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ATOM™ encoders help JUSTEK deliver custom motion control solutions that drive up profits

JUSTEK
Linear Motion Technology

Customer:
JUSTEK Inc. (Korea)

Industry:
Precision manufacturing

Challenge:
JUSTEK required a range of custom encoder feedback solutions for its precision process equipment designed for the semiconductor and FPD industries.

Solution:
Renishaw's family of ATOM miniature encoders, TONiC™ encoders and RESOLUTE™ absolute encoders.

> "Renishaw supplied a custom encoder scale that provides a non-standard resolution which allows our end-users to seamlessly connect to their original controllers — providing us with a perfect solution to win orders."
>
> **JUSTEK (Korea)**

Background

Renishaw can offer custom metrology solutions that help its customers to innovate.

JUSTEK Inc. is a leading motion control component manufacturer based in Gyeonggi-do, Korea. It designs and builds linear motors, direct-drive rotary (DDR) motors, motion stages and conveyors.

The flat panel display (FPD) manufacturing industry in South Korea, which includes electronics giants such as Samsung and LG, meets over a third of the global TV market demand.

The market for advanced FPD organic light emitting diode (OLED) and quantum-dot light emitting diode (QLED) technologies has grown significantly — particularly in the small-sized display market representing smart phones and tablet computers.

Motion control systems are an essential part of FPD manufacturing equipment and are responsible for ensuring that the required manufacturing precision is maintained.

JUSTEK has developed a range of customisable direct-drive (DD) motors using Renishaw's high-performance optical position encoders, including the miniature ATOM optical encoder, for OEM customers that sell manufacturing equipment into the FPD and semiconductor/electronics industries.

Challenge

One of the greatest commercial challenges that OEMs face is one they share with their component manufacturers: understanding what the market will buy and how to differentiate it. Connected manufacturing machines that share data via The Internet of Things (IoT) are a promising opportunity for strategic differentiation.

The motion control industry is preparing to help customers integrate motion technology into their connected solutions.

To this end, motion control vendors have added and are continuously improving the onboard intelligence of components — giving them the computational capability and communications necessary to participate in connected strategies.

Whether in applications with connected systems or more traditional standalone applications, well-designed and customer-specific motion control solutions are needed to support the latest OEM innovations.

JUSTEK's DD motors are compact and are designed for precision process equipment in the FPD and semiconductor industries. Integrated encoders for position feedback must comply with a wide range of end-user requirements relating to size, weight, performance and reliability.

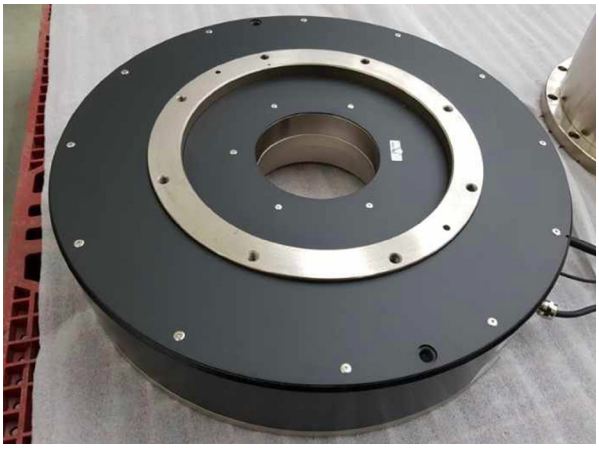
Solution

JUSTEK has chosen Renishaw's family of ATOM miniature encoder solutions for its DD motors and motion stages.

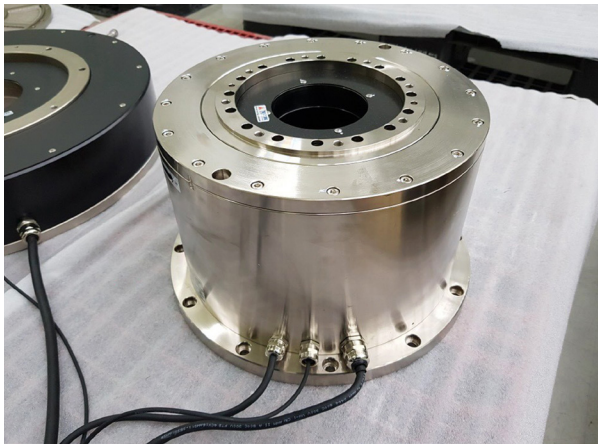
Mr. Young-dong Jo, JUSTEK's product manager, explains the advantages of the ATOM encoder:

"The miniature design of the ATOM readhead is ideal for our DD motors as space inside the motors is inherently limited. There are relatively few encoders options available on the market that meet our requirements for volume and performance. Initially, we tried some other encoder brands but found them to be unreliable as some batches had to be replaced after only a short period of use — which forced us to search for alternative solutions. Before choosing ATOM optical encoders, we tested them repeatedly and found that the ATOM has advantages in terms of reliability, system volume and performance. Of course, Renishaw's excellent after-sales service and technical support, and on-time delivery helped to strengthen the partnership between both companies."

Renishaw's ATOM optical encoder has a readhead measuring just 7.3 x 20.5 x 12.7 mm. It is one of only a handful of integrated miniaturised optical encoders available on the market and features leading-edge signal stability, dirt immunity and reliability. Scale options include RTLF and RKLF tape for linear and partial-arc applications, and RCDM glass discs for rotary applications.



JUSTEK JTR49 series DDR motor (Ø490 mm OD)



JUSTEK JTR30 series DDR motor (Ø300 mm OD)

The ATOM encoder's RCDM rotary scale is a one-piece glass disc featuring scale graduations marked directly on the disc face with a single reference mark, and an optical alignment ring.The optical alignment ring can be used to accurately align the disc to minimise eccentricity and improve installed accuracy.

ATOM is a non-contact optical encoder with an open format, the advantages of which include the effective elimination of backlash, shaft wind-up (torsion) and other mechanical hysteresis errors that are inherent in traditional enclosed encoders.

During rotary scale installation, glue is applied to the mounting surface (hub) and the disc is placed on top and then adjusted to be concentric with the centre of the hub before the glue is cured. This alignment is generally done using electronic or optical methods. Electronic alignment involves monitoring output signals from two readheads installed 180° apart, and then adjusting the disc to minimise the difference between the readings from each readhead (adjustment tools include two ATOM readheads and a Renishaw DSI interface). Optical alignment uses a microscope to manually align the position of the disc with the centre of the hub.

Mr. Young-dong Jo continues: "In addition to ATOM, JUSTEK's precision motion stages also use other Renishaw optical encoder models, including the TONiC™ optical encoder series for OLED panel inspection equipment, and the RESOLUTE™ absolute encoder series for OLED panel inkjet printing equipment. What impresses me is that the combination of the TONiC encoder with ZeroMet™ linear scale, which has a near-zero CTE, enables high-accuracy measurements across a wide range of operating temperatures."

For quality control, JUSTEK tests and calibrates its motion control products prior to leaving the factory using Renishaw's advanced machine calibration tools.

"We always use Renishaw's XL-80 laser system and XR20-W rotary axis calibrator for product quality control. These systems are fast, extremely accurate with linear measurement accuracies under ±0.5 ppm, lightweight and portable," adds Mr Young-dong Jo.

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Results

A value-added partnership with Renishaw has enabled JUSTEK to build bespoke motion control systems for its customers that drive increased orders and higher profits.

Mr. Young-dong Jo explains his company's winning product strategy:

"Product flexibility is one of our strengths. In today's highly competitive market, the ability to quickly respond to customers' needs is key to our success. Sometimes, we need to provide customers with customized DD motors, rotary tables and linear stages. Renishaw impressed us in this regard. For a DD motor project, Renishaw supplied a custom encoder scale that provides a non-standard resolution which allows our end-users to seamlessly connect to their original controllers — providing us with a perfect solution to win orders."

JUSTEK's DDR motors achieve an accuracy and repeatability of ±30 arc seconds and ±2 arc seconds, respectively, using Renishaw's ATOM RCDM rotary encoder system equipped with a 40 µm-pitch scale and a customised Ti interpolation interface providing 0.25 µm resolution.

Mr. Young-dong Jo concludes: "Renishaw is highly regarded in the metrology industry and has been involved with our products over many years. The specifications of DD motors will continue to improve in the future, particularly in terms of accuracy, speed, and torque. JUSTEK will continue to develop new products to meet this future market demand — including the development of DD motors equipped with absolute optical encoders."

About JUSTEK

Justek Inc. was founded in 1999 and has contributed to the growth of the electronics industry by developing key components and devices, such as DDR motors and motion stages, to meet the precision motion control demands of semiconductor and FPD manufacturing.

JUSTEK focuses on developing state-of-the-art technologies for direct-drive motion control and is an experienced technology leader in the global motion control marketplace.

For more information, please visit **www.renishaw.com/justek**

Renishaw plc

New Mills, Wotton-under-Edge
Gloucestershire, GL12 8JR
United Kingdom

T +44 (0) 1453 524524
F +44 (0) 1453 524901
E uk@renishaw.com

www.renishaw.com

For worldwide contact details, visit www.renishaw.com/contact

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