India: a market of the future
Frauscher India is on the right track

FSE tested in the field
Frauscher’s software interface is certified to SIL4

2nd Wheel Detection Forum
A great deal of interest and excellent feedback
**Special feature**
Frauscher India is on the right track

**Innovation**
FSE protocol tested in the field
Individual solutions for level crossing protection systems

**Communication**
Wheel Detection Forum gains new ground

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Dear Reader,

In the last edition of *ultimate rail* we reported on the opening and development of our subsidiary in India. Due to the importance of this market and the positive development of our activities, we will once again focus on Frauscher Sensor Technology in Bangalore in this edition. Managing Director Alok Sinha has succeeded in building up a team of more than 20 qualified employees and preparing them for their future duties. And yet, India is not the only new market from which good news is forthcoming.

In accordance with our slogan "Global Leader + Local Partner", we are establishing subsidiaries or representative offices in markets that are of strategic importance to us. We want to have a local presence, be near our customers, communicating in their national languages and ensuring we are available as soon as possible in the event of queries, or to provide support.

We are currently in the process of establishing a subsidiary in Brazil, which will be run by Maicon Ferrari. An increasing number of enquiries, rising interest in innovative axle counting systems and the development of a test installation at ALL (América Latina Logística) have prompted us to take this step. The large number of visitors to our stand at the "Business on Rail" trade fair, as well as the positive feedback on our first appearance in Brazil, confirm that this was the right decision.

The successful internationalisation strategy was also reflected in the second Wheel Detection Forum, both in the choice of speakers and in that of participants. Sixteen speakers from nine countries and 150 participants from 29 countries prove that Frauscher Sensortechnik has established itself as a global player in the field of wheel detection and axle counting.

I hope that you will find this magazine most inspiring.

Michael Thiel
India: The course

Frauscher Sensor Technology India, which is based in Bangalore, organised an opening ceremony on 11 October. Over 100 guests took the opportunity to visit the new office and participate in the celebrations. The office was opened officially by A S Shankar - Chief Signal and Telecom Engineer, BMRCL (Metro Bangalore), Anshul Gupta - Executive Director, Corporate Coordination, RailTel Corporation of India, and Michael Thiel - CEO of Frauscher Sensor Technology.

On the next day, the subsidiary organised a traditional inauguration, known locally as the Ayudha Pooja festival. All employees of Frauscher India, as well as representatives from the head office, took part in this ceremony. A priest consecrated and blessed the premises, products, employees and management team.

“We have now created an excellent starting point from which to launch and develop our business here in India”. By the end of the year, we will have recruited around 30 employees, who will have received excellent training and will be well prepared for their future duties and projects”, said Alok Sinha, Managing Director of Frauscher Sensor Technology India. “We have also made progress in the localisation of project planning and manufacturing services. We completed the project design and configuration for another system for trial operation within the framework of measures aiming at acquiring RDSO approval, and we have even manufactured some of the components ourselves. As before, we import the wheel sensors and the axle counting system components from Austria, however the cabling and final assembly take place here, on site. Components such as cubicles, trackside connection boxes, reset boxes or rail deflectors for mechanical protection of wheel sensors are manufactured in our own Indian production site. We are therefore on the right track and will now develop the resources and capacities in accordance with orders received.”
A further test installation for RDSO approval

As part of the approval process, Frauscher was asked by the RDSO to build a test installation on a main line. The site which the RDSO chose for the trial is on the section Chhata – Kosi Kalan in Uttar Pradesh, on the network of the operator North Central Railways. The aim of these tests is to demonstrate that the ACS2000 axle counting system can also be reliably used for track vacancy detection on India’s main railway lines. Furthermore, the functionality of digital suppression of railway trolleys as well as the availability of the system were tested in an area electrified at 25kV AC.

At the end of October all of the equipment was set for inspection by the RDSO in Bangalore, and then tested accordingly. Following successful acceptance, the test installation was commissioned as planned in mid-November.

Digital suppression of trolleys

The suppression of push trolleys is a specific requirement of the Indian market. As early as 2007, Frauscher had already tested various solutions for the suppression of trolleys, as part of a trial in Chandigarh, in the Punjab. However, neither the methods for the evaluation of wheel diameter, nor the adjustment of algorithms led Frauscher to a satisfactory solution.

With the patented ‘counting head control’, it is now possible to detect the push trolleys, however it is not possible to count these pulses as axles. If only two axles pass the sensor and at the same time, the adjacent track sections are ‘clear’, both of these axles are suppressed and not forwarded to the axle counting system. This digital solution for the suppression of trolleys has already been successfully used for several months by MRVC.
FSE has become the standard

Modern signalling systems require a high degree of integration of all sub-systems and therefore high-performance interfaces. An efficient exchange of data between the sub-systems can only be achieved with software interfaces. Frauscher has developed the Frauscher Safe Ethernet (FSE) protocol for this purpose.

As an independent provider of wheel detection and axle counting systems, it is of central importance to be able to communicate with all system manufacturers and integrators via software interfaces. The development of modern communication interfaces is therefore particularly important for Frauscher.

A separate team of developers was formed, which deals solely with this specific and extremely complex issue. The successful operation and the positive feedback received for the projects with software interfaces – be it with customer-specific protocols or with our own software protocol – demonstrates that Frauscher has sound, expert knowledge in this field.

Frauscher has developed its own software protocol FSE

In addition to the basic requirements concerning safety (SIL4) and availability, the following functional requirements are of central importance:

- quick and easy to implement
- flexible and free definition of the data content to be transferred
- simple, redundant and network-compatible point-to-point connection
- can be used universally for any wheel detection and axle counting application and for any other application in which data needs to be safely exchanged between two systems.

With this new interface protocol – Frauscher Safe Ethernet FSE – up to 512 bytes can be safely transferred cyclically. Frauscher provides this protocol free of charge and can support its implementation with its expertise and knowledge. The partner receives all the necessary, detailed information and the specifications for applications, protocols and tests. A simulator and extracts from the source code will also be provided.

FSE has become the standard

In the meantime, clients from various countries are already using the FSE interface on various hardware platforms, in order to communicate with the new generation of axle counters, FAdC® und FAdC®i. More and more system integrators are holding discussions with Frauscher to coordinate the details or the implementation of the FSE protocol. If this trend continues, FSE will become a de facto standard in the field of wheel detection and axle counting.

The software specifications and further information on the FSE protocol can be downloaded free of charge from the website www.frauscher.com/FSE.
Successful implementation in Russia

Vyacheslav Sergeyevich Zamyatin, Deputy Head of the Process Control Systems of ASK Russia, comments on his experiences during the implementation of the FSE protocol:

“We installed the FAdC® axle counting system with the FSE software protocol for the first time in a coal terminal of the company OAO ‘Vostochny Port’. Data exchange through this software interface between the interlocking system based on Simatic S7-400 and the Frauscher axle counting system offers a range of advantages. For instance, as well as the basic information "clear/occupied" and "reset", data regarding the number of axles, the direction of travel and diagnostic information can also be transferred. A further advantage is the fact that no additional components are required for the relay interface. This reduces the investment costs and the time and effort spent on cabling.

We were able to implement the FSE protocol within two months and integrate it into the project on site. This shows how easy it is for system integrators to use the FSE protocol. Furthermore, we received excellent advice and the very best support from Frauscher.

Although this protocol has a simple design and can be integrated with ease, from our perspective, it is ideally suited for data exchange between interlocking and axle counting system. Frauscher’s FSE protocol is the ideal solution for system integrations without their own software protocol.”
The range of technical solutions for level crossing protection systems and their variations is extremely diverse. The reasons for this are mainly related to the regulations on design, safety and approval, which vary from country to country, as well as the differing standards and technical solutions of the providers, which are mostly local and regional entities. As an independent supplier of components, Frauscher Sensortechnik serves a number of these manufacturers and has therefore already realised an extremely wide range of different configuration variants.

The main component of a level crossing protection system is the train detection system. The information from outdoor equipment is used in the control logic of the level crossing protection system for the initiation of the warning and operational sequences. In automatic level crossings control systems the warning and closure/opening sequences are interrelated to the signalling system and are triggered by train movements. In the latter case, track circuit and track loop technology is still widespread, but is increasingly losing importance in this regard. These days, the focus is on wheel detection, which is often combined with axle counting technology for synergistic effects.

Configuration variants

The wide range of configuration options available for wheel detection and axle counting systems knows no bounds. For instance, the configuration can be realised based on detection points only, track sections, overlapping track sections, using a combination of detection points and track sections or implementing speed-dependent switching.

In this regard, it is advisable to contact the manufacturer of the level crossing protection system and outdoor equipment at an early stage, to discuss the possible scenarios. Here, Frauscher’s broad product portfolio in terms of wheel sensor types, evaluation platforms and interfaces offers the best conditions for customer-specific adaptation, simple integration and consideration of future requirements.
Wheel detection

The existing wheel detection systems RSR180 / RSR123, incorporating two independent sensor systems, are based on inductive processes and generate an analogue signal. The latter is proportional to the dampening effect of the wheel and is transmitted to the evaluation board EB as a direct current signal. The relevant evaluation board EB is responsible for evaluating these signals and generating the appropriate digital switching patterns available at the interface, in accordance with the customer application. The interface to the customer application can be provided via electronic switching contacts (optocouplers), relay contacts (voltage-free) or in software-based form (serial data protocol), as required.

ACS2000

The system architecture of the Frauscher axle counting system ACS2000 is very simply designed, with each counting head and each track section assigned to a fail-safe module. As the individual modules are pre-configured during manufacture, application-specific configuration takes place exclusively via the hardware (DIP-switches and/or soldering jumpers). Using open and universal interfaces such as optocouplers and relay outputs, the ACS2000 can be simply and reliably integrated into level crossing protection systems. Customer-specific requirements can be implemented in a very individual and flexible manner thanks to the large selection of pre-configured modules available.

FAdC®

The Frauscher Advanced Counter (FAdC®/FAdC®i) constitutes the latest generation of axle counting systems based on an Ethernet-based software interface (a relay interface is also available as an option). Thanks to this open communication structure, the FAdC®/FAdC®i can be integrated into level crossing protection systems very effectively, using only a small number of components. This system therefore offers a range of benefits with regard to functionality, required space and investment/operating costs. The connection can be established either by developing a customer-specific interface or via the Frauscher protocol (FSE).

Frauscher has already supplied detection systems for level crossing protection systems in more than 30 countries, together with 25 different partners.

For technical questions, please contact Martin Rosenberger, Head of Product Management: martin.rosenberger@frauscher.com

Can be configured in the following variants
A: with detection points
B: with track sections
C: with overlapping track sections
D: with detection point and track section
E: with speed-dependent switching

Wheel detection

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Successful second

Almost 150 participants from 29 countries seized the opportunity to gain first-hand information on current trends and compare notes with industry experts. The high level of interest shown and the extremely positive feedback demonstrate that the Wheel Detection Forum has become an international meeting point. The next WDF will take place in the autumn of 2015.

Trends in the field of wheel detection and axle counting

Wheel detection based on inductive sensors and axle counting technology define the state of the art for the most varied applications in signalling and control technology. All over the world, more and more operators are making use of this technology.

According to an estimate, around 350,000 wheel sensors are in operation around the world, and every year, a further 30,000 new wheel sensors are manufactured, a trend that is on the rise. Despite intensive efforts to push forward the introduction of ETCS Level 3, we cannot rely on the fact that within the next 15 to 20 years, track vacancy detection will be realised safely and cost-effectively without axle counting systems or track circuit technology.

Panel 1: Alternative technologies for inductive sensors

There is a range of promising and interesting alternative technologies, which are not yet available for track vacancy detection based on SIL4. It is not yet possible at the present time to say when, if ever, any alternative technology would be able to replace inductive sensors in the railway applications.

In any case, it is worth developing the technologies further, in order to optimise individual applications or to combine them with inductive sensors.

Panel 2: System decision – Track circuit versus axle counting

When deciding which technology is most suitable for train detection, there are many different aspects to analyse and consider. In
addition to the general technical and operating conditions, life cycle costs (LCC) and the evaluation of additional functionalities are the most important criteria in the decision-making process.

The investment costs of axle counting systems are comparable or slightly higher than those of track circuits. The difference varies somewhat, depending on the market region. As the operating costs of axle counting systems are considerably lower, the life cycle costs over a period of 25 years are 20-30 percent lower.

Best practice examples from various rail sectors, as well as technical visits to the Austrian Federal Railways (Österreichische Bundesbahnen, ÖBB) and to the Bahnorama observation tower completed the intensive programme of the Wheel Detection Forum.

First impressions on the 2013 Wheel Detection Forum

Antonio Casazza, Ansaldo STS S.p.A.:
“I could make a number of new contacts, good relationships and meet some interesting people. The presentations showed a high level of quality and I really can recommend this forum to all signalling engineers.

The whole event was perfectly organised and I congratulate Frauscher for this very successful forum.”

Annika Granlund, Bombardier Sweden:
“I appreciate Frauscher’s initiative to invite the whole business: customers, partners and competitors, to share experience and explore new technologies for track vacancy detection in order to increase the competence and competitiveness of the railway business.

In addition, a good organisation, interesting study visits to ÖBB and the new main railway station and last, but not least, tasty Austrian food, contributed to the success of the event.”

The evening event in the Technischen Museum Wien [Vienna Technical Museum] created the perfect atmosphere.

Conference documents can be ordered, for a nominal fee of €50, by emailing marketing@frauscher.com.
Foundation of the company in Brazil

In order to have a presence in Latin America too, a subsidiary has been founded in Brazil. This means that both existing and new clients can be served in the best possible manner, in their national languages, on site.

The new company has its registered office in São Carlos, in São Paulo, the business and technology hub of Brazil. Frauscher Brasil is responsible for the import, sales and after sales service in the 25 countries of Latin America.

Maicon Ferrari, Managing Director of Frauscher Brasil, comments on his new role: "In Brazil, our products are already successfully used in a number of projects. We are currently operating a test installation at ALL (América Latina Logística), one of the largest transport and logistics companies in the country. Initial feedback and test results are positive and promising. The latest generation of axle counters FAdC® and the wheel sensor RSR180 are being used for this project. At a later stage, data transfer by radio will also be tested with this installation. As the lengths of the tracks and distances are enormous in Latin American countries, this form of communication would be an additional advantage for operators."

Participation for the first time in the "Business on Rail" trade fair in November was a huge success. The exhibition stand was very busy on all three days. Frauscher was able to welcome many opinion leaders and decision makers at its stand. The international guests were impressed by the state-of-the-art technology in the field of wheel detection and axle counting, and by the wide range of possible applications.

References in Latin America:

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<tr>
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Gilmar De Souza (After Sales Service) and Maicon Ferrari at the "Business on Rail" trade fair in São Paulo

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Innovations at TRAKO

The TRAKO trade fair in Poland has been an important meeting point for the Polish railway industry for many years. Numerous visitors were very impressed by the newly developed products and innovative solutions.

FAdC® unveiled for the first time

Alongside the tried-and-tested, widely used axle counting system ASC2000, this time, the focus was on the latest generation of Frauscher axle counter, FAdC®. The advantages of the software interface and the simple scalability, as well as the high degree of flexibility of the FAdC®, attracted a great deal of interest.

"Thanks to the new design of the exhibition stand, we were able to showcase the wide product portfolio in a clear and lively manner. With this appearance, Frauscher Polska was able to emphasise, in a convincing manner, the company’s power of innovation and status as a technological leader in the fields of wheel detection and axle counting. The discussions and positive feedback from the many interested visitors also confirmed this*, states Janusz Mikolajczyk, Managing Director of Frauscher Polska.

ACS2000 integrated into the CBL2010 block system

Not only has Frauscher Polska earned a good reputation as a manufacturer of wheel sensors and axle counting systems, but it is also perceived as a valuable development partner. Frauscher once again gave proof of this with the integration of the ACS2000 into the new CBL2010 block system of the company Kontron East Europe. As part of this, the company was able to draw on the experience gained during the many projects carried out with PKP.

The CBL2010 system has already been granted unrestricted approval by the Polish authorities UTK. In the meantime, the first three projects with PKP have already been successfully commissioned. Initial feedback regarding functionality and cost-effectiveness is very positive.
In the middle of this year, Frauscher UK moved into its office in the Regus building in Frimley, Surrey. This new office has excellent road and rail connections and is only 30 minutes’ drive from Heathrow Airport. As well as state-of-the-art communication facilities for audio, video and web conferences, this building also has a business lounge, a café and several meeting rooms.

The successful market launch of FAdC® with Network Rail and the associated positive business development of Frauscher UK made it necessary to increase the workforce and move into a new office.

In March of this year, the first phase of the project, Cardiff Area Signalling Renewal (CASR), was successfully commissioned. Project director Conor Linnell, from Atkins, commented on the progress of the project: “The biggest challenge was posed by the very short timeframe for implementation. Innovative products, like the RSR123 wheel sensor with claw mounting and pluggable cable, and the FAdC® axle counting system, were decisive in ensuring that we could comply with the tight schedule. We required only 52 hours for the commissioning of 75 wheel sensors, for instance. Thanks to intensive and effective collaboration between Atkins, Frauscher and Network Rail, we were able to implement the first phase with success. The whole system is running in an extremely reliable manner.”

FAdC® successfully used by Network Rail

The first project with Network Rail was carried out by Frauscher jointly with Invensys Rail (Siemens), on the double track railway line between Crewe and Shrewsbury. This project was implemented in accordance with the “modular signalling” programme in a decentralised architecture. As the so-called object-controllers are connected via Ethernet with the Westrace M II interlocking, it stood to reason that the axle counting system should also be connected through Invensys’ own protocol (WNC). This meant that all of the advantages of FAdC® with regard to the use of the additional functionalities and cost savings, could be exploited in full.

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Frauscher UK is on course for success

Conor Linnell, Project Director for CASR

Andrew McCarthy and Managing Director Richard Colman
Axle counting system trends for metro networks

Communication Based Train Control Technology (CBTC) is being used more and more frequently as the automatic train control and train protection system for modernisation or extensions of metro lines.

CBTC systems must incorporate fall-back level in case of a failure.

Axle counting systems are used more and more frequently for this, as the advantages in terms of functionality and operating costs far outweigh those of track-circuit systems. The axle counting system is constantly on stand-by, and therefore provides a redundant and reliable fall-back level. In the event of a fault on the CBTC system, the axle counting system takes over the track vacancy detection, to ensure safe train control at all times.

Frauscher's modern axle counting systems can be integrated effectively in all interlocking systems available worldwide, either through a relay interface or through a software interface.

Frauscher is currently planning and delivering axle counting systems for metro projects in the following cities: Hamburg, Stockholm, Amsterdam, Hong Kong, Beijing, Chengdu, Chongqing, Tehran, Lima and São Paulo, among others.

New: Open product days at Frauscher

The range of applications and integration possibilities of wheel detection and axle counting systems, as well as Frauscher’s product portfolio, are becoming more and more extensive. This is why the company is now offering a new information service - Frauscher’s product days - to be launched in the coming year, in addition to the tried-and-tested product training sessions. During the product information sessions, delivered over two days, participants are introduced to the theory and working principles of inductive wheel sensors, and the set-up and functions of axle counting systems. In addition, they are given an overview of the applications for which this technology is suitable. As part of this, the advantages of individual wheel sensor types, axle counting systems and interface variants are explained and discussed.

The target groups for these product days are the employees of operators, system integrators, consultants, supervisory authorities and suppliers, who wish to be given an overview of Frauscher’s product portfolio in particular.

The dates for the events in 2014 that will be held in German are 10 and 11 April, and 16 and 17 October, with the events in English held on 24 and 25 April, and on 23 and 24 October.
Health All Round

The Frauscher Group sets particular store by the promotion of healthy living among its employees. As part of the company’s health promotion programme, “Rundum g’sund” (Health All Round), special activities and measures are being supported, both in the workplace and outside of it. Courses, health checks and talks, which are free most of the time, are offered all year round.

The in-house sport groups for football and volleyball, and the new Frauscher trial club are very popular.

The Group has invested in two top-quality electric trial motorcycles, it has set up a course in the company’s own ‘Hackschnitzelhalle’, and founded its own trial club. The trial course was officially opened on 6 November 2013 by the club’s chairman and founder of the company, Josef Frauscher. Frauscher’s trial club is all about safe race enjoyment, during which one can also gain experience for on-street riding. The electric trial bikes are charged up from the company’s own photovoltaic equipment, meaning that they are noiseless and environmentally friendly.

Frauscher’s football team took part in the Pilz football tournament.

Josef Frauscher. Frauscher’s trial club is all about safe race enjoyment, during which one can also gain experience for on-street riding. The electric trial bikes are charged up from the company’s own photovoltaic equipment, meaning that they are noiseless and environmentally friendly.

Dates
Frauscher product days
German: 10–11/4 and 16–17/10/2014
English: 24–25/4 and 23–24/10/2014
Please address any queries to Elke Gimplinger, T: +43 7711 2920-9284 or email: training@frauscher.com

Frauscher trade fair dates
First half of 2014
Rail Solutions Asia: 7–9/5/2014, Kuala Lumpur/MY