

THE TECHNOLOGY AND PEOPLE AT LEINE & LINDE

2016/2017

Impulse

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Complexity can be made so simple

COLLABORATION simplifies processes. Collaboration can sometimes seem difficult, but in reality it's just the opposite: It's collaboration that clears the way towards the best solution. Mistakes are corrected earlier in the process. Resources are better used. Knowledge from several areas is utilised. This provides customers with major benefits. And – not the least – work is more fun!

AT LEINE & LINDE we collaborate to always deliver the best solutions for feedback of speed and position in heavy industrial applications with harsh production environments.

OUR CORE VALUES are teamwork, open mindset and customer focus. We make sure that we have a thorough understanding of our market's needs and utilise the expertise that is a part of our various departments' DNA to deliver fantastic products. Customer adapted and with less than 24 hours from order to shipping. Electronics and mechanics in perfect harmony ensure reliability and cost efficiency.

IN THE INDUSTRY 4.0 world, our products provide data via a wide variety of different output signals and interfaces. We also offer condition monitoring in our encoders, so that maintenance needs can be anticipated and downtime avoided. Thanks to teamwork we can focus on each user's needs, from buyers and system developers, machine designers and production planners, to operators and maintenance personnel, and in this way simplify industrial processes. This is why Leine & Linde is a key player in automation, control and machine safety.

It is together that we build success.

Strängnäs, October 2016
Per Andréason
CEO, Leine & Linde



Leine & Linde's gateway products are among the most compact and robust on the market.

GATEWAY NEWS

THE GATEWAY CONCEPT enables the use of small and very robust EnDat encoders, suitable in applications where very high ambient temperatures are a limiting factor. Moreover, if a fault should occur in an encoder it can be easily replaced without interrupting bus communications.

New EtherCAT gateway

The EtherCAT gateway has now been released. EtherCAT is one of the more commonly used fieldbus communications interfaces in heavy industrial applications, known for its short cycle times. This gateway complements Leine & Linde's line of robust EtherCAT position encoders in sizes Ø 58 mm to Ø 100 mm.

New generation of CANopen gateway

Leine & Linde's CANopen gateway, which can be used with any Leine & Linde EnDat encoder, has been updated. While it has undergone a minor facelift on the outside, the big difference is on the inside, where profile DS 406, version 3.2 has now replaced version 2.0. ■

ATEX ZONE 2/22 PORTFOLIO GROWING

Keeping pace with the increased needs for Zone 2/22 products for explosive areas, Leine & Linde has now broadened its product portfolio to meet demands from the market. This entails that several products have been tested in accordance with the applicable directives. They are now approved and declared for use in Zone 2/22 per the ATEX directive. It is thus possible to obtain for instance, ADS On-line – an advanced diagnostics system for condition-based maintenance of encoders; Overspeed – an embedded programmable speed monitor; as well as encoders in the Premium 900 series. For a complete description of the assortment, contact your closest Leine & Linde office. ■



Product Manager Linda Carnbo shows the use of encoders in various zones on an oil platform.

ROLL GAP REGULATION WITH LINEAR 4000 SERIES

Leine & Linde has been a well-known supplier of solutions for velocity feedback and position feedback in heavy duty industrial processes for several years. The company will now be releasing its first robust, linear absolute encoder series, RLA 4000, to meet the need of roll gap regulation in the steel industry.

A STEEL MILL'S rolling stands operate in one of the industry's absolute toughest environments, with high temperatures, aggressive chemicals, shock impact and vibrations. Roll gap control must be extremely reliable and exact to assure the quality of the end product and the lowest possible material consumption.

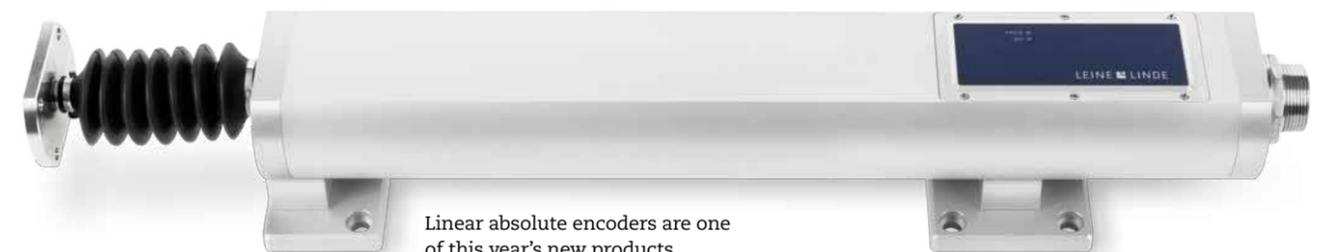
The new RLA 4000 series includes an encapsulated, inductive, absolute linear encoder that is designed to stand up against the demanding environmental conditions inherent in this application.

Compared to other solutions for roll gap regulation, RLA 4000 does not need to be installed inside a cylinder and it is thus easily accessible both for installation and service.

Absolute position values

Thanks to robust, absolute inductive scanning, RLA 4000 can resist hard impact and strong vibrations. The encapsulation enables it to withstand heat and other strong external stresses. In contrast to an incremental linear encoder, RLA 4000 provides an absolute position value directly to a PLC without the need of a counter in between.

RLA 4000 can be supplied with a number of industrial interfaces, such as EnDat, EtherCAT, PROFIBUS, PROFINET, CANopen and EtherNet/IP. It can manage stroke lengths of up to 680 mm. ■



Linear absolute encoders are one of this year's new products.

MAGNETIC ENCODER WITH ROBUST ENCAPSULATION

For the toughest environments in heavy duty industries, such as pulp and paper, oil and gas, as well as steel, Leine & Linde is now presenting the latest addition to the Magnetic 2000 series: MRI 2850.

THE MRI 2850 ENCODER has been designed to provide velocity feedback with high precision for extended periods without production stops. Without ball bearings or other contact surfaces, it will be immune to mechanical wear. Its mechanical service life is virtually unlimited. MRI 2850 is built on the well-proven technology from the Leine & Linde 2000 series, where a ring with a magnetic band is mounted directly on the rotating shaft. The speed is detected by a fixed scanning head. What is new with MRI 2850 is that robust

aluminium encapsulation protects both the magnetic band and the scanning head. This means that the risk of damage during transport, installation and use is entirely eliminated.

Good choice for NEMA standard C-Face motors

These encoders fit motors with the NEMA standard 8.5" C-Face, shaft diameters 25 mm to 100 mm (or 1"-4"). The distance from the scanning head to the ring is fixed, and consequently no additional tools are needed for distance adjustment. The product on the whole is designed for easy installation, with multiple connection capabilities and electrical interfaces that match users' needs.

Dual outputs

MRI 2850 is available with single or dual outputs for incremental signals. The two outputs are independent of one another and can be supplied with various resolutions, 1 - 16 383 ppr, as well as with electronic interfaces, such as HTL, RS422 and High Current HTL for transfer over long distances. ■



An entirely new bearingless encoder for high-horsepower electric motors is available for flange mounting per the NEMA standard.



Today's rotary incremental encoders supply both diagnostics and operating environment data.

ADS ONLINE—THE STEP INTO INDUSTRY 4.0

Predict the maintenance needs of the encoder and get more control, more data. ADS Online provides the step into Industry 4.0.

PREDICTIVE maintenance is noted among the key themes of Industry 4.0. The maintenance processes evolve from being preventive to being predictive. Finding the potential source of failure, before problems occur, is crucial. Encoders are perfectly suited for this.

Leine & Linde's advanced diagnostic system ADS was developed to permit the early detection of fault functions internally in rotary incremental encoders. The diagnostics turned out to be very useful for deducing the cause of deviation and finding the source of error, which in many cases is an installation imbalance in the motor, or bearings starting to wear out.

Several sensors in one

ADS Online constantly reads off the levels for several environmental parameters in the encoder's surroundings, including vibration, shaft speed, frequency, temperature, and supply voltage.

The system conducts automatic interpretation and analysis of detected internal deviations. Detailed logs for operational and environmental parameters are provided, and can be analysed by the included software or in the system of the users' choice. The encoder provides recommendations for when to check the installation and how to correct deficiencies.

ADS Online can also be purchased as ADS Upgrade Unit, a separate module that can be installed on any Leine & Linde 800-series encoder in operation. This way ADS Online can provide the step into industry 4.0 for any existing drive system. ■

THE SHORTEST CYCLE TIME ON THE MARKET

Leine & Linde's series of absolute encoders with EtherCAT® interface support the fastest cycle times on the market. Thanks to the optimised electronics, the encoders are able to provide position values in 31.25 microseconds.



THE MAIN ARGUMENT for choosing Leine & Linde's encoders is durability. The robust design, combined with their reliability and ability to handle extremely long periods of operation despite temperature fluctuations, moisture, shocks and vibration, make the encoders the first choice in process industries with demanding production conditions.

Faster automation systems

Fast feedback and precision are also important factors in present day automation systems and those of the future. When using an EtherCAT

interface and a Leine & Linde absolute encoder from the Industrial 600 or Premium 900 series, the cycle time can be as short as 31.25 microseconds. Leine & Linde has optimised the electronics so that the encoder is able to read the value, process it in accordance with the chosen configuration and then supply it faster than any other encoder on the market today. This provides support to the fastest automation systems on the market, through reliable feedback on rotary movements in everything from process industries to steelworks and wind turbines.

Leine & Linde's encoders are available with a wide range of different output signals and fieldbus interfaces, such as EtherNet/IP™, DRIVE-CLiQ™, PROFINET®, PROFIBUS®, CANopen® and DeviceNet™ – all so that the feedback and control needs of industrial automation can be met. ■

ABB'S MACHINE SAFETY INCREASES PRODUCTIVITY

Imagine that you work with process automation in pulp and paper production. You design control and drive systems for producing and moving paper at a speed of nearly 2000 metres per minute – which is 120 kilometres per hour. The final product is rolled up on 12-metre wide reels that are automatically cut and changed. Each reel weighs 85 tons. The slightest unevenness in how the motor runs can tear the paper apart and stop the process.

IF YOU WORK AT ABB'S unit Process Industries in Västerås, Sweden, you understand what precision and reliability mean for productivity. The entire facility is a flow, where innumerable tasks are conducted in parallel and people work in shifts. When your client is in the pulp and paper industry, production processes are expected to be in operation around the clock, often without operational stops more than every third month.

“Safe speed is a requirement for most industries today,” says Project Manager Finn Agensjö from ABB. He works with among other things, engineering and implementing effective control and drive systems based on each facility's needs. His specialty areas include applications in the iron and steel industry, mining, as well as pulp and paper production.

Finn Agensjö tells of processes that are complex and environments that are

tough on machines and equipment, where weight, speed and force can create hazards for people.

“Machine operators need access to perform certain maintenance and production tasks while machines are in operation,” he explains. “This is why the EU has a machinery directive, which applies to all safety-critical functions in active systems. Major damage and high costs can be incurred if something goes wrong.”

“Safe speed is a requirement for most industries today.”

Finn Agensjö, ABB

Functionally safe encoder FSI 800

In systems for safe control and speed monitoring, Leine & Linde's FSI 800 encoders have an important task: reliable and exact feedback of rotation speed in real time. The encoder is safety certified and designed with either a solid or hollow shaft mount that cannot slip. It inter-operates with ABB's ACS880 frequency converter that optimises motor function and energy consumption by direct torque control (DTC). It also communicates well with ABB's embedded safety functionality.

Self-control and signal strength

The FSI 800 series encoders not only provide feedback on speed in the machine, but also monitor the quality of their own signal reading. If a deviation should be detected, the signals enter a fail-safe mode so that checks and maintenance can be performed. This integrated, functionally safe solution eliminates the need of a

redundant signal from another encoder.

Leine & Linde's encoders provide high current HTL signals, which also enable good signal connections in environments with considerable noise interference, and sending signals over long cables.

Efficiency-improvement process

The safety system is activated when a person enters a hazardous area. All production tasks are therefore analysed, which may result in that certain steps can be simplified or eliminated. When a person needs to work close to a hazardous machine in operation, the safe speed function is activated. This is accomplished with automatic controllers, such as safety gates or sensors

that detect movement, so that work can continue without interruption.

“Each assignment begins with an analysis, which often constitutes the starting point for the process of improving efficiency,” explains Drives Systems Manager Eric Carlsten at Process Industries at ABB. “Correctly defined machine safety increases productivity.”

Safe process control

At the end of the production line it is common that the paper is manually fed between rollers when changing reels. By a machine operator switching in a control unit, operation is automatically slowed to a safe speed, and the machine's movements can then be regulated at the machine by the operator.

“Changing the speed of rotating mass is one of the machine's most dangerous manoeuvres,” Eric Carlsten explains. “It's therefore important that regulation in safe mode is based on functionally safe signals from the encoder.”

ABB meets the customer's skills requirements within the safety area, and thus not only complies with the current Machinery



“It's an advantage to have products that work well together”, says Eric Carlsten, and Finn Agensjö agrees. “It means the customer knows that there is a proven safety concept for motors and drive systems that can be installed directly.”

Photo: Per Sandberg

Directive, but adapts, integrates and secures effective production processes. As a supplier of reliable and safe speed feedback devices, Leine & Linde is proud of its involvement in this work. ■



FUNCTIONAL SAFETY IS INTEGRATED!

Leine & Linde's technical solutions focus on customers' conditions. The question placed by product management was, "How do we implement a solution for functional safety that facilitates component choices?" The buyer should be able to choose what is needed, neither more nor less.

WITH THE CURRENT Machinery Directive, it is of the utmost importance that all machines sold in the European market fulfil the set requirements for functional safety. This can be complicated, partly in understanding how the requirements are applied for users in general, but also in a way that creates high costs – and this within applications where productivity and resource optimisation are very important. Leine & Linde wants to make things easier for users.

"It should be easy to do the right thing," says Leine & Linde's Product Manager Linda Cambo. "This is why we've produced an entirely new product series, FSI, with integrated functional safety. The FSI 900 series features a number of ready-to-use safety solutions, depending on what the user actually needs.

Integrated safe relay outputs

All included functions are safe and certified in accordance with SIL2 and PLd, Category 3. This entails that they may be used in applications up to a specified safety level in accordance with EN IEC 62061, IEC 61508, EN ISO 13849-1, and EN IEC 61800-5-2. The available safe functions are overspeed monitoring, acceleration monitoring, end limits and standstill. These are configured in the provided software. Which relay output that activates which function is specified here. This is done in compliance with safety routines, and subject to the approval of a safety coordinator. The relay outputs are integrated in the product and covered by the certification, which means that the customer does not need to connect any externally certified relays, mechanical limit switches or speed monitors. This also facilitates or-

dering, support and other activities since the same supplier can take responsibility for all questions.

Stand-alone safe monitoring

Because all safety functions with associated parameters are integrated in FSI 900, stand-alone monitoring of motor speed, for example, is enabled. The solution saves space in the construction and simplifies matters for the customer since the safety requirements can be guaranteed even when the customer's system has a PLC that is not safety certified.

FSI can be easily connected directly to the emergency stop loop or directly to the selected braking function to execute the required function. This is possible due to it being manufactured with standard components for high connectivity.

Rotation and position data in real time

"Through safe monitoring and direct control of movement in rotating shafts, the customer attains safe operation in many of the functions that are typically critical," says Linda Cambo.

"It should be easy to do the right thing."

It is position data for real-time rotational movement that constitutes the basis for the safe functions that are used in the product. The scanning principle is constructed just as in a standard rotary encoder that monitors a rotating shaft. The safety coordinator configures these functions via software – which functions

need to have limit values and which limit values apply? A limit can be that the shaft is rotating faster than permitted. Another can be that the shaft has reached a critical position that requires the machine to be stopped. If a limit value is reached, the selected failsafe relay output will open to break the control circuit, thereby stopping the machine, or activating another preferred function, such as a warning or an alarm.

Movement cannot go unnoticed in the part of the machine where the FSI 900 series is installed. In the event of power outage, the machine enters the state defined by the customer as failsafe, as a result of the failsafe relay output setting.

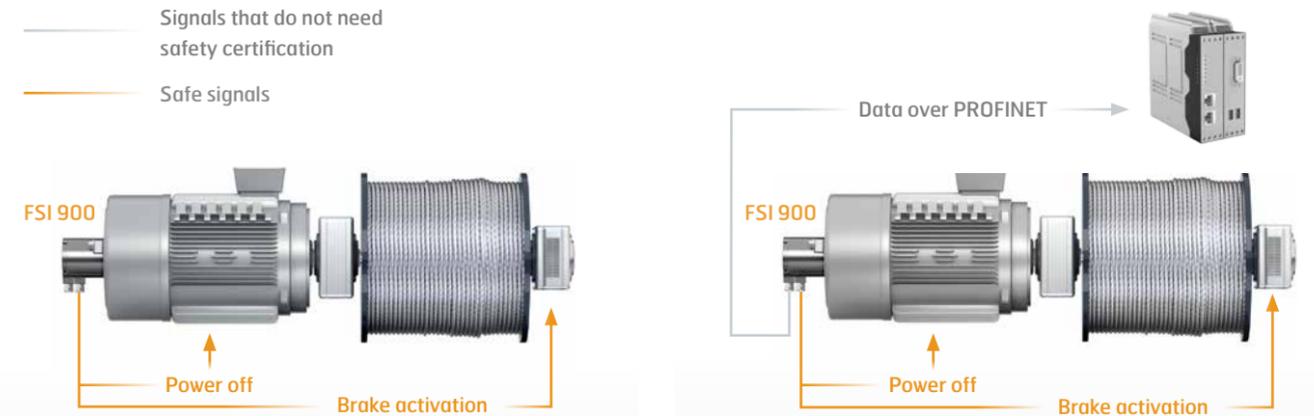
Reliability, quality and high precision are as usual, signatures of Leine & Linde products. The role of the encoder in automated processes is expanding, as it is from now on highly involved in simple and safe solutions for safety systems. ■

TERMINOLOGY

FSI stands for *Functional Safety Integrated*. FSI is a trade name for Leine & Linde's certified, functional safety encoder solutions. They comply with the current Machinery Directive for safety in applications in which an operator must have access to machines when they are in operation.

PLC stands for *Programmable Logic Controller* and designates the computer device that is used to make control programmable.

PROFINET is one of the market's interfaces for industrial fieldbus communications, based on the Ethernet standard.



System for safe monitoring without PLC

Positioned on a rotating shaft, by the motor, winch drum, roll drum, drill, wheel, or wind turbine, FSI 900 ensures safe movement. By connecting its failsafe relay outputs to for example motor power off and/or brake activation, a failsafe state will be realised at the event of a critical limit being reached. Overspeed, acceleration, end limits, and standstill, are safe functions maintained by the FSI 900.

System for safe monitoring with PLC

PROFINET can be used for integration with parent control systems. With data over PROFINET, the control system can be made aware of movement properties – such as position, acceleration and speed – for various purposes. All safety functions are still controlled integrated in FSI. The application is thus monitored in a certified functional safety manner and the Machinery Directive is complied with, even without the PLC needing to be certified.



The FSI 900 series has many different application areas. Safe speed in a crane application can be achieved by FSI being mounted on a motor shaft or directly on the winch drum. As the pictures above show, it can be connected with or without PLC.



Therese Kjellgren demonstrates the FSI Monitor software at an in-house exhibit where all employees at Leine & Linde had the opportunity to learn about the product and contribute to the development.

WHEN DESIGN CREATES BENEFITS

“Appropriate design gives the user cost benefits in the form of saved time,” says Therese Kjellgren at Leine & Linde. Together with software engineer Mattias Jadelius, she describes the design objectives: “The product should be easy to install, understand, use, and be smoothly integrated with other systems.”

ENCODERS are being developed today as increasingly more intelligent and communicative products. They include embedded software and are also often delivered with customer-optimised software, where customers can make settings or read off values in their own computers or systems that are connected to the product.

Only relevant choices

“The user experience is not just in the physical product, but also in the software,” Therese Kjellgren emphasises, conducting work with design and user friendliness for the customer software being created by Leine & Linde. An example of this type of software is the FSI Monitor, where customers can make settings so that velocity, acceleration and end-limit positions are regulated in a certified functional safety manner directly through the encoder in the FSI series.

“The customer’s safety coordinator specifies which functions need to be safe in the

particular application where the encoder will be used, directly in the software,” says Therese Kjellgren. “The customer will then be guided through setting of the limit values. Thanks to the design of the software, only the alternatives that are relevant to the customer will be shown. This reduces the risk of making mistakes. It also makes the interface more pleasant to look at and easy to understand.”

“We approach every step of our work with a question: ‘How can we make this simpler?’,” says Mattias Jadelius, who works as software engineer at Leine & Linde. “This saves time for the user. When we work with embedded software in the products, we also consider what we can do to simplify communications and integration in the customer’s systems or production.”

Early customer testing

An example of this is Overspeed, Leine & Linde’s integrated speed monitor, which

can now be programmed by the customer thanks to an embedded virtual series protocol that is accessible via a USB port. Previously, customers ordered an overspeed encoder which acted within a pre-programmed speed range. Now, the customer’s own settings can be made for four relays within the range 0–6000 rpm. This results in significantly greater flexibility than other similar products on the market.

Ease of use is especially important since Leine & Linde’s products are used in branches with exceptionally high investments in machinery, where operating time must always be maximised.

“Early customer testing is important for us in making effective design choices,” says Mattias Jadelius and emphasises that design and functionality are two sides of the same coin.

“The earlier we can participate in the process, the more we can benefit the customer,” says Therese Kjellgren. ■



RESPONSIVE WEBSITE IN ELEVEN LANGUAGES

Visits from mobile devices are increasing. Leine & Linde’s website features responsive design and easily adapts to different web browsers and mobile formats. It is available in eleven languages: Swedish, English, Finnish, Danish, German, Italian, Spanish, Portuguese (Brazil), Chinese, Japanese and Korean. The website is a part of Leine & Linde’s strategy for maintaining a high level of service and availability for its customers in different parts of the world. Everything is designed for quick access:

- Trace orders directly from the start page, and receive information each step of the way from product to delivery.
- Search for products via different technical criteria in the product guide, and obtain detailed information, including data sheets, 3D drawings and installation instructions.
- Use the shortcut to downloadable files under the Support tab to download everything from software and manuals to brochures and press photos. ■

DUAL OUTPUTS SAVE SPACE

Motors and drive system can receive direct speed feedback via pulse signals, while other control systems can receive absolute position data via fieldbus interfaces – from one and the same robust encoder. Several of Leine & Linde’s encoders can be ordered with dual outputs for both absolute and incremental signals. This dual output solution saves space, since only one encoder is needed to provide feedback on rotating movement to several systems or processes. It also means that the mechanical installation takes less space, since fewer connections and adapter components are needed. Appreciated by designers, system integrators, as well as operations and maintenance personnel. ■

PART OF A BIG FAMILY

Sentronics Automation and Marketing in Singapore is one of Leine & Linde’s distributors in Southeast Asia.

“We’re strongly dedicated to providing exceptional and efficient service to all of our customers,” says Sentronics CEO, David Teo.

Sentronics was founded in 1989 to provide customers with solutions to their industrial automation needs. The company is continuously expanding to meet the ever-increasing needs of Southeast Asian industrial expansion projects. Since 2008, there has also been a sales office in western Malaysia, Apextronic Sdn Bhd. David Teo attributes a large portion of sales successes to the Leine & Linde Group’s family feel.

“Our trained and experienced staff receive very good backup support from the head office and the worldwide sales organisation,” he says. “We pride ourselves in exceeding our customers’ expectations.”



Some of Sentronics office staff members and CEO David Teo (at the right) send their regards to the readers of Impulse Magazine.



Incoming inspection



All goods delivered to Leine & Linde first arrive at the inspection room at the incoming inspection department. This is where measurement technicians Annika Jansson and Helene Minholm work.

THROUGH their prompt processing and effective inspections of all incoming materials, the incoming inspection department serves a vital role in Leine & Linde's high delivery precision.

"Attention to detail is the most important part of our job," says Annika Jansson, who previously worked both with sales and shipping at Leine & Linde.

"If any faulty materials should pass through undetected, it would cause harm to our company as well as to our customers," says Helene Minholm, who began as a short-term temporary employee and thought she would only be working at the company for six weeks.

Both have now worked together for a number of years and can look back on how

| | | |
|-----------------------|--|---|
| NAME: | Annika Jansson | Helene Minholm |
| POSITION: | Measurement technician | Measurement technician |
| YEARS AT THE COMPANY: | 11 years | 8 years |
| LIVES: | Flat in Strängnäs close to her adult children. | House in Strängnäs with family. |
| MISCELLANEOUS: | Enthusiastic fan of crossword and Sudoku puzzles. Enjoys the outdoors, taking care of her horse, a Swedish half-blood with a good measure of stubbornness. | Loves to play football, now making the transition to the role of hockey parent. Downhill skiing is also a major interest. |

the incoming inspection department has developed, and continues to develop. The reference temperature and humidity in the inspection room is always the same, but the number of products measured and received has increased, just as the measurement instruments and methods. When new products are developed, the department maintains close contact with the development department to define how each included part or product can be inspected and measured so that quality and function can be guaranteed.

An arrival inspection can be a matter of measuring the depth of drilled holes with

consideration to both hole function and the exact angle of the drill bit's tip – or something completely different. It is essential to identify any deviations, regardless if there is one product, or thousands, to be delivered. If something does not agree with a drawing or specifications, it is returned – or remedied.

"That faults are promptly discovered saves both time and resources," Annika Jansson explains. "We can also often help in solving problems and correcting faults. The variation and understanding the whole makes our job fun." ■