High availability
FAdC R2 with intelligent functions

RSR110
New wheel sensor with open interface

New innovation centre
Expansion of research and development activities
Frauscher axle counters are in use throughout the world – including in Spain. Further information: p. 19

**Innovation**

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Wheel Detection Forum 2015

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**MASTHEAD**

Owner and publisher:  
Frauscher Sensortechnik GmbH  
Gewerbestraße 1  
4774 St. Marienkirchen, Austria  
Tel.: +43 7711 2920-0  
F: +43 7711 2920-25  
E: office@frauscher.com  
Internet: www.frauscher.com  
Editorship: Christian Pucher  
Photos: Foto Bartl, Frauscher,  
Foto Resch, Pasch, istockphoto  
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Dear Reader,

2014 was an extremely successful year for Frauscher Sensortechnik. Centred around a successful appearance at the InnoTrans trade fair in Berlin, the company succeeded in attaining a range of milestones and initiating various projects. The delivery of the one hundred-thousandth wheel sensor was merely the beginning.

A particularly high value is placed on active research and development work within our company. More than 10% of turnover is invested in this area every year, enabling continuous growth of the portfolio. The extremely positive feedback on the product innovations showcased at InnoTrans and the high-quality customer discussions confirmed that Frauscher is on the right path.

In order to enable the company to continue driving forward market-focused developments and intensifying its key areas of research in the future, its own Frauscher Innovation Centre will be established at the headquarters in Austria by the mid-point of 2016. In this edition, we offer an insight into the complex, multi-layered structures of the Frauscher Research & Development Department. Furthermore, the topic of high availability is presented in detail. This is one of the topics that this department focuses on particularly – alongside the associated solutions.

This year, our research team is receiving support from new employees, as well as from our branch in India since November 2014. The newly opened Mysore production facility is in constant contact with its own development department based in Bangalore. Here, working in close collaboration with the Austrian experts, tried-and-tested Frauscher products are developed further in line with country-specific criteria. This is a concept that is also being pursued in numerous other projects worldwide. Local partners and branches enable global thinking coupled with local actions. In line with this motto, Frauscher now also numbers North America, Malaysia and Algeria among the markets where we have a local presence.

Michael Thiel
In 2014, for the sixth time, Frauscher showcased its latest products at the InnoTrans trade fair in Berlin. The innovative axle counting system FAdC R2, the FSE protocol developed for software implementation and the new wheel sensor RSR110 drew the interest of the international visitors.

"For multiple reasons, InnoTrans 2014 was a great success for us. On the one hand, I am very happy with the high level of customer discussions and pleased with the large proportion of international visitors. The growing global interest in innovative railway technology, and particularly in our technologies, is tangible. On the other hand, we presented our products and new additions to the range in an innovative manner that gave rise to a great deal of positive feedback", says Michael Thiel, CEO of Frauscher Sensortechnik, looking back on the trade fair.

FAdC R2
The presentation of the FAdC R2 was especially well received. In particular, the possibilities of increasing availability by means of individual redundancy concepts and the application of intelligent functions, such as the "Supervisor Track Section" or the "Counting Head Control", were explained in detail in numerous discussions. Further information on the topic of high availability can be found on pages 6-7 of this Ultimate Rail edition.

FSE
The "Frauscher Safe Ethernet" protocol, developed for implementation of a software interface to the interlocking, was available for testing using an on-site simulator. Here, interested visitors could gain an impression of the added value that the FSE generates for customers when Frauscher axle counting systems are directly integrated in the interlocking.

RSR110
The new wheel sensor RSR110 was met with a great deal of attention. The highly-resistant sensor is easy to integrate into the electronics of individually structured systems, due to its open analogue interface. The model is available without an evaluation board and
therefore leaves all the options for further processing of the signal generated open. Read more on pages 8-9.

Multimedia presentations

Both new and tried-and-tested applications of the Frauscher axle counting and wheel detection systems were displayed on a multi-touch table that could be operated by the visitors themselves. A specially-programmed interactive app showed innovative solutions based on practical examples, within the framework of a separate virtual world. In addition, this app could be used on a range of touchscreen devices and tablets.

Animations and films in a modern style showed the Frauscher wheel sensors – and the newly-showcased RSR110 – in various situations. Accordingly, the precise method of operation and the diverse application possibilities were presented in a striking manner.

Frauscher stand party

After the trade fair closed, the Frauscher stand party provided an opportunity for relaxed discussion. Around 200 visitors rounded off the first day of the trade fair with stylish music and culinary delicacies at the Frauscher stand.

Survey & competition

Directly after InnoTrans 2014, Frauscher asked its trade fair visitors for their personal opinion on the company’s appearance in Berlin – with an iPad mini as a prize for one lucky participant.

Ms. Motoko Homma from Nippon Signal Japan is the winner of the tablet – many congratulations!
High availability is a term that is becoming increasingly significant in signalling. The complexity of this topic acts as the starting point for numerous discussions in research and development circles, as Franz Pointner, RAMS Management Director at Frauscher, knows well.

In discussion, he outlines possible definitions of availability and high availability and describes various possible solutions that reconcile the aspects of increased safety and cost-effectiveness.

How exactly are the terms “availability” and “high availability” defined and what do they mean?

The degree of availability quantifies the probability that a system, in the event of an error or problem occurring, will not fail, but instead can continue to be used without direct human intervention. Accordingly, high availability refers to the capacity of the system to ensure unrestricted operation if a component fails. In this respect, various institutes specify criteria for classification in different availability classes.

In the rail sector, it is fundamentally a matter of ensuring that operation is as smooth as possible, in order to avoid delays and be able to comply with timetables. In addition, there must be a guarantee that a system will continue to function without noticeable restrictions on rail traffic in the event of faults occurring.
Based on these points, when is it worthwhile to design and use highly-available systems?

Firstly, I would like to stress that signalling systems developed in accordance with CENELEC standards can be classed as highly available as a matter of principle. However, sometimes there is still a need for greater protection, and therefore increased availability, for example where particularly sensitive track sections are concerned. These may be tunnel systems, bridge sections that are difficult to access or level crossings. In such cases, it is a matter of considering how the availability of the system can be increased further with the greatest possible level of cost effectiveness. In order to achieve this, various redundancy strategies are available and linked to a range of cost structures.

Must a system always have a fully redundant design to attain high availability?

It is not vital – the increase in availability through redundancy can be attained through both complete duplication of the complete system and partial duplication of specific components. However, a redundant design is always linked to significant additional costs, particularly in the area of outdoor equipment. From practical experience, we know that a large number of faults are caused in outdoor equipment – and in turn by external factors such as lightning strike, traction, mechanical influences or simply wheels with dimensions differing from the standard. This is a particular area where intelligent, fault-tolerant functions can guarantee smooth operation even in the event of a fault, without noteworthy additional costs.

Do the functions that allow an increase in fault tolerance make it possible to ensure the same level of availability as is reached by implementing various redundancy strategies?

In the majority of cases, almost the same effect can be achieved by using fault-tolerant functions. The basis for successfully raising availability by increasing fault tolerance is ongoing maintenance of the system, the vehicles and the complete track layout.
RSR110: Highly-available wheel sensor with open interface for maximum flexibility

Increasing interest in high-quality wheel sensors with an open interface was the impetus behind the development of the new RSR110. With this development, Frauscher is breaking new ground in its product strategy: in future, the company will offer this high-quality sensor with an open analogue interface alongside the established wheel detection systems. The feedback on the presentation of the product during InnoTrans 2014 and the numerous enquiries are already confirming that this was the right decision.

Highly available
The new wheel sensor RSR110 was developed based on the operating principles and hardware platform of the proven RSR123. As a result, the high availability of the sensor can be guaranteed, including with individual integration in specific system electronics structures.

Even with extreme mechanical, electromagnetic or climatic interference, the combination of different inductive operational principles and the robust design ensure optimum availability.

Simple integration by means of an open interface
Various projects frequently present special requirements that can only be met by designing individual solutions. The wheel sensor RSR110 was developed to simplify the realisation of corresponding applications.

It is supplied without an evaluation board, and its open analogue interface enables easy implementation into the customer’s specifically-developed system electronics. Furthermore, this guarantees significant savings in terms of the hardware and space required.
e wheel sensor with open flexibility

Flexible evaluation
The information generated during traversing is made available by the RSR110 in the form of load-independent current signals. The analogue signal curve can be interpreted in a completely flexible manner, exactly in line with the individual definition and in accordance with specific requirements.

The damping-dependent current signal can be evaluated via a PLC or a microcontroller, for example. Frauscher provides its customers with fundamental specifications and documentation for this purpose.

The numerous evaluation possibilities make it possible to realise fully customised applications.

The RSR110 provides information in the form of load-independent current values. This enables the detection of an axle, direction, speed, axle count, wheel centre and wheel diameter to be interpreted from the analogue signal curve.

Would you like to learn more? Then request a folder and further information today: marketing@frauscher.com

Major applications
In addition to the installation of systems to detect flat spots and hot boxes, the creation of vehicle detection systems and execution of special switching and measurement tasks are possible, by way of example.
Expansion of the Research

With its own Research and Development Department, ongoing research projects and focus on different key areas of research, Frauscher stands for constant innovation in the signalling field. For more than 25 years, the international research team and the associated efforts within the company have grown continuously.

At Frauscher, more than 10% of turnover is invested in research and development every year. 100,000 sensors in use throughout the world, and various test systems, continuously supply new findings to the company's headquarters in Upper Austria. Based on this feedback, market-specific and customer-specific requirements and current research results, Frauscher components and products are constantly being developed further. While region-specific solutions are drawn up with international partners, completely new products are created in various research projects, including products for which the method of operation lies outside inductive sensor technology.

Stable process frameworks provide room for flexibility

An interactive development process specifies certain framework points and guarantees a high level of quality internationally, both for further developments and in the area of completely new products. Consolidating the inputs collected into a concrete requirement specification constitutes the start of this process, which has four phases:

- Research & analysis
- Design & development
- Test & validation
- Application & further development.

While the individual steps can be linked together and repeated as necessary, RAMS management (for reliability, availability, maintenance and safety), the creation of test equipment and documentation run parallel to the development process.
Above-average level of practical relevance

Modern technical test equipment is used in Frauscher laboratories, particularly in the test and validation phase. For example, fundamental mechanical tests, such as shock tests, are carried out on site using an air hammer. Frauscher’s own EMC test laboratory ensures extensive tests in the field of electronic interference. The company’s own climatic chambers are used to test the reaction of the material and the functionality when subjected to different environmental influences. What is more, stations that can be adapted to the individual task allow the simulation of specific influences such as those of rail current or overhead line short-circuits.

Field tests on the track

Long-term tests are carried out at Frauscher’s own test section in Upper Austria. Test installations on an Austrian Federal Railways (ÖBB) track section provide information on the true properties of the products when used in the field. This option also guarantees that long-term test set-ups can be implemented, for example in order to obtain certain certifications for new products.

At Frauscher, the Research and Development Department has been a key area since the company was established. As well as continuing to increase the number of personnel in the department, there are now plans to create a Frauscher Innovation Centre to act as the international hub for signalling knowledge and experience.
Frauscher 2014: Review

Christian Pucher, Editor in Chief of Ultimate Rail, met Michael Thiel, CEO of Frauscher Sensortechnik GmbH, for an interview to discuss the 2014 financial year. The focus was on the milestones that have already been achieved, as well as the company’s ambitious goals for 2015 and the following years.

“Mr Thiel, 2014 is drawing to a close. How was the financial year from the company’s point of view? 2014 was a noteworthy financial year for many reasons. It was exceptionally successful and therefore followed on seamlessly from the growth of the previous years and indeed decades. We succeeded in increasing incoming orders significantly compared to 2013, taking them to 48 million euros. This was possible due to both larger orders, for example in Spain and Kazakhstan, and rising order volumes in Asia and Europe, particularly in the United Kingdom. Turnover was also increased by a further 10% over the very good figure achieved in 2013.

What were the most important events and activities?
As far as products were concerned, the completion of development on the FAdC R2 and the RSR110 constituted decisive milestones in our strategy. Both products were presented to the specialist public for the first time at the InnoTrans trade fair in Berlin [see pages 4 and 5, ed.]. They are targeted especially at our strategic customers, as well as our markets of the future in Asia and America.

“We succeeded in reducing our standard delivery times still further, while increasing production”
Within the framework of our global business development, the establishment of new Frauscher Group companies in India and Brazil was an important step. In addition, we were able to further strengthen our international presence in North America, Malaysia and Algeria.

From your point of view, what are the main reasons behind Frauscher’s continuous positive development?
A common response to this type of question is to make reference to outstanding employees – and in our case this factor does indeed play a key role!

For some years now, Frauscher Sensortechnik has been enjoying an accelerated process of growth and internationalisation. Ensuring that this process is largely stress-free and successful, while simultaneously increasing innovative strength and financial capacity, is only possible with extremely well-trained and highly-motivated employees, who above all are involved in creation of the process. What is more, our ownership structure constitutes an important building block in our success.

As you mention the ownership structure: a series of acquisitions and mergers are taking place worldwide in the field of railway technology. Was or is the sale of Frauscher a topic?
We are aware that there are rumours along these lines. However, as the owner of the Frauscher Group, the Frauscher private foundation has the clear objective of continuing to develop the innovative strength, growth and profitability of the companies united within the Group, and a sale can therefore categorically be ruled out. A sale would also call into question the business model of Frauscher Sensortechnik as an independent and exceptionally innovative manufacturer of systems and components. Consequently, I can assure you that no discussions of this type will be conducted with any of the many interested parties, either at present or in the foreseeable future.

"We will double our production capacity to more than 30,000 items."

On the contrary, next year we will be using our own funds to invest approximately 8 million euros into the expanding our R&D resources and our production capacities at the Austrian site. Our own new three-storey building is planned, which will house all the areas of the company focusing on innovation. There we will create an extensive new laboratory and other modern workplaces for development, product management and the RAMS department.

In addition, with the planned expansion of the sensor production facility, we will double the production capacity for wheel sensors to over 30,000 items.

This further sustainable investment is a clear message of our shareholders' commitment to our company and to the Austrian site, as well as showing they are certain that there will be long-term, successful development of the business in the area of railway technology.

In the near future, what will Frauscher Sensortechnik be focusing on in particular? There are various areas of focus for 2015 and the following years. In the short term, for example, we wish to further
Frauscher 2014: Review of the year
(Continued from page 12)

reinforce our market position in India by commencing serial production in Mysore and expanding our local technical resources. Here we will also be working towards RDSO approval for a range of other systems, including the axle counter FAfC.

In 2014, the foundations were laid for a very successful entry into the market in Brazil. All the major rail operators there were won over by the reliability and easy handling of our systems. Now it is a matter of successfully implementing the forthcoming project challenges for our customers.

Following the launch of our initial activities in North America, we are certain that we will also be able to offer the right solutions for this market in the fields of wheel detection and train detection. We will continue to expand our presence and the support network in North America by passing on our technical knowledge and experience.

With regard to products, what areas will Frauscher be focusing on in the coming years?

After increasingly specialising in the area of wheel detection and axle counting in recent years, we will continue striving to strengthen our position in this field as the market leader and leader in terms of technology. Alongside further development of inductive sensors and the expansion of the family of systems and tools for the axle counting systems that are exceptionally easy to integrate, we also want to investigate other technologies in detail.

For some time now, we have been looking at various possible solutions in the area of glass fibre sensors. However, as yet we have not been convinced by the safety and reliability of any concept, and none has even come close to attaining the level of inductive sensors. We must expect this to be a long process – and it is not yet clear whether it will ultimately be successful.

However, we will also be concerned with supporting technologies such as modern transmission technology, energy-saving architectures and particularly integrated and compact solutions. Here the interfaces to our customers’ systems play a special role. We will continue our work to set new standards in this area.

How do you see the market and the competition developing in the next few years?

The railway technology market, and especially the signalling field, are stable and are seeing constant development. Nonetheless, we are following the consolidation that is taking place on the rail technology market very closely. We have also already been indirectly affected by this in our existing strategic partnerships. Ultimately, however, we are part of a market that is experiencing fundamental international growth. Companies with the right ideas, above-average customer focus and constant innovation certainly have very good prospects.

Nevertheless, the development of signalling products and the opening up of new international markets in the field of railway technology both require a very long-term strategy. This means staying power and the necessary economic capacity. We believe that we are in a very strong position in this regard, with excellent support from both the foundation model and the investments planned for 2015.
Frauscher Innovation Centre

At its site in St. Marienkirchen, the Frauscher Group is investing 8 million euros into expanding its sensor production facility and constructing a new company building: the Frauscher Innovation Centre. On 17 December 2014, the groundbreaking ceremony took place in the presence of representatives from politics and the press, marking the official start of construction for the modern building.

The Frauscher Innovation Centre will be completed in the first six months of 2016

As a result, securing the company’s leading position in the global market and successfully implementing the internationalisation strategy calls for construction of our own research and development building and for expansion of the sensor production facility, which will double production capacity.

Research and Development

Michael Thiel, CEO of Frauscher Sensortechnik GmbH, emphasises this approach: "Long-term success is based on unique selling points and innovations in the product portfolio. Both are fundamentally dependent on in-depth, efficient and targeted research and development."

The Frauscher Innovation Centre will become an international hub for all research and development activities. Within the departments housed in the centre, inputs from global markets will be drawn together, evaluated and incorporated into a structured development process. So as to be able to carry out research and development at the highest level, the latest laboratories and test rigs will be set up in the new building.

Technology leader from Austria

The construction project marks an important milestone in securing the company’s position as an international technology leader within the signalling field. Frauscher products are in use in more than 70 countries. For the Austrian company, being active globally means, above all, offering individual solutions with flexible products, as different regions present different requirements. Entry into new markets frequently necessitates new developments and product adaptations so as to satisfy the local basic conditions. This forms the basis for approval in certain countries.
Frauscher India strength

Just one year after establishment of the branch in India, Frauscher was able to further reinforce its market position in Asia. Particular milestones were obtaining the RDSDO approval and the opening of our own production facility in Mysore.

ACS2000 receives RDSDO approval
The approval of the axle counting system ACS2000 in accordance with RDSDO guidelines was preceded by tests of the system's reliability and function in various test installations under conditions specific to the Indian market.

CEO Michael Thiel underlines the positive entrance to the Far Eastern market: "Following various installations in the Mumbai area, Frauscher India will now be expanding its activities to the entire Indian railway network. Based on the experience it has gathered, the highly-motivated on-site team will soon be showcasing further market-specific innovations in cooperation with experts from Austria. Combined with the new production capacities, this Frauscher India has thereby become an important part of our growth strategy in Asia as a whole."

Production facility in Mysore opened with traditional celebrations
The Mysore plant was opened on schedule on 6 November 2014. As with the opening of the Bangalore branch in 2013, the Frauscher team on site organised a stylish programme of events to mark the occasion. 150 guests from the Indian railway sector, including high-ranking representatives such as Arun Saxena, Advisor, Signal (Railway Board) and M. Elavarasan, CSTE, South Western Railway, displayed great interest in the new production facility. After the ceremonial opening and a tour of the building, the evening was rounded off in appropriate fashion with a display of traditional dance and a dinner together.

The production facility is also used as a research laboratory where work is carried out to optimise proven Frauscher products in line with specific requirements of the Indian market.
Frauscher India strengthens its position in Asia

rail structure. In his opening speech, Alok Sinha, Managing Director of Frauscher Sensor Technology India Private Ltd., emphasised the successful transfer of essential knowledge and experience between the Austrian headquarters and the new production facility in India: "In order to maintain Frauscher’s high quality standards in the international environment, we have integrated production processes from the company’s headquarters into the Mysore plant. Moreover, the test equipment used corresponds exactly to the equipment used in Austria."

In this way, Frauscher once again underlines the high value accorded to quality and proximity to the customer within the company’s philosophy. As a fixed site, the branch in India can now provide a full service that meets the specific market requirements. Based on the knowledge, experience and quality standards of the Austrian headquarters, project planning, production and support for large projects throughout Asia can now be carried out directly from Bangalore and Mysore!

ISO certification 9001:2008
A further step in the branch's development was obtaining ISO 9001:2008 certification. This standard sets out specific basic conditions for an effective quality management programme in companies with their own production facilities. Important key components include customer satisfaction and the introduction of processes to continually improve this.

The guests received a warm welcome in the festively decorated entrance area

Official opening of the production facility in Mysore

Frauscher axle counting systems in India

Our own test rigs guarantee the very highest quality

The products met with great interest in the Indian market
Frauscher International:
Green light in North America, Malaysia and Algeria

Quick response times and the specialist knowledge and language skills of employees from the region characterise the service of Frauscher Sensortechnik GmbH. As a global player, it is particularly important for Frauscher to be represented locally as a reliable contact partner in various markets. Many branches and sales partners throughout the world underline the philosophy of "think globally, act locally". Since 2014, Frauscher is also represented in North America, Malaysia and Algeria.

Frauscher USA / North America
Since autumn 2014, Vivek Caroli has held the position of Business Development Director for Frauscher in North America. With extensive knowledge of market-specific requirements, he deals with enquiries from the USA, Mexico and Canada.

"In the fields of axle counting and wheel detection, Frauscher products constitute the state of the art. Against the background of international thinking, a high level of dynamism and customer-oriented innovations are reflected in the product developments. Both the products and the service are optimally tailored to the relevant customer requirements and Frauscher is able to offer flexible solutions for market-specific requirements. I am certain that the highly-available systems from Frauscher will set new benchmarks in North America’s rail industry."

Vivek Caroli
Suite 2000
Koppers Building
436 Seventh Avenue
PA 15219 Pittsburgh
United States
vivek.caroli@us.frauscher.com

Frauscher Algeria
Through a cooperation with AMPHI-Electronics in Algiers, Frauscher is strengthening its position in North America and gaining another sales partner, this time a French-speaking one. A showroom is being constructed on the premises of the partner company so that equipment can be presented and explained on site and potential customers can discuss specific requirements with trained members of staff.

AMPHI-Electronics Algiers
Cité Aissat IDIR Bat. 5 - N ° 3
Dar El Beida
16000 Algiers
Algeria
amphi.abdelaziz@yahoo.fr

Frauscher Malaysia
Frauscher is reinforcing its sales and service activities in South East Asia and opening a sales office in Kuala Lumpur. Mr Martin Soosay Raj has many years of experience in the rail business and in the field of signalling.

"For more than 12 years now, Frauscher axle counting systems have been operating very successfully in Malaysia, for example on the high-speed section of the Express Rail Link between Kuala Lumpur International Airport (KLIA) and the Kuala Lumpur City Air Terminal. At present, a test system is being installed and monitored at KTMB. The latest generation of axle counters, the FAdC R2, is being used here. This system will show that the functions to increase availability operate in an optimal manner even when subjected to extremely difficult environmental conditions such as floods or lightning strikes."

Martin Soosay Raj
Tel.: +60123138926
martin.soosayraj@my.frauscher.com

Frauscher USA
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Vivek Caroli
Suite 2000
Koppers Building
436 Seventh Avenue
PA 15219 Pittsburgh
United States
vivek.caroli@us.frauscher.com
Frauscher project news

The implementation of two projects in Spain met with particular challenges even at the planning stage. Thanks to the high degree of flexibility in Frauscher projects, it was possible to win over system integrators and operators with individual solutions.

Tarragona – Castellbisbal

The aim was to equip the three-rail track layout covering this section with modern axle counters for train detection. When implementing the project, Siemens and Bombardier chose to use the FaC, as this provides fail-safe solutions for all project requirements, thanks to its flexible software configuration. This configuration enables the clear/occupied indication to be assigned to the relevant track section, the usual application of reset logic, and much more. More than 900 wheel sensors RSR123 were installed in the outdoor equipment.

Valladolid – León and Venta de Baños – Burgos

The sections between Valladolid and León and between Venta de Baños and Burgos constitute part of the ongoing expansion of Spain’s high-speed rail network. Alstom and Bombardier are fitting the stretches with signalling systems. Here Frauscher is providing the train detection technology. A combination of ACS2000, IMC boards and wheel sensors RSR123 satisfies all the requirements of the relevant standards in line with ERTMS Level 2. The necessary approvals have been confirmed by the operator ADIF.

Extract from the current Frauscher projects worldwide
Save the date: Wheel Detection Forum 2015

The third Wheel Detection Forum will be taking place in Vienna from 30 September to 2 October 2015. The high-quality event is clearly establishing itself as a regular meeting place for experts and decision-makers in the signalling field.

A combination of lectures and podium discussions on current topics, combined with exclusive side events, forms the basis of a platform to exchange news, transfer knowledge and experience and maintain existing relationships, as well as making new contacts.

Frauscher Product Days 2015

In the coming year, Frauscher will once again be providing an opportunity, on a total of eight days, to obtain an overview of the company’s extensive portfolio of products and services. During the two days of the event, information on tried-and-tested components, innovative systems, practical tools and the services included will be provided in both German and English.

Dates:
DE 09.-10.04.2015 EN 16.-17.04.2015
08.-09.10.2015 22.-23.10.2015

To register, or if you have any questions, please contact Alois Ortner, tel.: +43 7711 2920-9297 or via email: training@frauscher.com

Trade fairs & conferences in 2015

In 2015, Frauscher Sensortechnik GmbH will be represented at a range of international trade fairs and conferences.

We look forward to welcoming you to our trade fair stand!

10.03.-11.03.2015
MetroRail & LightRail 2015, London (UK)

28.03.-31.03.2015
ASLRRA Connections 2015, Orlando (USA)

22.04.-24.04.2015
Rail Solutions Asia, Kuala Lumpur (MY)

12.05.-14.05.2015
Railtex 2015, Birmingham (UK)