Focus on know-how
What constitutes the innovative strength of Frauscher

Interface factor
How systems can be intelligently combined

Wheel Detection Forum
Fascinating programme in Vienna in November
Special feature
Development success factor

Innovation
Trials as a secure basis for decision-making
It all comes down to the interfaces
State of the art in axle counting

Communication
Wheel Detection Forum 2013

News
Kazakhstan, IRIS certification
New office in India

Overview
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Dear Reader,

The focal point of this edition of ‘ultimate rail’ is technology and development within our company. For many years, Frauscher Sensortechnik has consistently followed the strategy of positioning itself as a leading, independent supplier of components for wheel detection and axle counting. We are focussing almost solely on the development, production and marketing of highly available inductive wheel sensors and axle counting systems that can be implemented on a global basis.

Continuous product development has therefore played a highly important role for a number of years now. On an annual basis, we invest an above-average share of our turnover in innovations and in the optimisation and adaptation of existing components and systems.

In order to provide more efficient and highly available wheel detection and axle counting in the market niche and to be accepted on the market in the long-term, we want and need to be the very best supplier. This can only be guaranteed by offering innovative products and services that fulfil the individual needs of the client as closely as possible in both technological and economic terms. Benefits to our customers always form the focal point for both system integrators and for the operator at Frauscher.

Our company’s growth strategy is based on the demand to cover all requirements on a global basis with innovative, flexible and generic products - in accordance with our motto “Global Markets - Customised Solutions”. It is extremely important to us that our customers are easily able to configure, install, operate, maintain or even adapt these components at a later date. This demand constantly places new and considerable requirements on our product management and product development.

In this version of ‘ultimate rail’, which is the most extensive edition to date, we would like to offer you an insight into our technological organisation and into the areas of development, product management, as well as business development and service.

Michael Thiel
The remit for the 15-strong development team working with Rudolf Thalbauer is to develop systems and solutions that offer a maximum level of availability, whilst simultaneously offering the highest level of safety at low life cycle costs. In order to be able to fulfil the individual requirements of the system integrators and operators under the most varied framework conditions in the individual rail segments and countries as best as possible, an extensive product portfolio that can be easily adapted to suit customer-specific remits is required.

Rudolf Thalbauer explains the following regarding the development strategy at Frauscher:

*Collaboration with system integrators throughout the world and the numerous functions of our applications in the most varied systems best define what our objective must be. This concerns developing generic products that can be adapted quickly and efficiently to specific remits - and this can even be carried out by the system integrators or the operators themselves.

We are constantly striving to develop our systems and would like to be the best supplier in our niche. We can only guarantee this because our development has a very broad structure and because our highly trained and motivated employees have been made available all the latest infrastructure and test facilities required for their work. Therefore, all developmental stages can be implemented in a rapid and flexible manner in-house.

Thanks to our partnership relations that have been nurtured for many years, we are also the first port of call for our customers for new ideas and when presented with problems. The complexity of modern systems requires close cooperation and/or R&D alliances with operators and integrators for the most part. Detailed analyses and on-site measurements allow specific adjustments to be made and offer findings that can be immediately incorporated in development thanks to structured processes. Findings are constantly being exchanged between our

Innovative concepts alone will no longer suffice - in the field of R&D, flexibility and time-to-market form the crucial factors today. Developments in recent years and the innovative strength of Frauscher prove that Research & Development have optimal framework conditions and are extremely well integrated into the business process.
specialists in product management and business development.

In order to detect future trends at an early stage, we also collaborate with universities and are a member of relevant standardisation committees. We do, of course, also monitor the various alternatives for inductive wheel sensors and carry out intensive research in this area”.

Sensor development using the Finite Element Method (FEM)

The development of inductive wheel sensors is highly complex due to the large number of influencing factors. In order to be able to implement optimisations and new developments as quickly as possible, the Frauscher development department uses the latest simulation software.

This maps out the sensor and the most important environmental conditions and records them in a mathematical model. The electromagnetic fields are simulated here and the key properties of the sensor can therefore be determined. Building on this, the behaviour of the virtual sensor in different scenarios and under the variation of specific parameters such as temperature, materials, EMC-influences, geometries, casting materials, coils, etc., can be simulated.

A comparison of the parameters of Frauscher sensors, as determined by simulation, with the results of actual measurement shows that the computation models agree with the reality to a high level of precision; a factor that saves both time and money when developing prototypes.

EU Research Project ECUC
[www.ecuc-project.eu](http://www.ecuc-project.eu)

Frauscher also plays a crucial role in this research project. ECUC investigates the thermal, mechanical and electromagnetic interactions of the entire eddy current brake system, the track and the trackside signalling equipment. Selected operators and manufacturers work together here in order to develop new design, construction and operational guidelines. Frauscher provides its knowledge and expertise with regard to inductive sensors and also employs computer simulations based on finite element methods.

Every detail counts in the field of development - independent test facilities form the basis for this (GTEM cells above). Functional tests are carried out at extreme temperatures of + 80°C to - 45°C (image on the left) in the climatic chamber.
Test systems guarantee

This free-of-charge service is offered by Frauscher in order to verify the reliability of the system when operating to customer-specific conditions on the one hand and to generate key data for product optimisation and for new developments on the other. What is more, field tests form a significant component of the CENELEC process. In addition to its own, permanently installed test centre in the Passau-Wels section of the Österreichische Bundesbahnen (ÖBB) network, Frauscher is currently responsible for 15 trial installations in a number of countries, operating under highly varying conditions.

Gerhard Grundnig knows how diverse the requirements can be here:
"In addition to fulfilling current technical standards, the guiding principle of our activity is the company policy of providing a broad and versatile product range, which can be flexibly applied in a variety of conditions. The best way of demonstrating this practically is to set up individual trial systems directly with the customers. When developing a demonstration trial set up, we follow simple and efficient rules. Firstly, jointly with the customer, a specific area of the rail network is selected, such that it not only exhibits the maximum concentration of adverse environmental conditions, but is where all possible types of service and maintenance rolling stock operate. If we demonstrate that our technology operates successfully in this section, then it can be used on the customer’s entire network.

Then we equip the reference area with an adequate number of counting heads and counting sections and monitor their operation using the most up-to-date diagnostic, logging and recording tools. The data acquired in this manner is then assessed in our laboratory, by means of which a final statement can be made regarding functionality and availability".

Equipped for all eventualities
If the analysis establishes irregularities of operation due to exceptional external environmental conditions, an immediate response can be achieved by adapting the evaluation algorithms, adjusting parameters individually, selecting the
most appropriate system component, etc. This is regardless of whether the problem concerns special structural features, different rail profiles, substructure, sleepers and vehicle emissions or unusual wheel flanges, bogie geometry or magnetic track brakes need to be taken into consideration: Frauscher components offer sufficient room for manoeuvre for all eventualities.

During the trial period, the technical team are in close contact with the customer, in order to ensure that the customer is familiar with the technology on the one hand and in order to capture all possible operating conditions on the other.

Frauscher carries out approximately 30 trials every year and by doing so gathers important findings that can be incorporated directly in further developments.

Endurance tests in Kazakhstan

A representative example is the long-term test on the axle counting system ACS2000 that was only recently concluded in the Kazakh railway network (KTZ). The ease of integration in the existing infrastructure and the reliability under local conditions were assessed between October 2012 and February 2013. KTZ and Frauscher chose a shunting yard and a train station with block working as test sites.

In addition to the influence by the fleet of vehicles - including all maintenance vehicles and the ADE-1 measurement train - the system also had to be checked in order to ensure that it functions seamlessly during extreme temperatures down to -45°C. The overall performance shown over five months won over the staff responsible at KTZ and following completion of the test phase, several suppliers expressed a clear recommendation for the axle counting system ACS2000.

Frauscher can therefore add the field experiences acquired in Kazakhstan to its reference list as valuable proof of the function and availability of its systems in new markets.
In today's high-tech world, it is incomprehensible that intelligent systems such as fully electronic interlockings and axle counting systems have not also been intelligently connected to one another. The intelligence of a relay interface is, in many cases, no longer sufficient or up-to-date.

Frauscher recognised this trend at an early stage and defined the implementation of different, serial software protocols as one of the central priorities in the field of development. The company made it its objective to set up an interface platform that can connect to every system in series. In the meantime, the first projects with serial interfaces are successfully operating.

Software interface
In comparison with hardware-based interfaces, a modern software interface allows the exchange of a range of further information, such as direction, diagnostic data, speed, etc. in addition to the "clear/occupied" or "reset" output. The serial connection and the flexible configuration of the axle counting system offer almost unlimited opportunities for data transfer here.

What is more, software interfaces offer cost reduction opportunities when networking the interlocking and axle counting systems. This means that fewer hardware components are required, which can be seen in reduced spatial requirements and significantly lower wiring costs.

Frauscher Safe Ethernet FSE
System integrators that do not have their own interface protocol are optimally advised with the Frauscher standard interface. This allows a simple integration of the axle counting system into higher-level systems via the FSE protocol (Frauscher Safe Ethernet). This is a process that Frauscher supervises with its extensive knowledge and expertise, from the advisory stage right through to specification and simulation of the protocol. Corresponding expert reports in this regard will be available shortly.

Customer-specific interfaces
These constitute the Non-Plus-Ultra individual solutions. If the system integrator has its own secure transmission protocol, it is generally wise to also connect the axle counting system using this protocol. Initial projects with customer-specific interfaces have already proven successful in live operation and demonstrate the considerable benefits of this variant.

Always optimally connected
Depending on the system platform and scope of functionality, Frauscher has several interface technologies for technically and economically optimised connection - regardless of whether this concerns safety critical or non safety critical interfaces. Hardware interfaces are also still justified for more simple applications. With this interface type, the "clear/occupied" information is generally transferred via a relay contact as an output variable while the "reset" command is...
transmitted to the axle counting system via an optocoupler interface as an input variable. Using these proven, voltage-free hardware interfaces, axle counting systems can be integrated into relay-driven, electromechanical or electronic interlockings.

For an independent component supplier such as Frauscher, it is vital to be able to integrate components and systems simply and efficiently in higher-level systems. It is for this reason that the set-up of the interface platform will continue to remain at the centre of development work in the coming years.

**Focus on intelligent interfaces**

**FAdC with software and hardware interface**

**FAdC with software interface**
Since its presentation at InnoTrans 2010, the innovative generation of axle counting system Frauscher Advanced Counter FAdC® has been stirring up considerable interest. A closer look at the challenging development phase shows how comprehensive the range of functions actually is.

The FAdC® axle counting generation is one of the most recent textbook examples of the exceptional innovative strength of Frauscher. Following its presentation in 2010, some projects are already successfully operating on a global basis in different rail segments and applications, as well as with different interface integration.

Challenging from the very beginning

Martin Rosenberger, Head of Product Management, explains the approach that was selected for the FAdC® development:

"We were initially faced with the complex challenge of coordinating the wishes and concepts of our global customers and the ideas of our engineers with regard to future developments, so that with a generic product and customer-specific configuration all of the applications known and conceivable to us up until that point are achievable at the lowest life cycle costs. We were successful in that and we were also able to integrate a range of groundbreaking functionalities that can be configured upon request, without the need to change system components.

In the specification phase, we discussed, refined and implemented the innovations incorporated within the basic concept of the FAdC® with selected customers. This led to the fact that even the first approval of the FAdC® included a customer-specific, safe, ethernet-based software interface to the interlocking - in addition to the Frauscher standard interface.

A further important aspect was the modular structure and scalability of the FAdC® and the use of a standard network infrastructure, which permits both a central architecture and a decentralised distributed arrangement of the axle counting components on the section of the rail network and therefore the local separation of FAdC® and the interlocking system. What is more, the proven philosophy that our customers are able to independently design, configure, commission, operate and expand the axle counting system after a brief training session, should be seamlessly upheld. We have solved this by means of

The name FAdC® not only stands for a modern, flexible hardware and software platform, but for an integrated solution. All processes, starting with planning, design and configuration, diagnostics and simulation up to maintenance and adaptation are generally supported with innovative software tools.
pressive in practice

a simple concept that will now be expanded and automated further by the Frauscher Configuration Tool FCT. Discussions with customers on-site confirm that the FAdC® concept is extremely capable of meeting the requirements”.

Getting straight to the point

The strategy of focussing on customer demands has been corroborated by Frauscher lately with the FAdC®, a cost-effective variant for axle counting for SIL 2/SIL 3 applications that have also already proven effective in practice.

In order to consistently continue the success story of the Frauscher Advanced Counter, the development department in St. Marienkirchen is currently carrying out intensive work on FAdC® Release 2 with even more functionalities, where several customer-specific software interfaces will be concomitantly fine-tuned in the implementation of this.

Further information in this regard can be found in one of the next editions of ‘ultimate rail’.

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**Summary of the current FAdC® projects**

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With cutting-edge, much discussed topics, optimal prerequisites have been created at Frauscher, in order to make the Wheel Detection Forum 2013 due to be held in Vienna in November a high-profile industry event. Register for this Forum now!

“Our objective is to offer visitors a concentrated forum of experts and a platform for networking and to establish the Wheel Detection Forum as an international industry event, focussing on wheel detection and axle counting”, explains Michael Thiel, CEO of Frauscher Sensortechnik.

Benefiting from one another

The forum of experts will convey the most up-to-date knowledge and in-depth expertise on planning, design and maintenance of signalling systems, and present the latest findings on much debated issues.

In comparison to the first forum, we have managed to acquire a higher number of external speakers this year - particularly from the field of research and development - who can offer valuable insights into highly topical knowledge. This should result in a viable platform that serves as a basis for operators, system integrators, manufacturers, consultants and research representatives and representatives from academia and professional associations alike, to enter into dialogue and exchange their experiences.

The following subject areas will form the focus of the Wheel Detection Forum 2013:

- Are there alternative technologies for inductive wheel sensors?
- What solutions are available and reliable for rail-break recognition?
- What strategies and measures are possible and/or necessary for lightning and overvoltage protection?
- Examples of Best Practice

www.wheeldetectionforum.com

Simply visit our website today in order to register for this event and view the latest information on the Wheel Detection Forum 2013!
More than 70 participants in 2011, excellent feedback and registrations already being taken for the second forum mean that there is considerable support for the intention of making the Wheel Detection Forum a permanent institution for the high-calibre exchange of opinions and knowledge on an international level.

Dozens of industry experts from 16 nations took the opportunity two years ago to gain first-hand information regarding developments and trends in the field of wheel detection and axle counting. This year, the exclusive event will have an even broader basis and will be expanded to include additional subject areas and presentations.

Jan Miśkiewicz, PKP Polskie Linie Kolejowe S.A., Poland
"I find it very interesting how Frauscher deals with special requirements. It became clear that customer focus is something they really put into practice."

Ing. Daniel Busanszky, Siemens AG Austria:
"I really enjoyed the mix of presentations and interesting reports from operators regarding their experiences. I will definitely be attending the next forum".

Carlos Astor, ENYSE S.A., Spain
"I was able to make a number of new contacts. The entire event was organised perfectly - I am highly impressed by Frauscher".

DI Michael Kette, V+S Ingenieurgesellschaft, Germany:
"This forum impressively showed that wheel detection can be considerably more than just the basis for track vacancy detection".
New representative office in Kazakhstan

Following the successful outcome of the trial operation and thanks to excellent project outlooks, particularly with the Kazakh railway operator ("Kazakh Temir Zholy" KTZ) as well as Acelor Mittal, Frauscher has now opened a representative office in Astana.

“The dedication and efforts invested over the last three years are now paying off”, Uwe Günther, head of the sales office in Astana, rejoices. “Over the next few years, KTZ will be expanding its existing network by 1,600 km and modernising 2,700 km of it. Since both the Kazakh railway operator and Acelor Mittal have issued formal approval for the axle counting system ACS2000, we can look forward to future projects with confidence.”

After the memorandum of understanding between KTZ, the local partner Kazcenterelectroprovod and Frauscher was signed in September 2012, the task was to demonstrate the functionality and high availability of the axle counting system ACS2000 on site in Kazakhstan (see also Page 8). With the opening of this office, Frauscher has now completed the next step of its entry into the Kazakh market. In the meantime, a production localisation strategy is in preparation, which will allow Frauscher to tailor projects in Kazakhstan and neighbouring CIS nations in the best manner possible.

Passing IRIS Certification

At the end of March, Frauscher underwent a stringent assessment of its long-standing quality strategy with IRIS auditing - and passed straightaway without reservation.

The ISO 9001 certification for quality management systems, ISO 14001 for environmental management systems and OHSAS 18001 for occupational health and safety management systems have formed a part of Frauscher’s technical basis for many years, and are prerequisites for succeeding in international markets.

Now the company has also undergone a review in respect of the IRIS standards. The auditors awarded the Upper Austrian company with an excellent rating. The "International Railway Industry Standard" is a worldwide quality standard for assessing management systems in the railway industry. Most importantly, the official IRIS inspection was of essential importance to Frauscher customers, allowing them to place their trust in a dependable supplier evaluation system. This also involves a clear reduction or outright elimination of evaluation processes and associated approval audits.

“The certification once again impressively confirms the high quality of our products and processes”, says Quality, Environmental and Safety Manager Maria Reisinger.
“As a result of the positive experiences, axle counting systems will in future be the first choice in new railway line constructions and modernisations in India. Track circuit technology is gradually being phased out, and owing to the size of its rail network and the multitude of projects in the pipeline, the Indian market is incredibly important to us strategically. In order to achieve success on a sustainable basis, we are going to adapt our business model and our products according to the requirements that are specific to the country, and transfer part of our value-added chain to India”, says CEO Michael Thiel.

The first step was to establish Frauscher Sensor Technology India Private Limited in Bangalore at the beginning of July. In addition to the project office in Mumbai, we now have a branch in Bangalore and an accompanying production site in Mysore, with Alok Sinha assuming the role of Managing Director. With this stage, we fulfilled a crucial pre-requisite for the general type approval for the ACS2000 in India. We expect to receive the unrestricted approval from the Research Design and Standards Organisation shortly.

The Indian office is responsible not only for supply and project management, but also for installation, commissioning and after sales services. Moreover, production is carried out in collaboration with our own test centre, where the necessary market-specific modifications to the product portfolio can be carried out and tested.

With Alok Sinha as Managing Director, Frauscher has gained a highly experienced manager with an incredible knowledge of the market. “It was Frauscher’s working methods, flexibility and expertise in entering the Indian market that impressed me. New challenges and task definitions are analysed rapidly and resolved without any red tape. I look forward to this new assignment and I’m convinced that, with the measures introduced, we will be a highly attractive and competitive manufacturer of axle counting systems in the Indian market. Frauscher wants to and will undertake a vital role in this line of business”, Alok Sinha explains.
Indian Delegation visit

A number of delegates from India examined the factors behind the success of Frauscher’s components at St. Marienkirchen in the spring of 2013.

Within the scope of the approval process for the axle counting system ACS2000 in India, Frauscher welcomed high-profile representatives of the RDSO Railway Board and of Indian railway companies to its head office.

Guests were able to familiarise themselves with the entire development and production line, which is the basis for the high quality and functionality of Frauscher components. In addition to training sessions and intensive debates, the in-house test and simulation facilities and the inspection of reference projects proved to be particularly interesting to participants. The inspection of the second scope of delivery for MRVC Mumbai was also carried out parallel to this - in the meantime, two thirds of the approximately 1900 wheel sensors and the corresponding axle counting systems are in the installation phase and/or in operation.

Being responsible for one of the most frequently used rail networks throughout the world, the guests from India appeared interested in the safety aspects of the equipment made in Austria.

Dates

Frauscher product training sessions
1 – 4 October 2013 (EN)
15 – 18 October 2013 (DE)

If you have any questions, please contact Elke Gimplinger, T: +43 7711 2920-9284 or via email: training@frauscher.com

Trade fair dates
TRAKO in Gdansk: 24 – 27/09/2013
Metro China in Beijing: 19 – 22/11/2013
AusRail in Sydney: 25 – 27/11/2013