THALES

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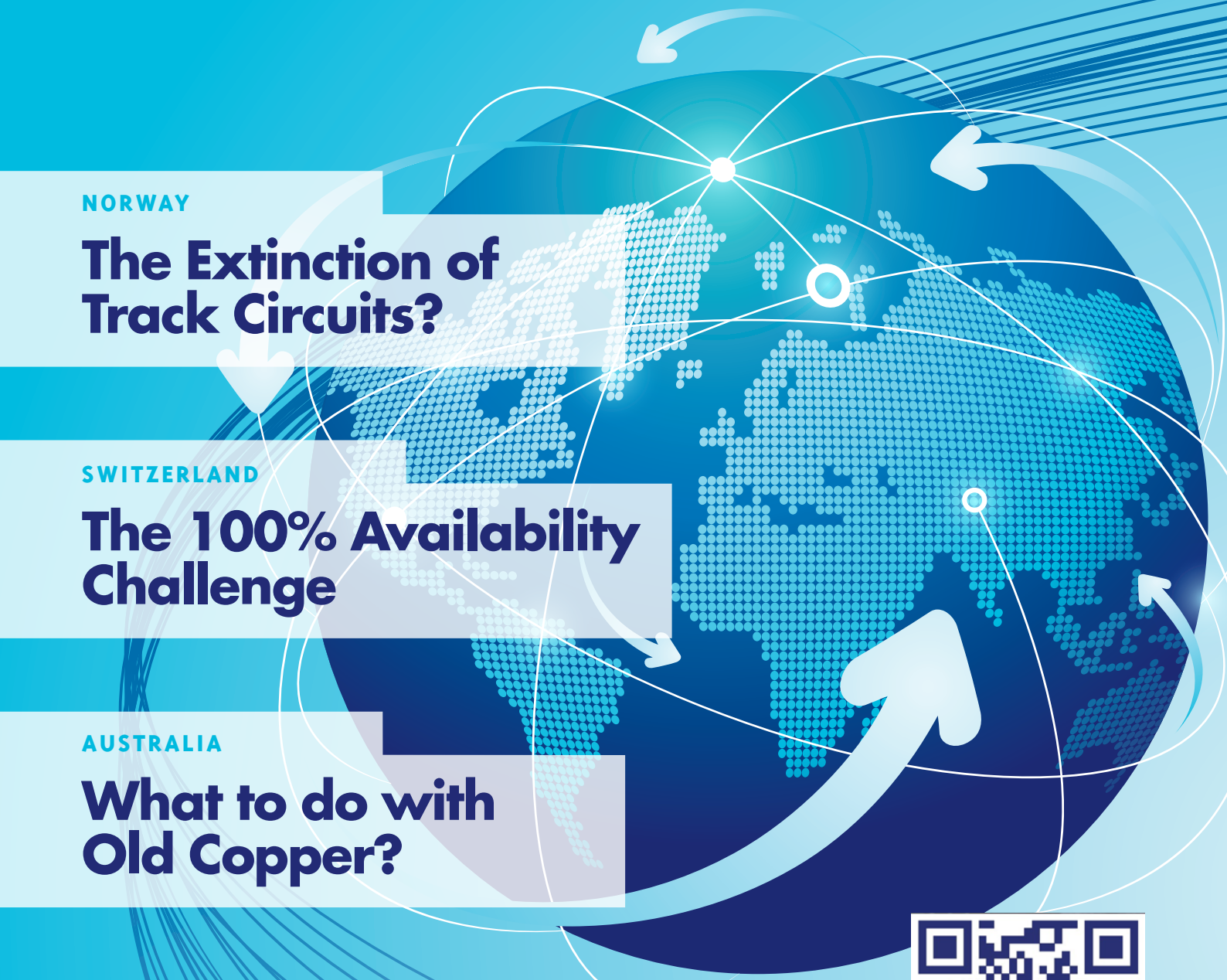
counting world

THE CUSTOMER MAGAZINE
FOR AXLE COUNTER SYSTEMS, EDITION 1



NORWAY

The Extinction of Track Circuits?

SWITZERLAND

The 100% Availability Challenge

AUSTRALIA

What to do with Old Copper?

Dear Reader,

The signalling equipment world is changing.

Technologies that have been distributed for decades as a collection of hardware modules, are transforming into a global system approach, fulfilling the complex requirements of modern railway signalling.

The same which holds true for the entire railway signalling system is particularly valid for Axle Counters: taking "Fail Safe" as a given, today's systems have to cope with ever increasing operational requirements in terms of reliability and availability, against a background of higher train speeds and higher train punctuality.

All of this of course, is in parallel with the need to reduce the overall Life Cycle Cost of the systems.

A good example for the change in technology is the interface between the THALES Axle Counter and the interlocking systems.
Even today, to the largest extent, relay-based interfaces are being used. However we are now seeing increased use of serial Ethernet interfaces, enabling the possibility of redundant and fault tolerant connectivity. This is just one of many advantages this solution brings with it.
I am convinced that in a 10 years time, this situation will be reciprocated and the use of relay-based interfaces will be an individual exception.

The use of Ethernet, transmission over fibre optical cable or even GSM-R has drastically reduced the quantity of copper cable along the railway line.

There will always be the need in signalling for copper cable on an operational railway. The challenge is to find the right balance between cost, functionality and availability.

The key to this is the application of modular systems, which scale from cost effective solutions to high-end solutions. Scalable 2-out-of-2, 2-out-of-3 or 2 times 2-out-of-2 Axle Counter systems with both, parallel and serial interface options, Ethernet connectivity and transmission for open and closed networks, is what we believe to be the key for continued success.

The cost of non-availability of tracks is one of the key aspects in today's operational railway. The Gotthard Tunnel project, where THALES provides the complete signalling system, has shown that the clever use of Ethernet and redundant system concepts over fibre optic cable is a feasible High-End Axle Counter application scenario of today.
This project shows that the cost of unavailability in the tunnel is much larger than the initial investment cost of the system solution.

Another important aspect of the changing environment is the increased significance of life cycle cost targets. Previously, equipment reliability and availability achievements were paramount, however today an equal emphasis is laid on ease of operation and maintenance, with condition monitoring becoming an increasingly important factor. Remote diagnostics to assist preventative maintenance, resulting in reduced fault finding and repair times, is one of the key investment areas of THALES.

This, together with the new services concepts for training and certification puts THALES in the forefront of technology and innovation.

It is our intention with this first issue of „Counting World" to give an interesting insight on some of the topics raised above.

We are delighted to welcome you as a member in the exclusive Counting World of THALES.

Volker Schenk
Vice President/CEO
Transportation Systems
Thales Deutschland

New Campus for sustained Growth

Thales Germany will move to new premises in summer 2014 in order to stay competitive in the future. Starting in 2012, an ultra-modern complex of buildings is being erected in Ditzingen near Stuttgart, offering around 51,000 square meters of usable space - and providing up to 2,000 places of work. The decision to move into new headquarters was made due to new orders in the domestic and export markets as well as due to a consolidation of locations in the Stuttgart metropolitan area. Thales hereby safeguards employment and commits itself to Germany as a location for business. As the world market leader in axle counter technology, Thales Transportation Systems Germany furthermore offers innovative railway signalling solutions for route and train control as well as network management to its main line and urban rail customers world-wide.

Success Story

for Thales Axle Counter System Az LM in Norway

In November 2011 Thales was awarded a contract by Jernbaneverket (JBV) to equip the Bane Øst project with the Multiple Section Axle Counter Az LM. The project is located close to Oslo on the line towards Drammen and comprises the main contract with several options.

The contract award followed the successful completion of the Flåmsbana and Sandnes-Stavanger Axle Counter projects by Thales.

The Norwegian rail infrastructure is currently undergoing a major renewal. JBV stated that the overall availability of the signaling system is one of the main objectives in this process. As they have identified track circuits (insulated joint type) as a major contributor to the non-availability of the signaling system, a decision was taken to replace the existing system on high priority lines.
Axle Counters have only been installed and are operational on one major line in Norway so far, which is Thales Az LM on the Sandnes-Stavanger line. Sandnes Stavanger is today the line with the highest availability on the Norwegian Network, thanks to Thales axle counters.
With the Bane Øst project, Thales will install Az LM axle counters on a second major line in Norway.
The scope of the contract incorporates the detailed design, installation and commissioning of the axle counter system and connections to several different types of interlocking. Thales will utilise its new detection point with the slim line heads, Sk30K, and electronic unit EAK30K.

Why Thales Axle Counters?

The rail contact Sk30K can either be mounted over the sleeper or between the sleepers. Both options give a variety of benefits to the railway operator. The Sk30K does not need to be removed from the rail during rail grinding activities. If mounted over the sleeper, even tamping is possible without the need to remove the rail contact which saves time and cost.
The rail contact 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.
Together with our local Thales Unit we are working closely with our customer, allowing us to meet customer specific requirements and tailored solutions based on the generic, modular Az LM product.
As market leader with more than 100.000 axle counter systems in service worldwide in more than 40 countries, and thanks to the outstanding performance and service of the Az LM axle counters in Norway, we look forward to delivering state of the art axle counters to Jernbaneverket after being awarded the Interlocking framework agreement which will be signed in September 2012.

Sk30K

EAK30K

The 100% Availability Challenge

Proven and Hardened Redundant Axle Counter Application with Az LM

The reliable detection of trains is fundamental to the safe operation of modern railways. This puts a great demand on the availability of modern train detection systems, because availability is a precondition for the reliable and safe detection of trains.

Since the reliability of any system is limited by the given MTBF values of the individual components within the system, only redundancy can improve the availability of the overall system. In areas with a high impact on operations, a 100%-availability is indispensable, e.g. on lines with a high traffic density, on operational bottlenecks or in tunnels, where the site access is limited or a train forced to come to a standstill causes major congestion.

The availability of a train detection system can drastically be increased by redundancy. The ultimate train detection system is fully duplicated to allow any component to fail but the signaling circuit remains functional. This arrangement provides highest availability, provided that both systems are of SIL-4 type and the failed systems can be restored within a reasonable period of time.

Where the indoor equipment already provides some redundancy (e.g. a 2-out-of-3 system), only the outdoor components need to be duplicated (including cabling) to achieve full redundancy.
The redundant configuration of a single 2-out-of-2 system uses the complete duplication of indoor and outdoor components. This redundant system concept has been applied and successfully proven with Thales Axle Counter System Az LM on various projects.

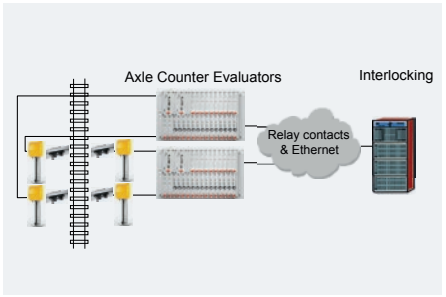
Thales Az LM with duplicated systems have been in service since 2005 making Thales the frontrunner in this technology worldwide.

In Switzerland two lines are using a full redundant design: The new double line between Bern and Zürich and the Lötschberg tunnel with a mixed traffic of 110 trains a day (international passenger trains, national InterCitys and heavy cargo trains) at a maximum speed of 250 km/h with a headway of 180 seconds.

The train detection system for the ongoing Gotthard tunnel project in Switzerland is designed in a similar way by using a redundant fibre optic backbone to connect Detection Points, Axle Counter Evaluator and Interlockings. In Netherlands, the double track high speed line HSL-Zuid with trains running at a maximum speed of 300 km/h creates a high demand on the availability of the system.
Since non-availability of the track infrastructure very often causes compensation payments from the owner of the infrastructure to operations, the additional investment reduces the overall Life Cycle Cost and enhances safety by a 100% availability.

HSL Zuid high speed line, The Netherlands

Lötschberg tunnel, Switzerland



Full redundant 2-out-of-2 configuration

IP Connectivity

Seamless standardised serial interface for train detection

In order to reduce the complexity and the cost of their infrastructure railway operators are moving from closed system architectures to open systems. For the interface between the interlocking and the electronic train detection an IP-based interface according to EN 50159 via closed or open networks has been selected as the best choice.

Thales Az LM is the first axle counter system which can be connected to an electronic interlocking via open or closed networks. This versatility reduces the complexity of the interface between the axle counters and the interlocking. Reduced complexity means less interface components, e.g. relays and opto couplers resulting in cost reduction and increased availability.

The unique modular architecture of Thales Az LM enables centralised as well as distributed architectures as 2-out-of-2 as well as 2-out-of-3 systems with redundant or non-redundant equipment.

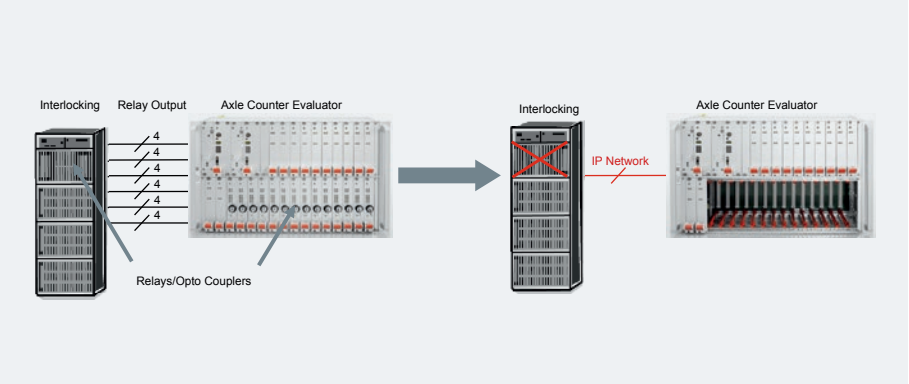
In order to align the interfaces used in their infrastructure, major railway operators have started standardisation initiatives.

Thales supports the major standardisation streams in Europe. The interface standardisation is resulting in a common definition of the interface from electronic interlocking to train detection.

Thales has implemented the standard interface SAHARA protocol (**SA**fe, **H**ighly **A**vailable and **R**edund**A**nt), which has been operational since 2010. SAHARA offers all services for a safe and highly available communication via redundant physical channels. With the implementation of SAHARA, Thales is at the forefront of the industry.

The SAHARA protocol is proven in use on several interfaces – interlocking-RBC, interlocking -interlocking, interlocking - axle counter system – and with several signalling manufacturers.

Standard IP-based protocol between interlocking and Thales Az LM is successfully in operation in the networks of Finnish Transport Agency, German Railways, LDz (Latvia), PKP (Poland), Swiss Railways, SZ (Slovenia), ZRS and ZFBIH (Bosnia and Herzegovina).



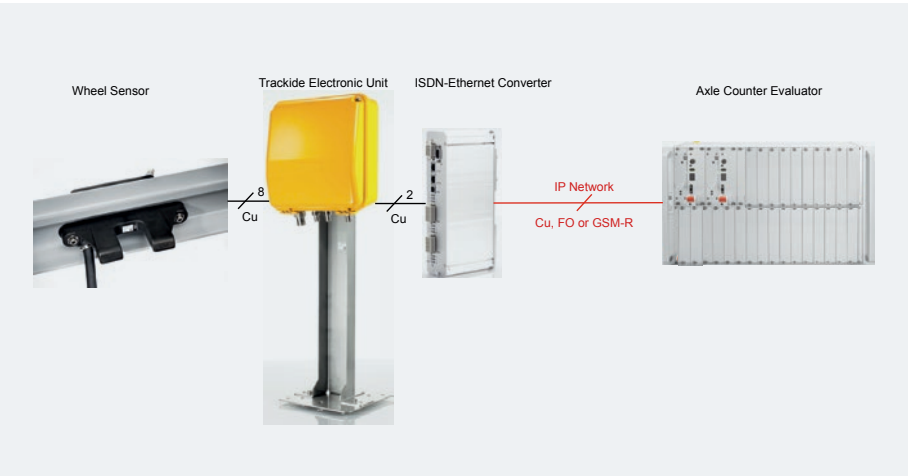
Seamless integration of outdoor components into IP networks

The architecture of modern rail signalling systems is moving towards distributed remote trackside units (TCU) responsible for the control of railway field elements in their locality. These units are typically connected through an IP network, spanning from the centralized interlocking safety modules down to the remote TCU.

Thales Az LM axle counter system is offering a unique architecture for these solutions. The centralized axle counter evaluator (ACE) is located with the interlocking safety modules. This centralizes the maintenance of configuration data and software giving an OPEX advantage to the operator.

Thales intelligent detection points Zp30H and Zp30K at the trackside do not require either data or software maintenance, and deliver the full status of the detection point to the ACE, from where the information can either be fed into the maintenance system of the interlocking or into a separate maintenance system.
In the TCUs Thales ISDN-Ethernet converter is used to connect two detection points directly to the IP network. In this way the counting data can be transmitted over any media: over copper, through fibre optics or through air.

This architecture also returns a CAPEX saving at the centralized interlocking. As the detection points are connected directly to the ACE through an IP network, no serial I/O boards are needed in the ACE. If the connection to the interlocking is also through an IP interface, then an additional CAPEX saving is possible, as no parallel I/O boards are needed in the ACE.



Success Story

Queensland Rail National deploys Axle Counter System Az LM as 1:1 replacement for existing track circuits

EAK30K

Thales was approached by its customer Queensland Rail National, Australia, to develop a solution for several axle counter detection points to be connected over an available pair of an existing signalling cable in brown-field environment, to directly replace old track circuits becoming obsolete.
Thales proposed a "Multi-Drop" solution to Queensland Rail National, with the Az LM detection points connected to its centralised evaluator as it can be multiplexed over a digital transmission system.
For this configuration, the ISDN links of detection points are connected via Thales ISDN/Ethernet converter to Ethernet extenders which are linked together with SHDSL (Symmetric High-bit rate Digital Subscriber Loop) transmission.
The SHDSL transmission will provide benefits for customers in cost savings and installation time by reusing existing cable infrastructure, from track circuits.

Even unshielded cables for the connection of outdoor equipment to the indoor equipment of the Az LM can be used.

So no new cable trenching and cable installation is required, hence saving further costs.
Caused by the low need of data traffic in Thales axle counter applications, the distance between SHDSL modems achieves up to 10km and more.
In addition, the Multi-Drop solution offers the availability to create a secured and protected solution with redundant ring networks. The use of Ethernet-extenders allows also the possibility to access and control the network components remotely for diagnostic purposes.
After installing the equipment at a trial site in Queensland, the performance was closely monitored by Queensland Rail National and Thales.

The Axle Counter system Az LM with Multi-Drop application has been working reliable over a period of more than 12 months now.

The new rail contacts, Sk30K, were installed over the sleepers and did not require removal during frequent tamping and grinding operations, demonstrating another cost saving of the technology to the maintainer.
The fault free performance of the axle counter system, which included the tolerance to electrical noise within multicore multi service cables and environmental influences (e.g. lightning strikes, rolling stock) together with reliable detection of high rail vehicles with small wheels was sufficient to gain a type approval for the application for Thales Axle Counters in June 2012 and underlines the versatility of the Az LM Axle Counters.

Customer Testimonials

SBB CFF FFS

"The Schweizerische Bundesbahnen SBB is successfully operating 5000 detection points with Thales Axle Counters on the Swiss railway network. In the Swiss railway tunnels projects, Thales Axle Counters are achieving an impressive availability."

Mr. Andreas Horvath
Infrastruktur Sicherungsanlagen
Schweizerische Bundesbahnen SBB
Switzerland

Liikennevirasto

"The national rail infrastructure administration, the Finnish Transport Agency (FTA) is utilizing Thales axle counter systems successfully since 1990's. The systems in use are working reliable under Nordic climatic conditions with winter temperatures down to -40 °C and axle counting is the preferred track vacancy detection solution in Finland due to its many benefits."

Mr. Aki Härkönen
Head of Control and Safety Systems
Finnish Transport Agency
Finland

QR NATIONAL

"QRN together with Thales in Australia, has successfully implemented axle counter detection points over an IP network to the evaluator using an existing 50 core signaling cable as the communication bearer. Overall, Thales have been an active partner for the introduction of this equipment into QRN's transport system."

Mr. Christopher Truscott
Principal Signalling Engineer
QR National
Australia

NetworkRail

"The Thales Az LM axle counter system is assisting Network Rail in meeting its obligation to reduce the cost of running the UK railway network."

Mr. Graham Wire
Route Asset Manager
Network Rail Infrastructure Limited
United Kingdom

Jernbaneverket

"The Sandnes-Stavanger line is today the line with the highest availability on the Norwegian Network, thanks to axle counters, despite some of our oldest Interlocking Systems."

Mr. Kjell Holter
ERTMS Programme Manager
Jernbaneverket
Norway

Iarnród Éireann

"Irish Rail are very satisfied with the performance of our Thales Az LM Axle Counter Systems which have been in service on our Rail Network for over 8 years."

Mr. Ronan Feely
Senior Signalling Technical Support
Iarnród Éireann
Ireland

High-Tech

„Made in Germany“

With a history dating back to 1938, the Arnstadt site today is the complete and exclusive producer and supplier for transportation systems technologies and pre-assembled systems for THALES.

On a site of more than 22.000 m², and around 380 employees it manufactures state-of-the-art products and systems for mass transit and main line applications.

As the business domains' only manufacturing plant worldwide, it is certified as a Q1 supplier (classification pertaining to manufacturing and quality-related performance) of Deutsche Bahn AG, as well as to DIN EN ISO 9001:2000 and DIN EN ISO 14001.

This site in southern Thuringia manufactures highly sophisticated industrial components for outdoor use, such as axle counter systems, track magnets, colour light and LED signals and point machines. In addition the facility focuses on assembling and testing not only highly complex printed circuit boards, but also complete systems, such as electronic interlocking systems, automatic train control systems (ETCS/LZB) and traffic control systems. Components for relay interlocking systems, such as signal relays, relay assemblies or racks are also assembled and tested at the Arnstadt site.

The logistics and materials management sector relies on high-performance PPC systems for manufacturing planning, execution, delivery management and transport products according to individual customer needs and preferences (rail, road, air or sea).
With its own centre for training factory apprentices and students, the Arnstadt factory is keeping the pace with the fast evolving technology trends.

THALES FIT FOR THE FUTURE

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