**HEIDENHAIN at SPS 2019:**

**Scalable encoders for application-specific drive control**

*A single motor and a host of possibilities: Drives can be simply adapted to a wide variety of applications thanks to encoders from HEIDENHAIN, AMO, and RENCO. Compatible mechanical and electronic interfaces enable trouble-free connectivity, while the wide range of variants makes it possible to use different encoders on one motor. This means that manufacturers of machines and other production equipment can standardize their drive solutions and optimize them for the respective application via the measurement technology.*

**The right encoder solution for every drive**

Diversity enables standardization. This will be demonstrated at SPS 2019 by rotary encoders and angle encoders from HEIDENHAIN, AMO, and RENCO for drive control. The large variety of these encoders provides motor manufacturers as well as machine and plant producers with incomparable opportunities to adapt their drives to a wide variety of applications via the measurement technology.

For example, encoders with inductive or optical scanning, different accuracy grades, and singleturn or multiturn functionality with identical mechanical interfaces are available for the 35 mm and 58 mm standard designs. The ECI/EQI 1100 and ECI/EQI 1300 inductive rotary encoders without bearing have mounting compatibility with the ECN/EQN 1100 and ECN/EQN 1300 rotary encoders with optical scanning and bearing. In practice, this means that switching from an inductive rotary encoder to an optical rotary encoder enables the robustness, overall length and accuracy to be varied according to the application. The system accuracy of a given motor can thus be improved from ±65" to ±20".

**Variety of interfaces ensures compatibility**

The connection to all common motor controls enables wide-ranging electronic compatibility, e.g. via the serial interfaces EnDat, DRIVE-CLiQ, Fanuc Serial Interface, Mitsubishi High Speed Interface, and many more. Thanks to the elimination of analog signals, these fully serial interfaces offer potential savings in terms of the cabling technology required between the position encoder and the subsequent electronics. The position values are digitalized in the encoder and then transferred to the subsequent electronics. This minimizes potentially negative influences on the quality of the position information and its transmission that can arise when sinusoidal signals are used, and it increases the attainable position resolution compared with that of incremental interfaces using TTL or HTL output signals.

Furthermore, a serial interface enables transmission of the "electronic ID label" information for the commissioning of the encoder and the drive. It also transmits additional data such as the winding temperature of the motor and diagnostic data. During operation, the EnDat 2.2 interface makes it possible to quickly and reliably provide information about the functional condition of the position encoder as part of regular maintenance or in the event of a malfunction. Maintenance measures can then be derived based on this information.

Because functional safety is becoming increasingly important many encoders are also available in versions for safety-related applications. In addition to precise position measurement and reliable data transmission to the machine control, these encoders also have mechanically safe connections and feature the necessary mechanical fault exclusion. They thus provide all prerequisites to achieve classification SIL 2 in conjunction with a safe control system, or even SIL 3 in particularly critical applications.

**Scalability of encoders for rotary axes**

A demo unit equipped with different angle encoders on an ETEL torque motor illustrates the influence of the measuring principle on the dynamics and accuracy of rotary axes. It also shows the system architecture for digital temperature monitoring of the torque motor. For applications with special requirements, e.g. in machine tools, robotics, medical technology, and astronomy, selecting the right encoder is decisive for realizing the desired properties of a rotary axis:

* The new RCN 2001 optical angle encoders with integral bearing and integrated stator coupling now offer even greater system accuracy and a higher maximum rotational speed.
* The new generation of modular, optical ERA angle encoders is now also equipped with the HEIDENHAIN HSP 1.0 signal processing ASIC. The HSP 1.0 almost completely compensates fluctuations in signal amplitude caused by contamination on the scale drum.
* AMO will present its WMKA modular scale-tape solution for especially large diameters. These encoders feature EnDat and DRIVE CLiQ interfaces and are ideal for safety-related applications.

**Secondary encoders: significantly greater robot accuracy**

With a secondary encoder the absolute position accuracy at the tool center point of a robot arm can be improved by up to 80 percent. Industrial robots can thus assume tasks needing greater precision in assembly technology, e.g. in the automotive industry. To this end, a secondary encoder for additional motor feedback is mounted to each robot axis on the output side of the respective gear train. It there measures the actual position of each robot joint without transmission errors. A comparison of the position data from motor feedback and secondary encoder on each axis of the robot arm also allows the opposing forces from the machining to be determined.

A typical solution for high-accuracy robots consists of a HEIDENHAIN inductive rotary encoder from the EBI 1100 or EQI 1100 series for the purpose of motor feedback, and an inductive WMKA/WMRA angle encoder from AMO serving as the secondary encoder. Thanks to its high resilience to contamination the AMO angle encoder is ideal for mounting on the outside of the robot.

The LIC 2100 is an exposed, absolute linear encoder for precise positioning of the robot on a longitudinal axis along large workpieces. It enables high traversing velocities of up to 600 m/min, enabling the robot to rapidly traverse long paths of up to 28 m.

**Future-proof enhancement of the EnDat family**

Since its launch more than 20 years ago, the EnDat interface has firmly established itself on the market. All rotary encoders, angle encoders, and linear encoders from HEIDENHAIN, AMO, NUMERIK JENA, RSF, and LEINE LINDE are available with the EnDat interface. The manufacturers of machines and production plants worldwide utilize the benefits of data transmission via EnDat. HEIDENHAIN will be presenting the future of the interface at SPS 2019: EnDat 3 will complement the existing range of EnDat interfaces and consistently further develop its strengths. These include, above all, simple cabling, an enhanced functional safety concept, and new options for integrating auxiliary sensor technology.

**HEIDENHAIN, AMO and RENCO at SPS Smart Production Solutions:   
Hall 7, Booth 190**

***For more information, visit:***

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|  | *The ECI/EQI 1100 and ECI/EQI 1300 inductive rotary encoders feature mounting compatibility with the ECN/EQN 1100 and ECN/EQN 1300 rotary encoders with optical scanning and bearing.* |
|  | *High-accuracy HEIDENHAIN and AMO encoders for absolute position measurement as secondary encoders on robots.* |