

# COUNTINGWORLD

The Customer Magazine for Axle Counter Systems

09.2013

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**Axle Counters in the UK**

**An entire railway relies on Thales**



**High Speed Rail Grinding on Axle Counters  
Myth or Reality?**



**Factory Acceptance Testing**

**A valued service,  
NOT a suppliers' nightmare!**





## Dear Reader,

### The World Counts on Thales

With the recent contract awards of large signalling projects, like the Signalling Framework Agreement in Norway or the New Railway Signalling System for the Western Cape Region in South Africa, Thales has demonstrated its technological strengths

in railway signalling. While Thales has shown its capabilities to support the technology of its products over many decades, the current trend in technology poses a new threat to railway operators in future:

#### The availability of Signalling know-how and skilled man power

Many COTS (Commercial Off The Shelf) components become obsolete faster than they get introduced into the railway networks; transmission systems like Ethernet or even GSM-R evolve faster still and require railways to keep pace with the technological evolution.

It is a must for Thales to maintain the necessary specialists for the various disciplines aligned with these technologies, however for the railway operation and maintenance it becomes a challenging task. It is for this reason that the service and support activities will play an ever increasing important role.

Thales has therefore invested heavily in this field and has developed a number of inno-

vative approaches in order to **provide the right information whenever and wherever it is required.**

Examples of these initiatives include: the *Thales Product Training and Certification Program*, the *Intelligent Remote Diagnostic Facility*, the *Conflict Management Systems* or the latest *myProducts Online Know-how Database*.

We believe it is our duty as a trusted signalling supplier to anticipate the technological advances and implement the necessary tools and services for the provision of lifetime support.

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

**Anne Bolot Gittler**  
*Vice President*  
*Main Line Signalling BL*  
**Thales Ground Transportations Systems**

# Axle Counter Training Concept

## Why develop a detailed training program for the Thales Axle Counter System?

Thales has been selling Axle Counters worldwide due to its easy adaptability to all kinds of different interlockings and various applications. Naturally, Thales has been approached with many technical queries requesting support. These queries come from a variety of users and staff categories. Subsequent to this Thales realized that the Axle Counter System was often not being correctly deployed.

Hence, our main goal in setting up the Axle Counter Training Program was to avoid failures at the earliest possible moment during the different stages of the project life cycle, by training the different users of the Axle Counter product.

Back in 2010, Thales started developing a training concept for Axle Counters, which was implemented at the end of 2011. This training concept covers the complete product implementation cycle and is tailored for every staff category in a modular set-up. In addition, the training concept is unique, as it is not only product training. To ensure that the knowledge has been properly received, a test has to be performed at the end of the course. Attendees need to prove that they have un-

derstood the Axle Counter System by passing a theoretical and/or practical exam by reaching the score of 75% for standard courses and 85% for the expert course. Modern tools (e.g. 3D Simulations) are used to support the training particularly to explain complex operational rules such as reset procedures.

**The feedback from the training participants has been excellent. In the first 18 months of applying the new training concept, 35 courses have been completed and 190 participants have been certified by Thales University. In addition to this, Thales provides a "Train the Trainer Program" in order to certify local trainers in collaboration with Thales University Stuttgart.**

Each certification is valid for two years and can be extended after the expiry date by 2 years through attending a refresher course. This ensures that participants who have not worked with the Axle Counter System for a

longer time can refresh their knowledge without going through the whole course again. Certified participants will also obtain access to Thales *myProducts* service in the future.

The implementation of the Axle Counter Training Program has been a huge success for our customers and Thales. One of these success stories relates to our customer in Queensland, Australia. They were doing the very first design for a new project with the newly introduced Axle Counter System Az LM and supported by our training, they prepared the engineering for the project, applying the design by themselves easily with the result of the project delivered successfully into smooth operation.



# Anytime, Everywhere @ your Service

Thales Transportation Systems in Germany intends to increase its footprint in the products and services business. To improve the customer experience, a customer self-service portal called myProducts has been identified as a first step.

With myProducts, Thales aims to achieve higher customer satisfaction levels as well as an improvement on its own competitiveness. **It is characterised by a worldwide 24/7/365 availability, bringing Thales even closer to its customers and partners.**

The basic target is to support & assist operations of customers equipment or systems throughout the whole life cycle; thereby improving the operational efficiency and leading to optimised processes with shorter

lead times. Thales is planning to release the first version by the end of 2013.

During the initial stages it will revolve around three main aspects:

- **Document Download:**  
*Customers can easily download relevant documents for their products (e.g. manuals)*
- **Book a Training Course:**  
*Customers can see a calendar showing which courses are on offer and where so that they can reserve places on the courses*
- **Maintenance Wizard:**  
*Customers will get first hand troubleshooting assistance on-site*

These services will be provided on an easily accessible, personalised, customisable and password protected portal. At a later stage, an offline version for mobile devices will also be available.

In the long run, myProducts will provide a broad range of value-added services to our customers offering specific information, apps, tools and support.

So wherever you might be,  
help is always just  
a fingertip away!

Contact: [myProducts@thalesgroup.com](mailto:myProducts@thalesgroup.com)

## Factory Acceptance Test

Enhanced customer confidence by checking of the consignment before shipment start

In most railway projects, suppliers are bound to strict conditions and project milestones. An important factor of fulfilling the project schedule is the delivery of the equipment at the right time and place with the right quantity and quality. Thales enables each customer (and their partners) to get a set-up of an acceptance test directly at the Thales Industrial Plant, located in Arnstadt.

Thales performs more than 25 FATs per year for more than 50 product types for worldwide customers. In 2012, Thales spent around 700 hours in total in FAT support of our customers. Additionally, more than 40 factory tours for business partners and suppliers were undertaken during the year. During the tour, each of them can walk more than 1,400 meters with 2,000 steps and climbed 449 stairs.

### A FAT can be performed for commercial and/or for technical reasons.

In the case of a commercial FAT, the main focus is to cross check the pre-packed material including all necessary documentation of the completeness in regard to the contract. In the case of a technical FAT, the main focus is to repeat the standard tests

of selected assemblies after the production for demonstration reasons. Representative FAT tests are visual tests, high voltage tests and function tests of sub-assemblies and/or subsystems. These tests are done in different areas of the factory depending on the product and requirements, by using the same infrastructure as for manufacturing.

**To ensure that the customer expectations will be fully met, the FAT is planned each time individually** and well in advance in close collaboration with test engineers and responsible staff from Arnstadt. Best practice for preparation of the FAT is our checklist, as a guideline, which appoints all requirements and details of the FAT and beyond. Even the hotel booking, special food requirements and additional arrangements, such as guided trips, can be organized through Thales.



### Example of a typical standard FAT day:

Key facts of the technical FAT:

2 customer participants, Az LM:  
3 detection points and 1 ACE,  
196 kg net weight, 4 packages

- 09:00 Presentation of the plant and test strategy
- 10:00 Factory tour
- 11:00 Visual & high voltage & function test of electronic units
- 13:00 Visual & high voltage test of cabinet
- 14:00 Test of fully equipped cabinet
- 15:00 Isolation & parameter test of rail contacts
- 15:30 Demonstration of test equipment at the simulator
- 16:00 Analysis of the test results & discussion and signing of the protocols: finally the FAT protocol is worked out with Thales and the customer confirming the successful acceptance of the components

As a FAT at the Thales factory always takes place in an open and honest environment with questions are being clarified by means of competent and constructive answers, the customer feedback is consistently positive.



# Success Story

## Thales Axle Counter System Az LM on the busiest railway line in the United Kingdom

In 2010 Network Rail commenced the modernization of the Great Western Main Line. The Great Western Main Line links a number of thriving business towns and cities – from the might of London to the important regional economies of Oxford, Bristol and Exeter. It also connects to Heathrow as well as Gatwick Airport for business travellers and to some of Britain’s best loved tourist destinations in Bath, St. Ives and Newquay.

In the past 10 years a journey growth of 40% has occurred on the Great Western Main Line. The forecast of Network Rail is a growth of passenger numbers around London Paddington of 51% and around Bristol of 41% in 10 years. It is expected that 100 million passengers a year will be travelling on the Great Western Main Line in 2019.



Rail contact Sk30H

Being today the second busiest freight corridor into London, freight traffic on the Great Western Main Line is predicted to rise further.

**Network Rail is investing in a transformational 10-year programme for the Great Western Main Line to meet these challenges including:**

- *New electrification supporting high speed electric trains*
- *Major redevelopment of Paddington station*
- *Removal of track bottlenecks*
- *Modernisation of signalling system along the length of the line*

Reliability is the primary requirement to the signalling system. Therefore **Network Rail has chosen the Thales Axle Counter System Az LM as the main train detection system for the Great Western Main Line.** Thales Axle Counter System Az LM was introduced in the United Kingdom in 2002. Since then more than 8,000 of Thales’ rail contacts have been put into service on the tracks of Network Rail, the majority of them on the West Coast Main Line.

The West Coast Main Line is the busiest mixed-traffic railway route in Europe, and Britain’s most important rail backbone in terms of population served. It is connecting Greater London, the West Midlands, the North West, North Wales and the Central Belt of Scotland. Thales has acquired the contract for the Great Western Main Line against fierce competition, providing the best offer of a proven, reliable system, which due to

Thales constant investment into R&D is at the forefront of innovation of track occupancy detection systems.

The modernisation of the Great Western Main Line is one of the biggest orders of Thales Axle Counter Systems in recent years. Thales has already deployed 1,200 Axle Counter Systems Az LM rail contacts of the successful model Sk30H for the Great Western Main Line. These will be complemented by additional Axle Counter Systems Az LM equipped with 1,200 rail contacts of the newest model Sk30K, with the first deliveries imminent.

**The rail contact Sk30K is mounted using 2 bolts through the web of the rail, a highly reliable and maintenance-free method with no influence on the mechanical properties of the rail.** It does not require any mechanical adjustment during the lifetime of the rail.



Rail contact Sk30K

# High Speed Rail Grinding

## Compatibility with Thales Axle Counter Systems Az LM and Az LS

In the beginning of the nineties, the railway network operators saw an increase in problems relating to rail surface condition, resulting in the need for increased track maintenance activity.

The result of this increased maintenance leads to:

- Higher maintenance costs over the time
- Intensified noise pollution
- Traffic obstructions
- Shortened rail lifespan

In order to avoid these negative points, the German manufacturer Vossloh developed a rail grinding machine, which is able to operate without the requirement for special track possessions. The machine utilises High Speed Grinding (HSG), which can be performed up to 80 km/h between normal train operations. For HSG possible applications are preventative rail grinding, low friction coats removal for track circuits, acoustic grinding to reduce noise pollution emitted from the rail and grinding after track commissioning.



Vossloh – High Speed Grinding Train: HSG-2

For the railway network operator, this procedure delivered a lot of benefits but also problems regarding the compatibility to the existing axle counter systems. During the introduction phase of HSG, it was discovered that the relevant track sections had the “disturbed” axle counter status.

Because of their experiences in Germany, Deutsche Bahn (DB) demanded from Vossloh proof that the HSG would not interfere with the Axle Counter Systems. Therefore, Vossloh prepared a measurement setup on site to verify the compatibility of Thales Axle Counter Systems under real conditions. The verified technology was Thales Axle Counter System Az LM/LS.

After the measurements Thales was able to confirm the compatibility of its Axle Counter System with Vossloh HSG in normal operation up to maximum operational speed of 80 km/h.

This confirmation from Thales was a mandatory part in gaining the approval of DB in Germany and Schweizerische Bundesbahn (SBB) in Switzerland.

**HSG can be applied for every track equipped with a Thales Axle Counter System Az LM/LS without any risk of disturbance of a track section.**

# Safeguarding Interoperability in Europe

## Electromagnetic compatibility of rolling stock and axle counter systems

The interoperability between rolling stock and railway infrastructure is the key for seamless cross border train operation throughout Europe.

The European Standard TS 50238-3 for electromagnetic compatibility has been established guaranteeing for train operators that, if obeyed, their rolling stock will not disturb the train detection systems. All major manufacturers of axle counter systems have participated in establishing this standard with Thales being one of the main stakeholders in it.

This technical specification defines interference levels and a test specification for rolling stock, which is running on interoperable lines. Whilst new rolling stock must now fulfill the re-

quirements of the standard from their release, the only solution for existing rolling stock is to measure its electromagnetic emission.

For many decades Thales has provided a service to measure and evaluate the compatibility of rolling stock for Thales Axle Counter Systems.

**Now, Thales can offer a full spectrum of services in relation to the Standard TS 50238-3.**

This means, Thales is able to measure rolling stock with a simplified measurement setup, which detects the electromagnetic interference in 3 dimensions for any axle counter technologies being represented in Standard TS 50238-3, simultaneously.

Thales measures using a 3D antenna at both tracks with a spectrum from 10 kHz to 1.5 MHz capturing the full EMI footprint of a train.



ERA – Antenna (Magnetic Field Sensor)

The measurements can be made in a stationary setup (checkpoint) or as a mobile application, independently and fully automated. The Thales measurement system can be controlled remotely through a wireless network.

Thales analyses the measurement data providing consultancy to railway network and train operators.

**In partnership with Plurel B.V., Thales is currently measuring the rolling stock on the Dutch railway network.**



ERA – Magnetic Field Measurement System



# Success Story

Thales is the first to install Axle Counter Systems on main line applications in Thailand

In 2011 the State Railway of Thailand (SRT) launched the 'Railroad Level Crossing for Accidents Protection Project' (LX Project). It equips about 988 public road railway track crossings with automatic warning light signals but mostly with full automatic half barrier systems over a period of 5 years. With the 'LX Project' the train travel time and number of accidents at level crossings will be reduced significantly. Optimized minimal closing time, composed of the 3 main phases (activation, secured and deactivation) have a major impact on the success of the project.

The optimum means that the train travel is not impacted and the road traffic has to wait only for a minimum. So the reliability, availability, safety and accuracy of the activation and deactivation equipment is key to the acceptance of the level crossings by the users.

With SIL4 equipment for activation and deactivation, a safe operation with optimal closing times can be achieved.

Thales Axle Counter Systems provide all required features together with additional benefits in comparison to track circuits. **With an Axle Counter System there is no need for concern about rusty rails or water from flood or other origin because the System uses IP67 wheel sensors that have been proven to be highly reliable to operate below the water surface level.**

Also track condition and rail isolation do not impact the performance of an Axle Counter System as is the case with track circuits.

As an optimal, reliable, cost-efficient, flexible and safe system, SRT has selected Thales SIL4 Axle Counter System for the 'LX Project'. Since 2011, 200 Thales Axle Counter Systems have been installed together with the Thales local partners.

With the 'LX Project', Thales has started its relationship with SRT and the idea was born among the partners (SRT, Thales and its local partner Xenix) to further extent on the advantages of the Thales Axle Counter System beyond the application in level crossing systems.

The first project required the upgrade of Talang Chan Junction with a point track lock system. The purpose of this system is to notify that a train is approaching the point and the control system will automatically prohibit any movement by normal operation when a train has occupied the point track system.

SRT has chosen the Thales Az LM System for this point track system. It was installed in July 2013 and is operating with excellence. It is supervised through Thales remote diagnostics and the Graphical Diagnostic Interface. **SRT selected Thales due to the cost-efficiency, flexible design and performance**

**of its Axle Counter System Az LM for this kind of application.** This platform solution enables SRT to achieve savings of training cost for its staff as well as on the spare part stock as single section Axle Counter Az LS Systems are already in use on level crossing applications. Both systems integrate smoothly at their boundaries offering a seamless integration and the most suitable system design for each unique location.

Good trusted relationships among partners are the basis of our philosophy. Thales contributes with new products to the improvement of the railway service in Thailand with cost-effective solutions.



# Remote Section Blocking

## A modern way of reserving and blocking work areas

With the ever increasing demand of cost efficient solutions associated to low operating and maintenance costs the requirement for easy, quick and safe track access is becoming more and more important.

The forward way by utilizing Axle Counter Systems for that purpose is the usage of mobile, smart and safe solutions.

Thales has developed an innovative way of blocking work areas (WA) by giving a maintainer at the trackside and a local operator full control of the blocking while reducing the risk. The main components of Thales solution are the OTT® (Operator Trackside Terminal), MTT® (Maintenance Trackside Terminal) and LTT® (Local Trackside Terminal).

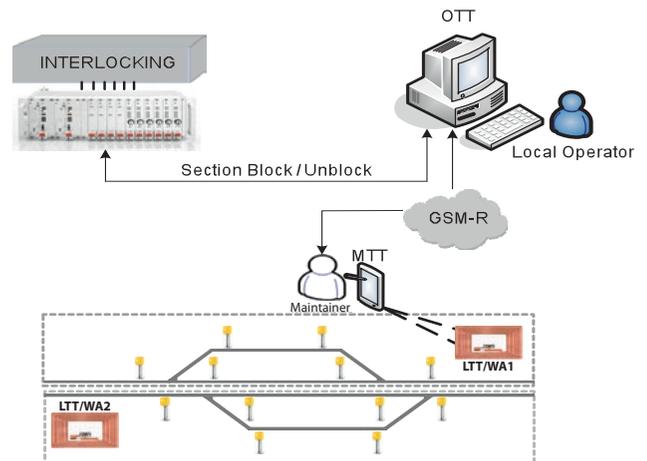
A maintainer required to work trackside first scans with MTT the RFID Tag LTT of its work area, located at the trackside. The sections of the track in his work area are displayed with the option to send a block request to

the local operator via GSM-R network. The requested work areas are virtually displayed at the OTT.

After the local operator ensures the correct involvement of the areas, he sends a block command to the Axle Counter Evaluator (ACE) translating the work area into Axle Counter Sections. Once the local operator gets the confirmation from the ACE that the sections have been blocked, he further sends a confirmation to the maintainer that blocking of the work area was successful, which is displayed on the MTT.

Remote Section Blocking offers several advantages: it is easy to configure and integrate into the existing infrastructure.

It is ready for use in GSM-R networks and easily adaptable to use in GSM networks as well. The blocking of work areas rolls up through all levels of route control, from the interlocking up to the central traffic control. Automatic route setting avoids the blocked work areas, allowing this solution to work in traditional and in ERTMS railway lines.



# Automatic Reset

## Applied through Meta Section Solution

In modern railways the availability of the train detection system is essential for reliable and safe operation. The safety backbones of any railway are modern SIL4 systems, providing maximised safety more than a million times higher than any safety level provided by a well trained human being.

As a consequence, the safety level is drastically reduced if such a related safety critical component fails. In this situation the operator is forced to make safety-relevant decisions, in many cases under unfavourable conditions. The limited reliability of system components can be compensated for redundancy provision. The cost for additional equipment however decreases the competitiveness of railway operators.

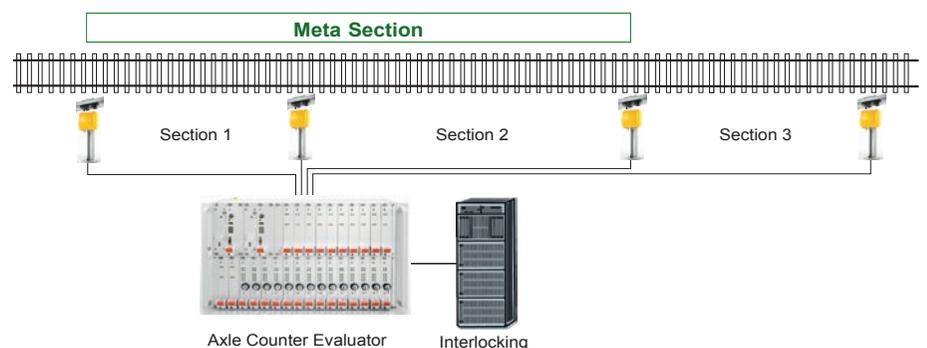
The Axle Counter Technology in general suffers from the disadvantage that a reset needs to be applied after a section is disturbed. This puts additional safety responsibility on the operators and the train drivers. The analysis of root causes for section failures shows that the vast majority of section failures are caused by some external influence such as power supply, cabling issues or inadmissible

EMI crosstalk from return current or the rolling stock itself. This means that in almost all cases no maintenance activities are necessary. Nevertheless, such a short term disturbance requires a reset procedure to be initiated with all the negative consequences.

**The automated reset functionality of Thales Axle Counters, called Meta Section Solution, brings an immense improvement in availability and safety under such conditions.**

recovered by the Central Evaluator, provided of course the sections are free. **The configuration of Meta Sections is fully managed and automated by the Axle Counter System itself. A manual configuration of the Meta Sections is not necessary.**

The Meta Section Feature reduces the section downtime in case of disturbances to its absolute minimum, releases the operator, train drivers and maintainer from any additional



In case the reason for this disturbance is no longer active and the counting information from the Detection Point is available again, the defective sections are automatically

responsibility/workload and optimises the availability and safety of the Train detection system to its best values without additional equipment.

# Deutsche Bahn AG relies on Thales Axle Counters

Decades of proven service of Thales Axle Counters on Deutsche Bahn

Deutsche Bahn AG (DB) with its affiliate DB Netz AG is running and maintaining Europe's biggest rail infrastructure. Regarding train detection, axle counters were initially used in DB's network in 1932 using inductive rail contacts. The first electronic axle counter applied was the Az 65SEL in 1968.

Thales consecutively improved the product being always in close contact with DB in order to meet their advanced requirements. The evolution of the Axle Counter Systems went via the Az L70-30, the Az L90M to the latest version, Thales Az LM. Still, more than 5,900 units of the proven Axle Counter Systems are working reliable in DB Netz infrastructure. These technologies are still being maintained and

repaired at Thales own manufacturing plant in Germany. This is just one of the reasons for being certified as a Q1 supplier of Deutsche Bahn AG.

Due to the good performance in the field, Axle Counters have to be used explicitly on the Federal Railways of Germany since 1995. Thales Axle Counters are qualified and approved by Eisenbahn-Bundesamt supported by Thales in-house independent and accredited inspection body.

During the last 15 years, Thales has supplied more than 20,000 detection points to DB in various projects and applications. The latest ones have been commissioned with a serial interface to Thales interlockings.

Deutsche Bahn AG is convinced using train detection by axle counters as preferred solution delivered mainly by German suppliers.



Thales Sk30K on DB infrastructure

## Topping out ceremony in Ditzingen



The topping out ceremony for the new Thales Germany headquarters was officiated on 14th June only eight months after having laid the cornerstone. Starting in 2014, the activities of the current Thales facilities in Stuttgart, Pforzheim and Korntal, which represent the close ties between Thales and German indus-

trial history, will be consolidated here. This is not only an opportunity to improve the efficiency of business processes and to intensify the communication between corporate divisions. Thales will also significantly gain in stature: as a brand and solution provider on the one hand and on the other, as a company

that is deeply rooted in Stuttgart and is today successful in several high technology fields worldwide. Going forward, the construction of the new campus is therefore also an important foundation for the competitive capabilities of Thales.

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