THALES

COUNTINGWORLD

The Customer Magazine for Axle Counter Systems

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FIBRE OPTIC WHEEL SENSORS

SHIFTING SPECTRUM – REVOLUTIONIZING COST

THALES EYE

ASSISTANCE FROM A DISTANCE

AXLE COUNTERS ON DOUBLE GAUGE TRACKS

RESOLVING A TRAIN DETECTION NIGHTMARE

Dear Reader,

GO GREEN – WHERE INNOVATION MEETS NECESSITY

In recent years, the design of signalling products and systems has increasingly been driven by requirements and directives to protect the environment and save natural resources. The European directive for the Restriction of Hazardous Substances is applied in the selection of components, materials and the production processes in manufacturing facilities to reduce and eliminate the use of dangerous substances such as lead, mercury or cadmium. But it is about more than compliance with directives and the expression of a willingness to improve the 'carbon footprint' of a company's undertakings. More and more railway infrastructure operators are encouraging their suppliers to reduce the carbon footprint of their engineering and production facilities as well as the energy consumption of their equipment.

Thales already has an impressive record of implemented environmental initiatives.

The newly constructed German Thales headquarters in Ditzingen, home to 1,800 employees, has been awarded the LEED GOLD certification for environmental protection and sustainability. In Railway Signalling, the Energy Saving Train Driving, or the use of low-power LED signal lights have already been part of the Thales product portfolio for many years. Redundant and highly available system concepts enable reduced and effectively planned preventive and corrective maintenance, reducing site presence and travel time for maintenance personnel.

But it is the latest innovations from Thales that will make its signalling solutions not only more efficient, but even 'greener':

Fibre optic axle counter sensors will lead to a massive reduction in copper due to the usage of simple fibre cable. The virtually unlimited transmission length through optical fibre will also eliminate line side electronics and therefore drastically reduce power consumption. ***Thales new Axle Counter System AzLE*** is designed for use in outdoor trackside cabinets, avoiding the waste of energy for the forced cooling of electronics.

Online support tools, such as ***myProducts***, provide precise information fast and in real time, if and when required. Such innovative tools make the use of large paper printed manuals a thing of the past. Even where quality and safety assurance processes require measuring and testing results to be properly documented, this is being replaced by effective mobile tools.

Save a tree - use your phone!

Thales AdjustIT Android App captures field measuring data automatically during commissioning and maintenance and provides the respective testing template immediately by e-mail or SMS to maintain a proper and easily accessible digital record - **paper-free!** And even more innovative initiatives are on their way.

Read the latest technology updates as a member of the exclusive Counting World of Thales.

Amaury Jourdan
Chief Technical Officer
GBU Ground Transportation Systems

An impressive new showcase for the Group's solutions in Germany

FOLLOWING THE CONSTRUCTION OF THE NEW HEADQUARTERS BUILDING IN DITZINGEN, THE FACILITY NOW ALSO INCLUDES A NEW 'INNOVATION CENTRE', DEDICATED TO THE PROMOTION OF THE GROUP'S CAPABILITIES.

The innovation centre in Ditzingen is open for clients and decision makers, political and media stakeholders, as well as partners and suppliers, including in the recruitment domain.

The new concept integrates several single showrooms into one impressive innovation centre, offering more than a simple showroom for Thales products. Invited guests will experience Thales as a global brand and a highly innovative provider in the various fields covering Mobility, Security and Defence. With targeted visitor groups having very different levels of expertise, the presentations focus on clear visualization with the hardware remaining in the background.

The showrooms include specific areas for space, cyber, control centres, air traffic management and signalling.

The centrepiece is a modern train station with array elements, such as axle counters and balises. A walkable railcar cabin includes an ETCS simulator and TrackView, a solution which enables train drivers to see in the dark. Visitors more interested in the defence sector can learn about maritime solutions, optronics, radio communication, ground surface radar and C4ISTAR (digital communication networks) in a separate room.

The Expert's View with Thales Eye

VIRTUAL PRESENCE AND REAL-TIME SUPPORT

Expert support for maintenance personnel

'Thales Eye', the innovative solution based on augmented reality glasses to provide quick and efficient expertise and remote support for field maintenance personnel.

The failure of a single railway component within the complex infrastructure of a railway system can shut down large parts of the whole system. In practice, involved suppliers often have difficulties understanding technical problems on-site in order to support their customers, due to a lack of site visibility. This means railway network operators have to send experts on-site, leading to very slow reaction times. Additionally, maintenance personnel usually have to manage several different products from different suppliers, which makes the product knowledge complicated to manage.

Considering the fact that railway equipment is usually very reliable, failure is very rare, but when it happens the impact on the availability and train schedule can be dramatic. Additionally, when maintainers are in any doubt about how to handle the product in the field they usually do not touch the equipment, so as to avoid causing any additional failures which will increase the complexity of the failure and therefore impact the downtime.

Thales Eye helps to understand and solve problems better and faster

Thales Eye is a remote support solution using augmented reality; its glasses are connected to the network in order to stream live video and audio from the field and display the actual situation to the support services desk.

The support can be provided via voice and video as well as by augmented reality, where the support desk expert can guide the maintainer during troubleshooting by mapping images, objects, texts and live procedures to the real product to be maintained. This is then displayed directly on the glasses used by the person handling the equipment, in order to be very precise in terms of what needs to be done to solve technical issues in the field.

The maintainer's glasses are connected to a 3G/4G network with 400Kbs in order to have full functionality by streaming the video and guidance using the augmented reality features. However, if the necessary bandwidth is not available, it is still possible to use Thales Eye with lower functionalities, such as sharing pictures with notes in order to keep the maintainer connected to his expert.

On-site maintainer supported by remote expert

What about safety of workers?

Thales Eye was designed taking into account the impact in terms of the safety of the workers. Using see-through glasses is one of the basic solutions to avoid the maintainer being distracted by too much information and losing visibility and awareness of the real world.

The see-through glasses help to keep the maintainer connected and aware of what is happening within the environment by just displaying the necessary information directly concerning the product to be maintained. Therefore the maintainer is focussed on the product and not on what is shown on the display, such as might happen if using a simple smartphone or tablet device.

Wear it and be guided

The other safety aspect taken into account is that the maintainer doesn't have to operate anything within the device; he just needs to wear the glasses in order to be guided by the remote expert and is still able to use both his hands. What is displayed and deleted from the glasses is entirely remotely controlled by the expert.

What are the customer benefits?

Thales Eye is a generic solution that can be used to provide efficient support for any kind of product. It is a source of real expertise, instantly providing a virtual expert presence to the maintainer in the field.

Advantages and impacts:

- Reduced downtime due to efficient failure analysis and troubleshooting
- Clear picture of the problem, no language barrier
- Hands-free
- Implementation possible with existing installations
- Continuous refresher training during operation
- Confident feeling from customer side
- Reduced environmental impact and costs (travel, time)

The first true outdoor electronic free Axle Counter

The new generation of optical fibre-based axle counter

For the past 50 years, axle counter technology has been based on electromagnetic sensors fixed to the rail in order to detect and count approaching wheels and evaluate the presence of a train in a certain track section.

Availability is an important aspect in the railway environment, but time to install, time to repair and life-cycle costs are increasingly becoming key aspects in railway systems. Therefore, jointly with fos4X, Thales is developing an innovative product based on a technology that provides better capabilities than classical sensors and will lead to simplification in the deployment, handling and maintenance of the system.

No more maintenance on the track, no more copper cable

The new axle counter system is based on fibre bragg grating technology, which uses a fibre optic sensor to detect deformation of the rail caused by the weight of the passing train. The resulting change in the reflected light wavelength is measured and used to count the wheels. There is no requirement to use copper wire for connecting the rail sensor to the indoor train detection systems, as the link is implemented fully via fibre optical connection. Avoiding the use of copper cable means avoidance of copper cable theft, which costs the railway industry millions of euros a year.

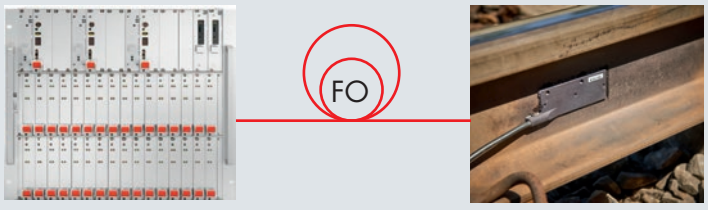
Real electronic free axle counter

The outdoor equipment is the first true outdoor electronic free axle counter system (no electronics in the sensor and no outdoor electronic unit). This has the advantage that there are no critical components which can lead to a failure, thus obviating the need to send maintenance personnel to adjust an electronic sensor on the track and avoiding disruption to rail traffic.

The other key improvement over current technology is a reduction in life-cycle cost. This is achieved by adding the capability to perform track maintenance (e.g. tamping, grinding) without removing the sensors from the rail. The axle counter equipment can therefore return to operation immediately, following completion of track maintenance.

Compatibility between rolling stock and train detection

With this new technology we will never have to worry about compatibility between rolling stock and train detection systems. The solution is completely free of EMI, as it works by measuring mechanical influences caused by the rolling stock. In order to learn and process the maximum amount of data, the new sensor technology has been tested in 5 different locations with the support of DB, SBB, CFL and SSB. The results following a year of site testing are extremely impressive. The rate of wheel detection has been shown to be close to perfection, proving that the technology is suitable for SIL4 train detection, and this technology will be soon be available within the Thales portfolio.



Outdoor equipment: Neither electronic components nor copper cable

fos4X

Fos4X is an innovative and fast-growing Industry 4.0 company with wind energy as its core market. The highly motivated team and dynamic corporate culture provide the space for innovation and have led to a steady doubling in annual sales. Fos4X develops solutions for monitoring and control of wind turbines based on proprietary fibre optic sensing technology. Advantages of fibre optic sensors include immunity against electromagnetic interference, long distances between sensor and controller as well as intrinsic insulation from high voltages or lightning strikes. This also makes the technology interesting for applications in the railway sector.

Success Story

Baku: A city on the rise

The country of Azerbaijan, with its capital Baku, has experienced strong economic growth over the last decade and is additionally expected to experience significant population growth in the coming years.

With over two million inhabitants, Baku itself is the biggest city in Azerbaijan as well as in the whole Caucasus region. Officially, about 25 percent of all inhabitants of the country live in Baku's metropolitan area. The city, located on the Caspian Sea coast, is the country's economic and cultural hub and an important traffic junction where several major oil pipelines cross.

Metro Baku: Ambitious plans for the future

To cope with the expected growth in population in the coming years, an urban development plan for a large-scale metro system was launched by the presidency of Azerbaijan.

The Baku Metro is the only metro built in Azerbaijan so far. It is known for its exquisite decorations, a mixture of traditional Azerbaijani national motifs with Soviet ideology, following the Moscow metro example. Although its construction was authorised in 1932, the works began 15 years later in 1947 by Soviet decree. The current network has been gradually commissioned since 1967.

The Baku Metro carried 215.5 million passengers in 2014, representing an average daily ridership of approximately 590,500 passengers. The stations have platforms of 105 m length which allow the use of 5-car trains (full sets in service since 1985). The fleet was considerably upgraded starting in 2000, and now consists of Soviet/Russian 81-717/714- and 81-760/761-family cars from Metrovagonmash.

The track gauge is 1,520 mm, the power supply is via a third rail (825 V DC). Trains run at 2-minute intervals during peak hours and from 5-minute to 15-minute intervals during the rest of the time.

The expansion plan for the Baku Metro proposes an increase to the length of the actual network from 34.5 km and 23 stations to 119 km and 76 stations. The number of lines is to be extended from 2 to 5, including a circle line. In order to maximise operational efficiency, safety and passenger comfort, CBTC (Communication Based Train Control) solution will be implemented on all new lines as well as on all existing lines.

Thales' Az LM provides Baku Metro with reliable train detection and axle counting

In 2014, Baku Metro chose Thales to equip its new metro line 'Purple Line'. The project currently includes 2 stations and 2.1 km of track, but it is foreseen to develop this line into 15 stations and 17.6 km of track.

The Thales turnkey solution under the responsibility of Thales Communications & Security in France is based on the Thales PMI interlocking and includes the delivery of the OCC (Operation Control Center), SCADA (Supervisory Control And Data Acquisition) as well as Tetra Radio, Multiservice Network and the signalling system.

The Thales Axle Counter Az LM ensures reliable train detection and axle counting. The integration of the Az LM System includes the Sk30K slim-line rail sensors as well as the electronic units, which are both installed in the tunnel. Within the constraints of operators and maintainers, the integration was completed successfully.

The first section of the line was commissioned in April 2016 and demonstrated to the customer the flexibility and accuracy in implementing Thales solutions within a very tight deployment schedule.

Wheel sensor Sk30K and EAK30K installed in Baku Metro tunnel

AdjustIT – making your life easier

SMART REPLACEMENT OF PAPER FORMS

Using a smartphone for almost everything in everyday life has become normality to almost every smartphone owner. Buying public transport tickets, booking the hotel on your way to your final holiday destination, checking in with your airline, using online navigation, ordering and organizing your books collection, managing your accounts, organizing your music collection, twittering the latest news, sharing pictures and events with friends and family - the list can go on and on. It is as variable as people's interests are.

Measurement and data transmission from track side to back office

For individuals who are handling Thales Axle Counter equipment, the ***Thales AdjustIT Android App*** enhances the list of useful helping hands. The App is designed to guide the user through the detection point adjustment procedure by using the available features of smartphones such as Global Positioning Services (GPS), camera (2D code scan), near field communication (Bluetooth) and online connectivity. It integrates existing software and hardware to replace paper and pen as the logfile tool.

Save a tree – use your phone

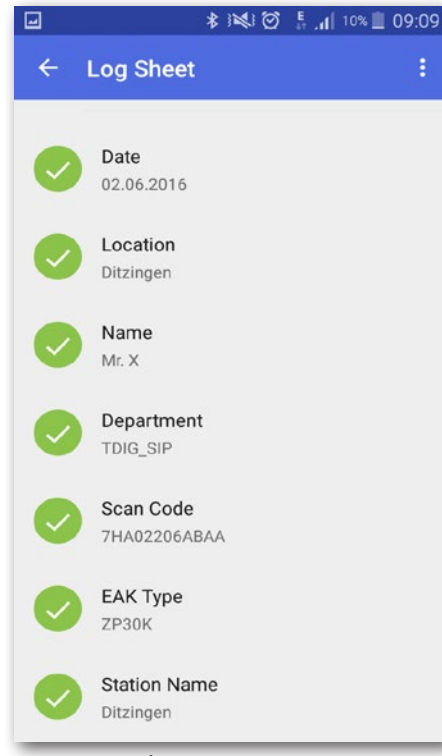
All of the inputs which are necessary for the logfile can be inserted manually when one of the above features is not available on a smartphone. This renders the system independent of organizational restrictions on smartphones, such as the prohibited use of cameras.

First of all, the App provides the logfile data as it is available today. The current output format of the gathered data is a .csv format, giving users the opportunity to use it in their own templates as required. The .csv is stored locally on the smartphone and can be distributed with the usual means of communication, such as e-mail, SMS, MMS or any other social media company application. As soon as the field engineer acquires the data, it can be made available in the organization.

Electronic helping hand

Using GPS identifies the location of the adjusted detection point and by scanning the appurtenant 2D code unambiguous data is made available for asset management identification. The description of the detection point and the connected indoor system designation is entered by the field engineer. Using the latest version of the existing test unit (Bluetooth enabled multimeter), all voltage readings are automatically transferred to the app. The App provides visual guidance through all the steps of the adjustment process and supports the user with hints and suggestions on optimal target values for adjustment purposes. Although the App makes it easy to follow the process, a knowledge of the axle counter system and its functionalities is indispensable.

As ***Thales AdjustIT*** is an independent extension of the axle counter product range, it is not part of a safety process and can hence reflect new ideas as they come along. Distribution of the App is realized through **rail.myproducts-thales.de**.



Intuitive user interface


Paperless logfile generation

ADVANTAGES

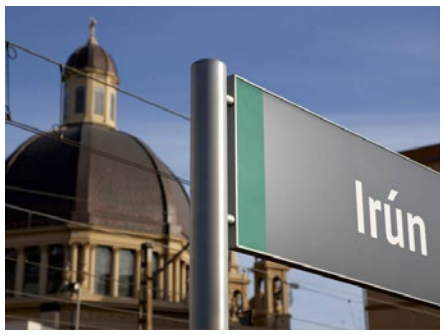
- Tracking of equipment which is installed trackside
- Smart replacement of traditional paper forms by fully automated log sheet
- Barcode scanning; GPS; Bluetooth link eliminates faulty information
- Comfortable documentation; predefined listings provide unambiguous data
- Results can be shared instantly without losing data

Success Story

Train detection on the Iberian Peninsula: The dawn of modern axle counters

While track circuits still remain the most widespread train detection system in Spain, axle counters are being used in an increasing number of signalling applications: on high-speed lines, on conventional lines and third rail track systems. While introducing axle counters for train detection, ADIF makes use of new redundancy concepts:

- The first cutting-edge 2oo3-type Az LM with IP-based interlocking interface and slimline Zp30K detection points was commissioned in the Lebario facilities of the ETS network (Basque Country Infrastructures Authority) back in 2013.
- Subsequently, the same Az LM 2oo3 system concept was introduced as the primary train detection system on the Olmedo-Zamora section of the north-west high-speed corridor and successfully entered service in 2015. The Olmedo-Zamora line was also selected by ADIF to conduct testing to enable subsequent certification of the new redundancy function and detection points.
- The single line sections of the new Antequera-Granada HSL will also be fitted with the same type of equipment for train detection.



Thales will modernise signalling and traffic control in Irun

Thales' Zp30K at the ADIF testing site

Axle Counters on double gauge tracks: Resolving a train detection nightmare

The Mediterranean Corridor, which will link the south-western Mediterranean region up to the Ukrainian border with Hungary, is another challenging project. It will be equipped with both 2oo2- and 2oo3-type Az LM evaluator units with slimline Zp30K detection points on the third rail track on the Almusafes-Castellon section to enable transit of UIC gauge (1,435 mm) as well as Iberian gauge (1,668 mm) trains. 430 detection points and 20 evaluator units ACE will be installed.

Thales Espana has recently been awarded the contract for modernisation of the signalling systems and traffic control in Irun, Gipuzkoa, which will enable connection to the high-speed international gauge line between France and Spain.

This is an extensive and complex project and will be vital in connecting Spain with the rest of Europe. The contract includes modernisation of the signalling systems and railway traffic control through installation of the third rail for implementation of international gauge and integration of the new Basque Country railway network on the Astigarraga- Irun section.

Thales will deploy its most advanced signalling and railway traffic control systems including the next-generation Intersig L905E electronic interlocking, 139 Zp30K detection points and 5 Az LM evaluator units of the 2oo3 type as the primary train detection system on the mixed gauge lines.

adif

ADIF, Administrador de Infraestructuras Ferroviarias, is Spain's state-owned rail infrastructure administrator. The company was founded in 2005 to separate infrastructure management from train operation, as this is required by European law.

ADIF's network extends over 15,000 km and includes the longest high-speed network throughout Europe, covering more than 2,500 km.

Thales has a long-standing presence in the Spanish rail market, with an involvement that stretches back to 1951.

myPRODUCTS
Facilitated repair returns

ONLINE RMA REQUEST AND REPAIR TRACKING

Mark Twain once said: 'Continuous improvement is better than delayed perfection'. So we continually strive to refine our products, our people, our procedures and processes.

This is why we have looked into our current repair process: together with the Thales factory in Arnstadt, we have simplified the whole course of activities and have implemented several improvements to offer a more transparent and effective repair and return service to our customers. Here, ***myProducts*** plays a major role: Not only does the self-service portal already provide an endless online library of axle counter documentation or useful video tutorials about installation or adjustment, for example; it also comes with a brand new and integrated RMA functionality.

RMA goes digital

RMA, which stands for 'Return Material Authorisation', describes the procedure of asking the manufacturer to obtain authorisation to return a component or product for repair or upgrade or in order to receive a replacement.

RMA workflow facilitated by myProducts

Despatch center in Arnstadt factory

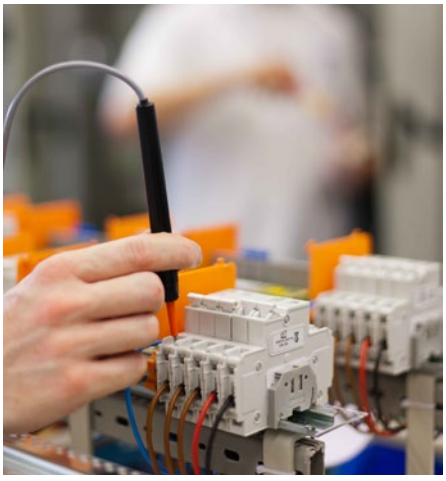
A resultant RMA number must be displayed on or included in the returned product's packaging.

myProducts now simplifies this process by providing its registered users with the opportunity to make an online request for an RMA label. From now on, our customers can quickly fill in a user-friendly online form with dropdown menus and selection boxes. Just a few clicks later, this label - containing an individual RMA number and all necessary information for attaching it to the parcel - will be generated as a PDF document. It can then be printed out simply in the same manner as is familiar from any Internet-based retailer.

The information provided with the delivery will then help to identify the sender and content within seconds by means of a QR code scanner. Automatic notifications are available as soon as the status of the repair item has changed.

Furthermore, our customers will be able to log in to ***myProducts*** to get an overview of all their RMA transactions - including entry date, transaction number, material number etc. and the current status. Filters can also be used or saved as default settings (e.g. open transactions). An FAQ page will also be available to assist with answers to questions that may arise.

More features and functions are already planned that will provide more possibilities for interaction and improve user-friendliness. The new RMA feature in ***myProducts*** offers an improved customer experience and enables Thales to handle requests more efficiently due to an improved end-to-end workflow with higher transparency.



Final functional test of repaired axle counter component in repair shop

myPRODUCTS

Stay tuned for further enhancements of ***myProducts*** that will provide more applications and e-services that support our customers' operational performance. Or simply catch a glimpse and logon to **https://myproducts.germany.thalesgroup.com.**

Interested in an account? Please contact us: **myProducts@thalesgroup.com.**

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