THALES

COUNTINGWORLD

The Customer Magazine for Axle Counter Systems

09.2018

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CHALLENGING THE STATUS QUO

LITE4CE™ PAVING THE WAY FOR SMART SENSING TECHNOLOGIES

A RAILWAY ACROSS THE DESERT

MOBILITY SOLUTIONS FOR THE TOUGHEST ENVIRONMENT ON THE PLANET

THE "WARRIORS" CHOOSE THALES

THALES FLAGSHIP AXLE COUNTER SYSTEM DEBUTS IN SAN FRANCISCO

Dear Readers,

RELIABILITY BY DESIGN

Higher speeds and train density, better punctuality, increased availability, lower life cycle cost: the key drivers in the design of new modern railway signalling products.

Squaring the circle or a realistic undertaking?

While higher speeds and higher train density are not that technically challenging today, they are often economically questionable or simply operational nonsense.

Would a doubling of a line speed make sense when the necessary expenditures for maintenance multiply? Is an increase in train density justifiable when the operational cost rises, but the number of passengers does not? It is, after all, the minimum level of safety required and affordable costs, i.e. the expected life cycle costs or investment costs, that determine a supplier's selection of signalling system or product.

Availability and punctuality become measurable decision criteria

Neglected in contract award decisions in the past due to a lack of success criteria, both punctuality and availability are slowly becoming the evaluation pillars for performance-based contracts. Fully redundant "2 out of 3" signalling system concepts have been on the signalling market for many years and have drastically reduced if not mitigated the effects of single points of failures. However, it is not possible to implement or rely on redundant system concepts everywhere. Furthermore, the reliability of outdoor or track-based signalling elements has a strong impact on overall operational performance.

60 years of experience – enabling our customers ambitions

Thales field elements like signals, track magnets, point machines or axle counters have reached an outstanding and unrivalled level of performance over the past decades of operation. *Reliability by design* is often the consequence of the design engineers' numerous years of experience.

In addition, finite element calculations and simulation of environmental conditions are suitable methodical instruments to get the basic design right from the beginning.

Nothing replaces real life experience to confirm resilience and reliability

With the new Lite4ce™ smart sensor, Thales is introducing an entirely new concept of wheel sensing for Axle Counting Systems: an unprecedented challenge for a track-based signalling system – innovative and fascinating – but with limited ability to rely on decades of operational experience.

Lite4ce™ – at the forefront of sensor technology

The Thales vision to introduce a reliable and truly generic worldwide signalling product has therefore already motivated many international railway operators, both mainline and urban, to join the "proof of concept" initiatives well in advance of a formal commercial product launch.

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

Gemma Salazar Luque
Technical Director, Mainline Signalling
Thales Ground Transportation Systems

RMA goes mobile

FLEXIBLE, EFFORTLESS MATERIALS RETURN

Following the successful launch of myProducts RMA (Return Material Authorisation) online, the next step is to make the material return process even easier. The aim of our brand-new app ReturnIT is to provide customers with even more support so returns can be processed quickly and more efficiently whilst also saving time.

Using the ReturnIT app on your mobile phone – simply scan the labels of the components you want to return for repair instead of typing the serial numbers by hand.

This is enabled by a guided step-by-step recording process of the relevant material data. All our components can be identified with a label (bar code)containing all important information. Scanning the label with the smartphone's camera saves time and ensures that the correct data is acquired.

Flexible, futuristic and device independent – ReturnIT is accessible from Smartphones, Tablets, IoS, and Android

Keep an eye on your transactions in ReturnIT. All status information on current RMA processes is visible at a glance. You don't have to choose between a mobile device or a desktop PC; both platforms are synchronized so you always have access to all data. For your convenience, start scanning on-site and print your RMA form in the office later.

Of course, the well-known track-and-trace functionality, overviews, the search function and automatic notifications will be available via ReturnIT as well – available anywhere and anytime. ReturnIT will be available by the end of this year. You will be able to upgrade your material return process and download the ReturnIT app from the download centre: https://myproducts-thales.com/ReturnIT.

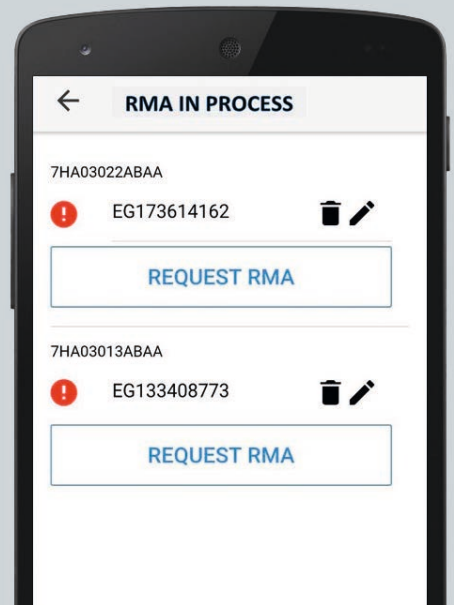
In order to use the ReturnIT app you need a myProducts account which you can create at:

https://myproducts-thales.com/rma-register

So stay tuned for the new myProducts ReturnIT app.

Ultimately, ReturnIT will also be available on Google Play and Apple iTunes store. Online Repair Returns made easier than ever.

Return **M**aterial **A**uthorisation (RMA) is the process of returning a product to the manufacturer in order to have it repaired, upgraded or replaced. The customer contacts the manufacturer to obtain authorisation to return the product. A resulting unique RMA number must be displayed on or included in the returned product's packaging to facilitate processing.



Success Story

Thales Axle Counter Az LM on the Orient/East-Med Corridor

MODERNIZING THE LAST NON-ELECTRIFIED SECTION OF THE BULGARIAN RAILWAY CORRIDOR

A consortium of Thales and Alcatel-Lucent (today Nokia) won the contract and delivered the rail signaling turn-key solution on the 150km stretch between Plovdiv and Svilengrad. The contract had been issued by the National Railway Infrastructure Company (NRIC). The consortium of Alcatel-Lucent and Thales was responsible for signaling and telecommunications. The line has been electrified with 25kV AC 50Hz and equipped with European Train Control System (ETCS) Level 1.

The railway line between Plovdiv and Svilengrad is part of the European Orient/East-Med Corridor, which is a crucial connector for central and southern European countries to the rest of the European Union, fostering thereby the internal market.

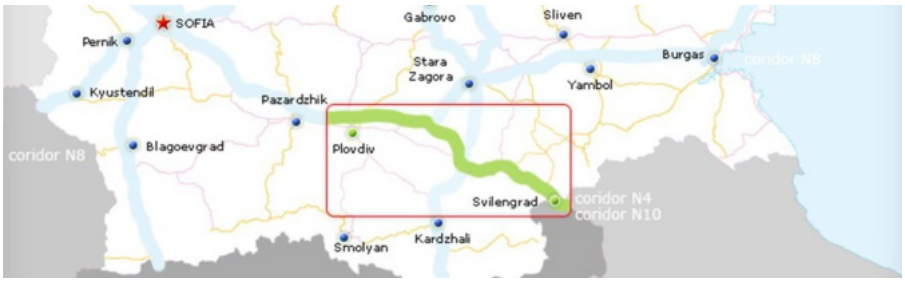
This railway line is not only of national importance to Bulgaria, but plays a vital global role as a part of the transcontinental route:beyond Svilengrad, the railway line connects to the Turkish border. In Istanbul, the Marmaray tunnel under the Bosphorus links Europe with Asia. From Turkey, Iran and Iraq are accessible by freight trains. China is accessible as well through the iron silk road via Turkey, Georgia, Azerbaijan and Kazakhstan.

The project involved the reconstruction and electrification of the railway line. It was the beginning of a remarkable journey that was aimed at modernizing this route: increasing the line speed and equipping it with ETCS Level 1. The permissible speed of the railway line after the upgrade is 160 km/h for passenger trains, 200 km/h for tilting trains and 120 km/h for freight trains. This upgrade requires a highly reliable train detection system with low life cycle cost. Therefore Thales Axle Counter Az LM was selected as train detection system.

The ETCS Level 1 turn-key solution for the railway line between Plovdiv and Svilengrad comprises

- 7 stations with Thales ELEKTRA 2 electronic interlocking
- a Thales centralized traffic control system in Plovdiv
- 420 ETCS Level 1 trackside balises
- 210 Thales Point Machines L826H, electro-hydraulic point machine with variable stroke
- 419 detection points of Thales Axle Counter Az LM

150 km of ETCS Level 1 railway line, with 12 stations and a centralized traffic control system are now in operation in Plovdiv.



Svilengrad lies close to the road borders of Greece and Turkey. The route is located along Corridor IV and IX, and connects the large city of Plovdiv with the Greek, Turkish and Bulgarian borders.

ДП НАЦИОНАЛНА КОМПАНИЯ ЖЕЛЕЗОПЪТНА ИНФРАСТУКТУРА

The National Railway Infrastructure Company (NRIC) is Bulgaria's state railway infrastructure company. Bulgaria has a long tradition in the railway industry: in 1866, the first line, between Ruse on the Romanian Border and Varna on the black sea was opened, fueling the growth of adjacent towns and communities. Today Bulgaria has over 4,000 km of railway network.

Lite4ce™ – Challenging the status quo

PAVING THE WAY FOR SMART SENSING TECHNOLOGIES

Until now, axle counting systems technology has been based on electro-magnetic sensors. However, years of extensive research in the field of optical sensor technology, has led to the development of a new generation of sensors. The sensors, based on fibre Bragg grating technology detect and measure mechanical strains caused by the wheel of a passing train. Fibre Bragg gratings are developing rapidly, driven by the increasing areas for their application, and this has finally made their application possible within the rail-signalling market.

History of fibre Bragg grating

Fibre Bragg grating was derived from Bragg's law. Sir William Lawrence Bragg, an Australian-born British physicist and X-ray crystallographer, discovered Bragg's law of X-Ray diffraction at the start of the 20th century. Bragg jointly won the Nobel Prize in Physics with his father, Henry Bragg, for the discovery in 1915. In 1978, Kenneth Hill et al. discovered photosensitivity in optical fibres and demonstrated the formation of permanent gratings in an optical fibre.

Fibre Bragg grating – working principle

Fibre Bragg gratings are inscribed in the core of the glass fibre. The core of these kinds of sensors consists of germanium doped quartz glass. The fibre Bragg grating is created by changing the refractive index of the core several times at a fixed distance (Grating Distance Λ) between the inscribed positions. The reflected wavelength λ, the Bragg Wavelength, is defined by the geometry and the refractive indices.

Fibre Bragg gratings produced with a femtosecond laser became commercially available for the first time in 2013. This technology enabled the production of fibre Bragg gratings with the required optical characteristics along with the required mechanical strength. These fibre Bragg gratings can be stretched almost as much as a standard optical fibre without fibre Bragg grating at >7 %. As of today, there are just a few companies worldwide that offer these femtosecond laser fibre Bragg gratings for sale.

There are applications where several hundred fibre Bragg gratings are inscribed in a single fibre. Such fibres or individual sensors are installed on or in large structures such as bridges, aircraft wings, wind turbines, oil drills and the masts of sailing yachts, so that the strain on these structures can be monitored. Fibres with multiple cores which are located around the mechanical neutral axle have also been developed. Multi fibre Bragg gratings are inscribed in all cores. This enables calculation of the path of the fibre in all three dimensions e.g. medical applications.

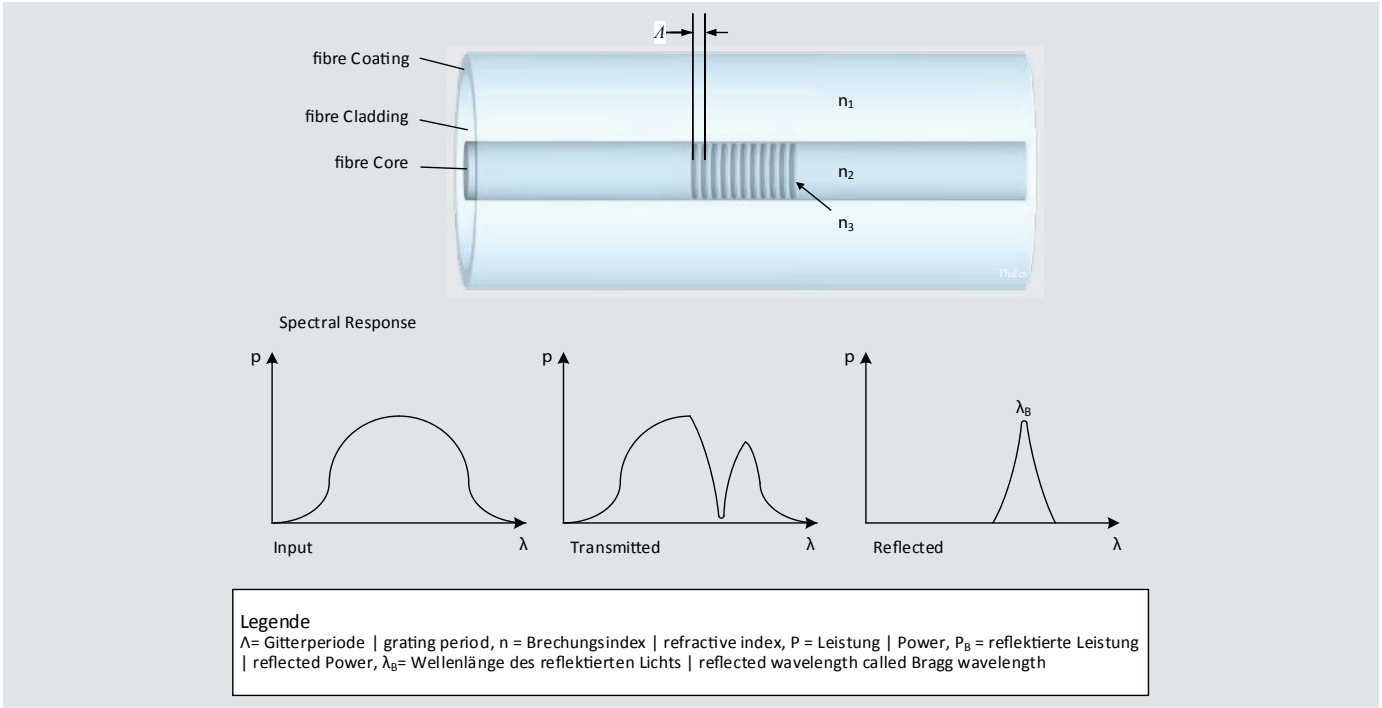
Thales sensor design

The working principle of the sensor is based on the fact that the reflected Grating Distance Λ and therefore the reflected wavelength λ changes if a pre-tensioned fibre is stretched or compressed. With the gratings glued in longitudinal direction directly on to the track as far away as possible from the neutral axis (near head or foot of profile), the biggest wavelength changes of 0.3nm could be measured. The Thales sensor is positioned at a 45° angle over the neutral axis of the rail profile. The sensor amplifies the strains in the track mechanically and reaches a working area of about 10nm.

The Thales sensor contains two fibre Bragg gratings placed 8 cm apart at a 45-degree angle above the neutral axis of the rail profile. This 45° positioning changes the algebraic sign as the wheel passes over the sensor.

The fibre Bragg gratings are pre-tensioned within the working point such that the reflected wavelength changes with any kind of strain. The mechanical construction of the sensor amplifies the strain. The optimised sensor geometry achieves the first level temperature compensation. The second level temperature compensation is achieved by establishing the differential signal of the two sensors within the later signal processing. Therefore, the temperature failure of the wavelength is completely compensated for. Both fibre Bragg gratings are first stretched (λ↑) and then compressed (λ↓) during the passing of a wheel in one direction and vice versa when the wheel passes in the opposite direction. Due to the unique characteristic of the signal, the direction can be detected by a single fibre Bragg grating only.

Any other information contained in the pattern of the reflected wavelength can be extracted by using highly specialised algorithms. Using Lite4ce™ sensor on railway infrastructure opens up new horizons for monitoring.



Legende
Λ= Gitterperiode | grating period, n = Brechungsindex | refractive index, P = Leistung | Power, P_B = reflektierte Leistung | reflected Power, λ_B= Wellenlänge des reflektierten Lichts | reflected wavelength called Bragg wavelength

The working principles of FBGs

Thales **Lite4ce™ sensor**

Innovative installation solution

The Thales sensor is ca. 40 mm high, ca. 170 mm long and ca. 5 mm thick. The sensor is glued to the track profile so as to obtain a frictional connection. The application of adhesive technology directly onto the track is another innovation within the railway industry. Cleaning and preparing the rail as well as gluing the sensor is quick to carry out, thus eliminating complex calibration and adjustment. Earthing the sensor is not necessary due to its design. The sensor is equipped with a heat-activated glue foil. In order to get high quality glue joints, the track, including the sensor, are heated inductively while the temperature of the joint is temperature monitored and loop controlled. The glue hardens completely within a few minutes. Therefore, drilling the track is not required. The sensor contains a mechanic/optic detachment detection. With no contact to the track (or the packaging) the fibre Bragg grating is strained beyond the normal working area, which is the basis for the detachment detection. While gluing the sensor onto the track, the sensor and the track are heated to over 100°C and hence stretched in the process. Achieving the exact working wavelength after curing the glue and cooling the track and sensor is an effective way to control the quality of the glue joint.

In 2015 Thales and its technology partner fos4X began the first field measurements at the rail track and filed patents worldwide in 2016. The Thales fibre optical axle counter system based on this technology will start its railway operation safety approval tests in 2018. This will be the first operating SIL 4 system based on optical sensors in the railway industry. With this fibre optical axle counting system, Thales is continuing to advance the innovative technology, overcoming inherent limitations of the electromagnetic principle of existing products in this market and offering numerous potential for further applications in the future. For more information about Lite4ce™ visit us at

https://myproducts-thales.com/lite4ce-fibre-optical-sensing

The strain applied to the Lite4ce™ sensor

Lite4ce™ enters the UK

FIRST INSTALLATIONS OF FIBRE OPTICAL SENSORS IN UK

There is an unwritten law: "Whatever technology you successfully introduce in the UK will work all over the world." Following this rule, Thales installed the new Lite4ce™ sensors in London at *Finchley Central Station* and at *Birmingham New Street* – one of the busiest stations in UK. The objective of the trials is to prove the value of fibre optic sensors on British railway systems.

In order to develop the most optimal product that can be used in diverse railway environments, Lite4ce™ sensors are being tested at various sites. Both *Finchley Central Station* and *Birmingham New Street* possess unique characteristics that make them ideal trial sites for the new Lite4ce™ sensors.

Finchley Central Station, which is managed by Transport for London, offers bullhead rail. This is the first time that the fibre optical sensors are being tested on a railway track with these attributes. *Birmingham New Street* on the other hand, managed by Network Rail, is equipped with *flat bottom rails*. Both railway lines also have a high level of traffic, which allows diverse data to be collected on rolling stock. The Lite4ce™ sensors have been installed in these sites alongside classic electro-magnetic sensors. The classic sensors act as reference for axle counts.

Thousands of axles are being recorded every day since April 2018 – both optical signals as well as conventional signals.

Finchley Central Station

As of today, Thales has received excellent feedback from customers who have supported Thales by allowing installation of Lite4ce™ sensors. Network Rail and Transport for London are two of Thales' most innovative customers who have successfully worked with Thales for many years. Both are very keen to introduce a totally new technology and start a "railway revolution" together with Thales. Together with Network Rail and Transport for London, every single day Thales showcases the feasibility of this new technology.

The next trial phase will be the upgrade from the "Lite4ce™ sensor only" trials to "complete systems trials" which include both outdoor and indoor equipment.

This presents a great opportunity for Thales: On one hand, to broaden experiences and on the other hand, to gain a much better understanding of the customers' needs.

The British Railway system is with its 15.799 km and 2.566 stations, one of the oldest but also one of the busiest in the world. The first railway started with isolated wooden wagon ways in 1560s - today more than 20% of European railway traffic is operated in UK (1, 7 billion passenger journeys every year). Transport for London is the integrated transport authority responsible for the day-to-day operation of London's public transport network, including the world's oldest and one of the largest underground railway networks: London Underground.

Success Story

A railway across the desert

MOBILITY SOLUTIONS FOR THE TOUGHEST ENVIRONMENT ON THE PLANET

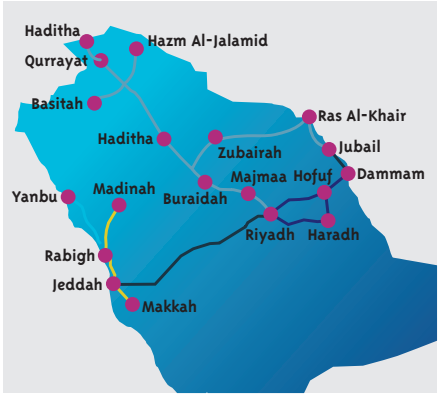
Thales completed one of the largest and ambitious projects in Saudi Arabia, the North–South-Railway network: a vital infrastructure for the Saudi Arabian economy, providing freight and passenger traffic across the country. The railway line connects the rapidly growing cities in the north with the capital Riyadh, as well as the ore mines with the harbours of the Persian Gulf.

Thales and Saudi Bin Ladin Group were awarded the contract to construct European-style signalling, ticketing, communications and security systems. The Saudi Arabian railway has been equipped with the latest technologies for train signalling, ensuring safety and operational efficiency.

ETCS L2 allows the reduction of wayside signalling elements and optimizes the system lifecycle cost

The upgrade includes a train control system with ETCS L2 and route control with interlockings. To increase safety along the route, field elements were deployed including an operation control centre for traffic management with ARAMIS. For the entire project, 100 GSM-R masts, 3 Radio Block Centres and 1600 Eurobalises, along with 15 interlockings, 781 point machines and 476 detection points were installed.

The line starts at Al-Jalamid mine located in the Northern Territory, passing through Al-Jawf and Hail, arriving at the 'Alnaithrah Railway junction' in the Qasim region, and then toward the southeast to the Ras Al-Khair export facilities near Jubail.



4 million tons of commodities and 2 million passengers will be transported via the rail line every year. The goal is to make Saudi Arabia the second largest exporter of minerals in the world.

Construction started in 2005 on the longest ETCS Level 2 Project worldwide, which has now been in operation since 2012. More than 2500km of railway line runs through sand and stone deserts, with temperatures ranging from a scorching 55°C during the day down to freezing -5° C at night.

Sand and wind combined create constant abrasive stress for all field elements. This harsh climate might be one of the most challenging environments for railway applications to be found on earth.

Harsh climatic conditions presented significant and unique challenges during installation. On-site work had to be carried out mostly at night and early morning due to extreme heat. During the summer, on-site work had to been stopped between 12 – 3pm. The sandy terrain presented logistical challenges: tracks were often covered in sand which required cleaning/clearing. On occasion, balise harvest machines had to be utilised. Sandstorms and large dunes were also risk factors.

IP 67 to withstand the toughest climate conditions

All of Thales field elements have IP 67 rating. This guarantees that neither sandstorms nor flash floods nor any other extreme climatic conditions will hinder safe reliable operation.

Thales Az LM System set for interoperability

COMPATIBILITY ALONG THE ENTIRE 70,000 KM EUROPEAN TEN-NETWORK

The principle idea of the European Train Control System (ETCS) is to allow for a unified railway signalling operation throughout Europe.

The successful introduction by many European railway operators has fuelled a significant growth of this concept, even in countries outside of Europe.

To facilitate the introduction of technically compatible railway systems in high speed as well as in conventional traffic operation, the Technical Specification for Interoperability (TSI) was introduced. This TSI contains all the technical and certification requirements for interoperable systems and its parts thereof.

In 2002 the implementation of ETCS, based on the Technical Specification for Interoperability (TSI), became mandatory for all Trans-European high speed connections.

Today, Thales ETCS trackside and trainborne equipment is prevalent in diverse applications across Europe.

Sk30k

Many countries in Europe have undertaken massive investments to upgrade their infrastructure with ETCS. In mid-2017, Luxembourg became the first European country to implement a fully-certified ETCS interoperable network country-wide.

The introduction of ETCS has paved the way for further harmonisation and standardisation initiatives in Europe, one of which is the standardisation and certification of train detection: a must have for operation on the Trans-European and high speed networks in Europe.

Thales Multisection Axle Counter System Az LM – the first TSI certified train detection system

In June 2018, Thales Axle Counter System received the Certificate of Compliance with the European Technical Specification for Interoperability.

The German Notified Body for Interoperability – EISENBAHN-CERT has not only proved Thales' compliance with the relevant EN 50617-2, but also with the special conditions in Chapter 7.6 of the TSI Command Control System.

Thales Multisection Axle Counter System Az LM is therefore completely technically certified for compatibility along the entire 70,000 km Trans-European Transport Network. A country-specific proof of compliance is no longer necessary – a huge benefit for European railway operators.

Benannte Stelle Interoperabilität Bahnsysteme
beim Eisenbahn-Bundesamt

EG-Zertifikat
EC Certificate
EG-Baumusterprüfbescheinigung
EC Type Examination Certificate

Zertifikat-Nummer / Certificate Number: 0893/1/SB/2018/CCT/DE EN/3081

Teil des streckenseitigen Teilsystems
Achszähler System Az LM
Version 7.0, 3CR 01800 APAB

Thales Deutschland GmbH, Thalesplatz 1, D-71254 Ditzingen

Benannte Stelle Interoperabilität Bahnsysteme
beim Eisenbahn-Bundesamt – EISENBAHN-CERT
Heinemannstraße 6, D-53175 Bonn

- Kenn-Nummer der Europäischen Kommission: 0893 -

Bonn, den 13.06.2018

Leiter / Managing Director
EISENBAHN-CERT

TSI Certification

Thales Az LM System speaks EULYNX

SUCCESSFUL IMPLEMENTATION OF EULYNX SCI-TDS

EULYNX is a European initiative by 12 infrastructure managers to standardise interfaces and elements of signalling systems.

Generally, standard communication interfaces (SCI) share a common protocol stack: On top of standard IP and UDP protocols, the RaSTA protocol provides logical communication channels to applications. Those logical channels are safe and availability-redundant by employing physically redundant network routes between sender and receiver.

Based on an initiative launched by ProRail at the beginning of 2018, Thales has implemented a demonstrator software based on the EULYNX interface specifications for axle counters, i.e. SCI-TDS.

The implementation is based on EULYNX baseline 2 and features all basic functionalities of a track detection system as well as a fully redundant connection on the safety protocol level. The functionalities and interface handling are fully integrated into the latest Thales Az LM axle counter software. The software is running on actual axle counter target hardware used for revenue systems.

After pre-integration within the Thales environment, only two integration cycles in Germany and the Netherlands were needed to establish a working interface communication to a non-Thales interlocking.

To achieve certification and operation under safety responsibility, a number of points like specification approval and variance handling still need to be clarified. Yet, the implementation has shown that this EULYNX specification is a solid foundation for interface implementation. The next step forward to stabilise this will be EULYNX baseline 3, which will be published at the end of 2018.

In general, Thales is in a strong position for implementing EULYNX SCI specifications in Thales products because of

- profound experience regarding the underlying safety protocol layers (SAHARA and RaSTA);
- active participation in the NeuPro standardisation efforts of Deutsche Bahn, which presents the initial source and basis of the EuLynx specifications;
- the current implementation of the German variations of the SCI interfaces in projects with Deutsche Bahn.

EULYNX

Thales implements 3D-printing

REVOLUTIONISING DESIGN AND MANUFACTURE OF MECHANICAL METAL PARTS

Additive Manufacturing (AM), also known as 3D-printing, has been around for a long time without considerable recognition. In the past few years however, new technologies and materials in this sector have advanced drastically, rendering this manufacturing process the most interesting and promising way of creating any part imaginable. AM is a process that transforms 3D-models into physical objects by adding successive layers of material, and relies on computer-assisted design, engineering, manufacturing and material sciences.

By removing almost all limitations associated with common manufacturing processes, AM allows parts of practically any shape to be created and, most importantly, they can be created a lot faster. 3D-printing can be used to produce complex components, which would otherwise be difficult with traditional manufacturing. Metals can be used to print 3D-objects with the highest manufacturing precision. Even though AM has its weaknesses when it comes to mass production, the advantages i.e. very light and yet strong components, have made AM indispensable in the aviation and space sector.

Thales leaps into the future

In the coming years, we will see AM spread into all sectors of engineering and become a major aspect for many businesses. 3D-printing will accelerate the manufacturing of complex parts and improve the efficiency of production machinery whilst lowering costs and preserving the environment.

Thales has established a 3D-factory in Casablanca Morocco – an industrial competence centre specialising in 3D-printing.

With plans to acquire more metal printers, all Thales units will be empowered to produce components for all product lines faster and more reliably.

Thales has already implemented several smaller desktop printers into the workflow to accelerate production and facilitate manufacturing of metal parts of exceptional complexity. From fast prototypes in engineering to educational models at Thales University – with 3D-printing there are no more limits to the creativity of Thales employees.

Thales 3D-factory in Casablanca Morocco

The “warriors” choose Thales

THALES FLAGSHIP AXLE COUNTER SYSTEM DEBUTS IN SAN FRANCISCO

Following more than 20 years of successful operation on Market Street, the new generation of Thales Axle Counter System has been selected by the San Francisco Municipal Transportation Agency?

Thales Multisection Axle Counter System Az LM are going to be installed in the centre of San Francisco close to the multifunctional arena, the new Warrior stadium, which is currently under construction. Amongst other events, the NBA team ‘Golden State Warriors’ will be hosting its home games here in the near future.

Station of the multi-functional arena which is currently under construction

The project comprises 22 axle counter detection points and 2 indoor evaluator units. Axle counters will initially run parallel to track circuits. After a defined test period, they will take over the primary function of train detection. The end user, the San Francisco Municipal Transportation Agency, expects a significant improvement in availability and reliability through the use of Thales axle counters.

Reliability leads to success

A field trial with the Thales Multisection Axle Counter System Az LM was conducted for over six months in 2015. This field test, carried out at the tunnel entrance on Market Street, delivered outstanding

Electromagnetic reliability tests with new rail vehicles

results: more than 100,000 trains were accurately detected – with the highest reliability and without any disruption. In conjunction with another commercial Thales project, electromagnetic compatibility tests with new vehicles have been carried out – where the new Thales Multisection Axle Counter System Az LM has again shown outstanding resilience and performance.

Thales is looking forward to delivering the project successfully. This will be the first stand-alone axle counter project in the Unites States without any other signalling system modernisation involved.

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