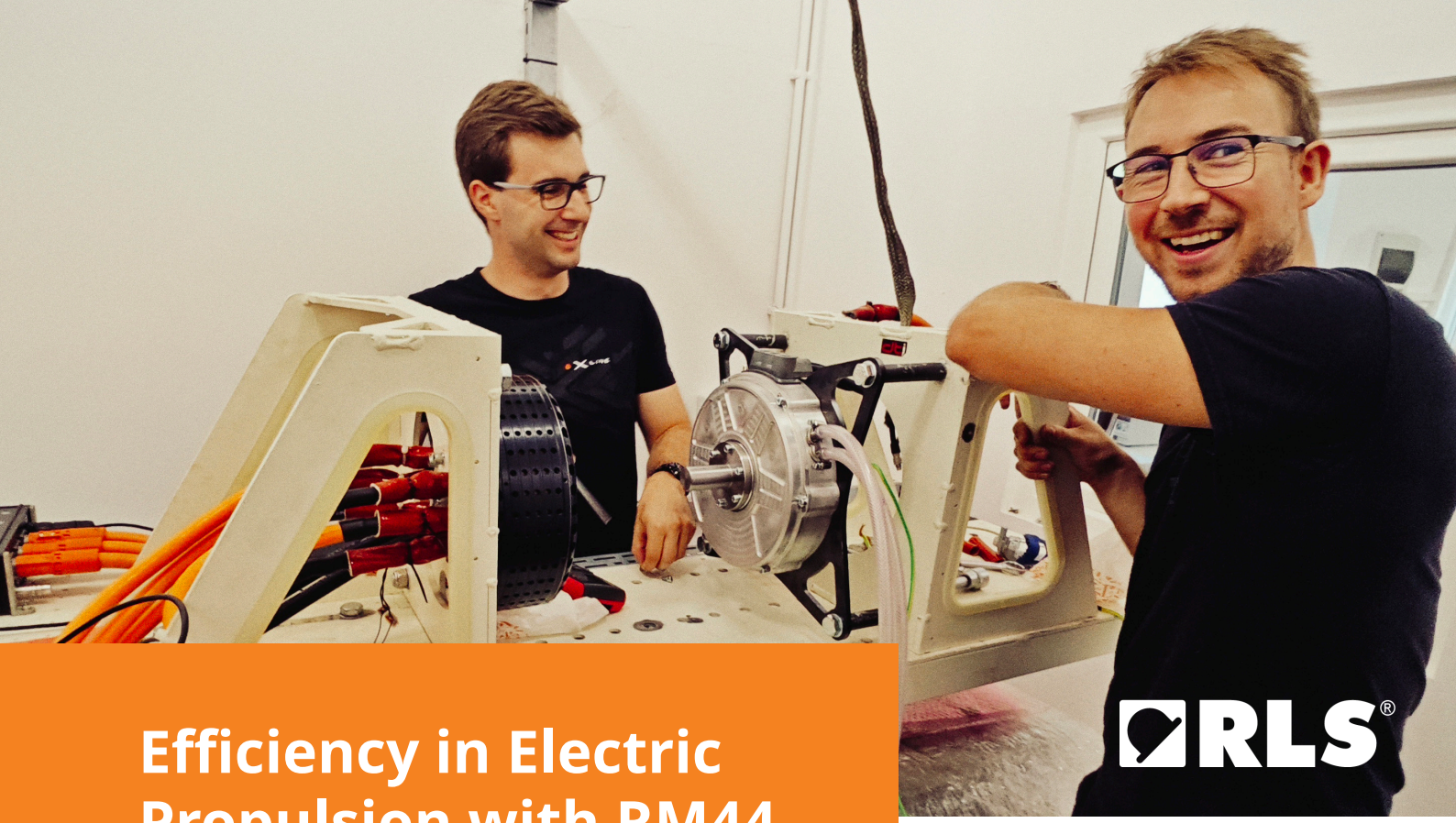

Efficiency in Electric Propulsion with RM44 Encoders

CASE STUDY

Customer:
Asruk, Slovenia

Industry:
Electric motors

Challenge:
Establishing reliable production technology and quality control processes for a new technology of electric motors, supported by precise encoder feedback.

Solution:
RM44 rotary magnetic encoder

BACKGROUND

Asruk is a Slovenian company that specializes in the development and production of high-performance axial flux in-runner electric motors. They target demanding sectors such as automotive, motorsport, aviation and traction systems for energy recuperation.

Driven by a mission to redefine the standards of electric propulsion, Asruk delivers both standalone motors and complete drive kits, providing customers with flexible, customised solutions. With in-house manufacturing and engineering expertise, the company can quickly adapt designs to meet unique project requirements.

Asruk motors combine the highest power and torque density on the market with compliance to industry standards. Their modular plug-and-play design allows units to be stacked together, enabling more power and performance without the need for a complete system overhaul.

To support this level of performance, the company relies on magnetic encoders from RLS. Highly accurate position feedback is essential for field-oriented control, which maximises torque output, improves efficiency and enhances dynamic response, while ensuring reliable operation under varying load and speed conditions.

Modularity of Asruk's electric motor system

CHALLENGE

One of the biggest challenges for Asruk is thermal management, as the motors have to deliver high continuous performance without sacrificing reliability. To achieve this, new production technologies and quality control procedures have been developed to ensure consistent performance of this new motor design. Both challenges require precision and consistency, with accurate position feedback from magnetic encoders playing a key role in efficient control and reliable testing.

SOLUTION

Asruk currently uses the **RM44 rotary encoder** because it is compatible with the inverter partners and is easy to integrate. For their motors, they use the SSI + incremental (RS422) output option, which provides absolute position feedback at start-up combined with incremental signals during operation, ensuring reliable and precise control at all times.

> *We selected RLS encoders for their proven accuracy, environmental robustness and compatibility with high-performance motor control.*
>
> *Uroš Klopčič, Founder of Asruk*

In the future Asruk plans to integrate **Artos** and **AksIM** encoders from RLS directly inside the motor. These through-hole designs are particularly advantageous in applications such as aviation, where a hydraulic pin can pass through the motor shaft to control the propeller pitch.

Integration of RM44 into Asruk's AIM-LBe motor

This integration will also enable a shorter axial length and support stackable motor configurations, with each motor equipped with its own redundant encoder instead of a single shared unit at the end of the chain.

POSITION FEEDBACK BY RM44

The RM44 rotary magnetic encoder is designed to be mounted directly on electric motors or other devices to measure shaft position and speed, bringing precision and reliability to demanding applications. Its metal housing provides IP68 sealing, excellent EMC immunity, an extended temperature range and outstanding resistance to shock and vibration, ensuring reliable performance in harsh environments.

RM44 housed encoder

Its non-contact design ensures a long service life without wear and tear. RM44 offers a wide choice of output formats, such as industry standard absolute SSI and BiSS C, incremental and analogue. In addition, the encoder is also available with commutation outputs, providing further flexibility for motor control.

With resolutions of up to 14 bits, an accuracy of ±0.5° and speeds up to 60,000 rpm, the encoder delivers the high-performance feedback required for modern electric drives. It can also be used as a cost-effective solution for OEM integration.

RLS provides a broad selection of options and customisations, delivering encoder solutions that adapt to specific application needs and integrate seamlessly into customer systems.

The RM44 encoder can be easily adapted to different needs. For even easier mounting the customers can add a 58 mm diameter flange. For applications requiring a shaft encoder, the RM44 base unit can be converted into the RE58 shaft encoder.

RM58 housed encoder

RE58 shaft encoder options

> *RLS has provided reliable products with strong technical support, enabling straightforward integration and dependable operation in our motors.*
>
> *Uroš Klopčič, Founder of Asruk*

RESULTS

Asruk has chosen RLS encoders for their accuracy, robustness, and compatibility with powerful motor controllers. The combination of SSI and incremental outputs offers the best of both worlds, delivering absolute position at start-up and high-speed feedback during operation. High-resolution feedback enables precise detection of rotor position, which is essential for accurate motor control and, consequently, high efficiency.

The close partnership between the two Slovenian companies enables fast technical support, efficient logistics, and ongoing collaboration, offering advantages for innovation and long-term reliability.

FUTURE GOALS

Asruk aims to expand its production capacities to support international growth. On the product side, the company is focused on improving efficiency and power density, integrating advanced sensor and control features and introducing new solutions based on its technology. In the long term, Asruk's priority is to preserve both the modularity and the high manufacturing quality that define its motors.

ABOUT ASRUK

A Slovenian company specialising in the development and manufacture of axial flux in-runner electric motors, that deliver high power density and reliability for demanding mobility and energy applications.

For more information visit **asruk.net**.

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.

RLS d. o. o.
Poslovna cona Žeje pri Komendi
Pod vrbami 2
SI-1218 Komenda
Slovenia

T +386 1 5272100
E mail@rls.si

www.rls.si

For worldwide contact details, visit www.rls.si/contact.

RLS D. O. O. HAS MADE CONSIDERABLE EFFORTS TO ENSURE THE CONTENT OF THIS DOCUMENT IS CORRECT AT THE DATE OF PUBLICATION BUT MAKES NO WARRANTIES OR REPRESENTATIONS REGARDING THE CONTENT. RLS D. O. O. EXCLUDES LIABILITY, HOWSOEVER ARISING, FOR ANY INACCURACIES IN THIS DOCUMENT.

© 2025 RLS d. o. o. All rights reserved.
RLS d. o. o. reserves the right to change specifications without notice.

A RENISHAW associate company