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InnoTrans 2014 EDITION



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Base Valves**



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Actuators**



**Complete Freight
Systems**

With a broad range of pneumatic components technologies, Parker delivers safety, reliability and efficiency for the latest generation of freight wagons. At Parker we design, manufacture and support innovative solutions for freight wagons applications such as interlocked wagon cargo discharge doors.

When collaborating with manufacturers of freight wagons, our commitment is more than making standard components to fit difficult applications. Working as partners we help our customers to create solutions that not only fulfil their engineering expectations but deliver real commercial value.

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Welcome to the new railway-news magazine *InnoTrans* special.

As with our website www.railway-news.com the aim of this magazine is to highlight to our readers some of the latest advances in Train, Rail and Track Technology that you can hope to see from some of our suppliers at The 2014 InnoTrans Exhibition on 23rd to 26th of September in Berlin, Germany.

We hope you like our electronic magazine and if you have any questions, please do not hesitate to contact our suppliers directly or if it helps contact us and we will happily help make the contact for you.

Have a fantastic InnoTrans exhibition and we hope to see you there.

Andrew Lush

Director

www.railway-news.com

A2B Global Media

Third Floor,
11-15 Dix's Field,
Exeter, EX1 1QA

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Discharge system for freight



PARKER HANNIFIN DELIVERS PNEUMATIC SAFETY, RELIABILITY AND PERFORMANCE FOR THE LATEST GENERATION OF FREIGHT WAGONS.



When it comes to the global rail industry there can be no doubt that rolling stock such as engines, carriages and freight wagons operate in some very challenging environments. From extremes of temperature to harsh working conditions, solutions utilised have to be able to cope with a wide variety of potential threats. Within the rail industry the guarantee of uptime and operational use is often the difference between maintaining profits or not.

Having gained a worldwide reputation for quality and reliability Parker Hannifin has been partnering with some of the world's leading global rail companies for over 30 years. With in-depth engineering expertise coupled with innovative integrated solutions, Parker products can be seen in every corner of the world, coping in many challenging operating environments.

Parker Hannifin have global experience of pneumatic control of wagon cargo discharge doors, working with major manufacturers of freight wagons designated as FALNS. Traditionally hopper wagon doors are controlled manually or

by a variety of pneumatic components and controls. These methods are still widely deployed throughout the industry. With this in mind, Parker's rail engineers have designed an integrated solution that would go above and beyond its customer's expectations.

The real challenge for any supplier of pneumatic components is to offer solutions that add value combining operational excellence with the ability to cope with the working environment, maximizing profit potential for the customer.

Typical projects call for reliable opening of the freight hopper doors on either side of the vehicle, giving flexibility to the operator to unload from the left or right depending on the destination's configuration. This can require the wagons themselves to have two sets of controls to enable independent opening on either side. Independent operation of the doors is a critical safety requirement. Parker's solutions are also able to withstand extremes of temperature from -40C to +60C and for the control cabinets to be completely sealed against water and

dust ingress.

Parker manufactures and supplies components that are ideal for deployment in the application, typically, P1D actuators, Viking Extreme in line valves, DXR ISO Valves, an integrated combination of air preparation equipment from the Global Air Preparation range and VA series heavy duty brass bodied valves.

These products are chosen not only for extreme reliability but also for the ability to cope with the environmental challenges that the rail industry demands. These are then coupled within a Parker designed and built pneumatic control cabinet and user interface panel (which controls the physical opening). Both units are sealed to prevent the ingress of dust, which can be present in coal environments and lead to equipment damage.

Parker's products are also thoroughly tested and meet the highest standards in term of:

- **Shock & Vibration (IEC61373:1999 Category 1)**
- **Fire standards (EN45545-2: 2013)**
- **Low/High temperatures (EN60068-2-1, test Ad/ EN60068-2-2, test Bd)**
- **Humid Climate (BS2011: Part 2.1 Db: 1981)**

It is also particularly important to have a short-term resistance to water because the wagons are sprayed with hot water spray in winter to defrost. (max water pressure of 3 bars up to +70C)

In the rail industry, air leakage across the system represents a major concern. Systems need to remain pressurised to operate the valves and cylinders effectively. Despite often being overlooked, Parker engineers are able to achieve significant leakage reductions, ensuring pressurisation and resulting in more reliable operation.

With dual sided coal hopper wagons it is very important that both sets of doors cannot be opened at the same time as this could potentially injure anyone close by. If the vehicle is to be unloaded from the right, then the operator must have a complete line of sight down the right

hand side of the vehicle. The operator also needs complete peace of mind that the left hand door will not open. To solve this problem Parker engineers designed an interlock into the system. The interlock makes it impossible for doors on both sides of the wagon to be open at the same time, guaranteeing safety.

With the customer in mind, Parker knows that every solution needs to be proven before being installed on a wagon. As part of any research and development phase, solutions will undergo extreme testing to ensure they are fit for purpose. To do this, Parker engineers designed and built a complete bespoke test environment. This whole pneumatic system was then tested over 3500 cycles with a hydraulic simulated resistance, representing a mock-up field trial of around six years. The solution performed perfectly, so Parker's engineers are confident that the quality and reliability will more than meet customers' expectations.

Parker supply a complete set of equipment, ready to be installed on to the wagons. There are no individual components to install other than the external actuators; the solution is plug-and-play so the customer can benefit from reduced assembly times. Functional

testing is also done on assembly reducing on vehicle test requirements and hence further time saving, resulting in quicker time to market.

When it comes to support it is also important that Parker, as a supplier can offer support on a truly global scale. Parker Hannifin is present in over 48 countries around the world, which gives confidence to customers that Parker can deliver the service if required.

About Parker Hannifin

With annual sales of \$13 billion in fiscal year 2013, Parker Hannifin is the world's leading diversified manufacturer of motion and control technologies and systems, providing precision-engineered solutions for a wide variety of mobile, industrial and aerospace markets. The company employs approximately 58,000 people in 49 countries around the world. Parker has increased its annual dividends paid to shareholders for 57 consecutive fiscal years, among the top five longest-running dividend-increase records in the S&P 500 index. For more information, visit the company's web site at www.parker.com, or its investor information web site at www.phstock.com.



TRU Simulation + Training

ENGINEERING & MANUFACTURING SOLUTIONS



About Us

TRU Simulation + Training, a Textron company, delivers full-spectrum solutions, superior technical support and outstanding customer service to the civil

and military simulation and training markets. TRU's custom-built, true-to-life training solutions are trusted by customers worldwide. Our team operates out of four facilities across the USA and Canada and has customer support centers located all around the world.

TRU is well-known for its aircraft simulation and training systems, and it has also expanded its capabilities to the railway industry. We apply our proven engineering expertise to design, produce and deliver complex hardware systems compliant with the highest quality standards, ensuring that operators are trained in the most realistic environments possible.

Our team of experts apply scientific principles, multi-disciplinary and

comprehensive design, and state-of-the-art production capabilities to produce industrial grade products and services.

Our Products and Services for the railway industry

We have partnered with several renowned organizations in the transportation industry for the supply of complex hardware equipment for training systems. TRU's technical approach is focused on minimizing risk during the design and production cycle and on providing products with low life-cycle and operational costs.

Training systems include simulators for rapid transit drivers, which are designed



to accurately replicate the ergonomics of the train driver's working area.

Full scope metro train driver simulator:

Our full scope driver simulator benefits from a state-of-the-art display system and interface technologies that are the core building blocks of the TRU suite of land vehicle training equipment. The exceptional fidelity of the simulator enables operators to perform all the training tasks required before entering the real train cab.

The main features include:

- Operator Station
- Realistic replica of the driver environment
- Visual display
- High-fidelity 270 x 40 field of view primarily & secondary display system
- Geospecific & Geotypical environment
- Precise development of performance and systems models
- Accurate simulation of malfunctions and incidents

Photo caption: Full Scope Metro Train Simulator

Ergonomic Training Desks:

Our training desk posts are comprised of a set of six displays replicating the operator station. They are designed to help students get familiarised with the train layout and the use of the different control panels located in the cab.

Each post consists of:

- Up to 3 color flat panel LCD displays
- Up to 3 color flat panel touchscreen displays
- Main operator instruments (real or virtue)

The training posts have a center and left console that encompasses the real line replaceable units of the metro/train. The training posts can be stand-alone or networked.

On Board Systems:

We design and manufacture ruggedized custom hardware systems capable of resisting the most unforgiving environments. Heat, dust, moisture, shocks and vibrations are only a few examples of the challenges encountered. Our systems are made to resist these threats and last for extended periods in challenging terrains or emplacements. Photo caption: Ruggedized Infotainment LCD Displays for the Railway Industry.

Key features:

- Protect against EMI/EMC (electromagnetic interference / compatibility)
- Fire resistant
- Anti-graffiti thanks to multi-layer plastic
- Resist high impact shocks
- High-definition LCD
- Easy to repair
- Life-span of 40,000 hours / 20 years

Meet all standards:

- Environmental
- IEC60529:2001
- IEC60068-2-30:2005
- IEC61373:2010
- EMC
- CISPR 11 (EN50121-3-2 Levels)
- IEC 61000-4-2/3/4/5/6
- IEC 60571 (Figure 4b, waveform A)
- IEC 60571 (Section 10.2.9.1)
- IEEE C37.90.1



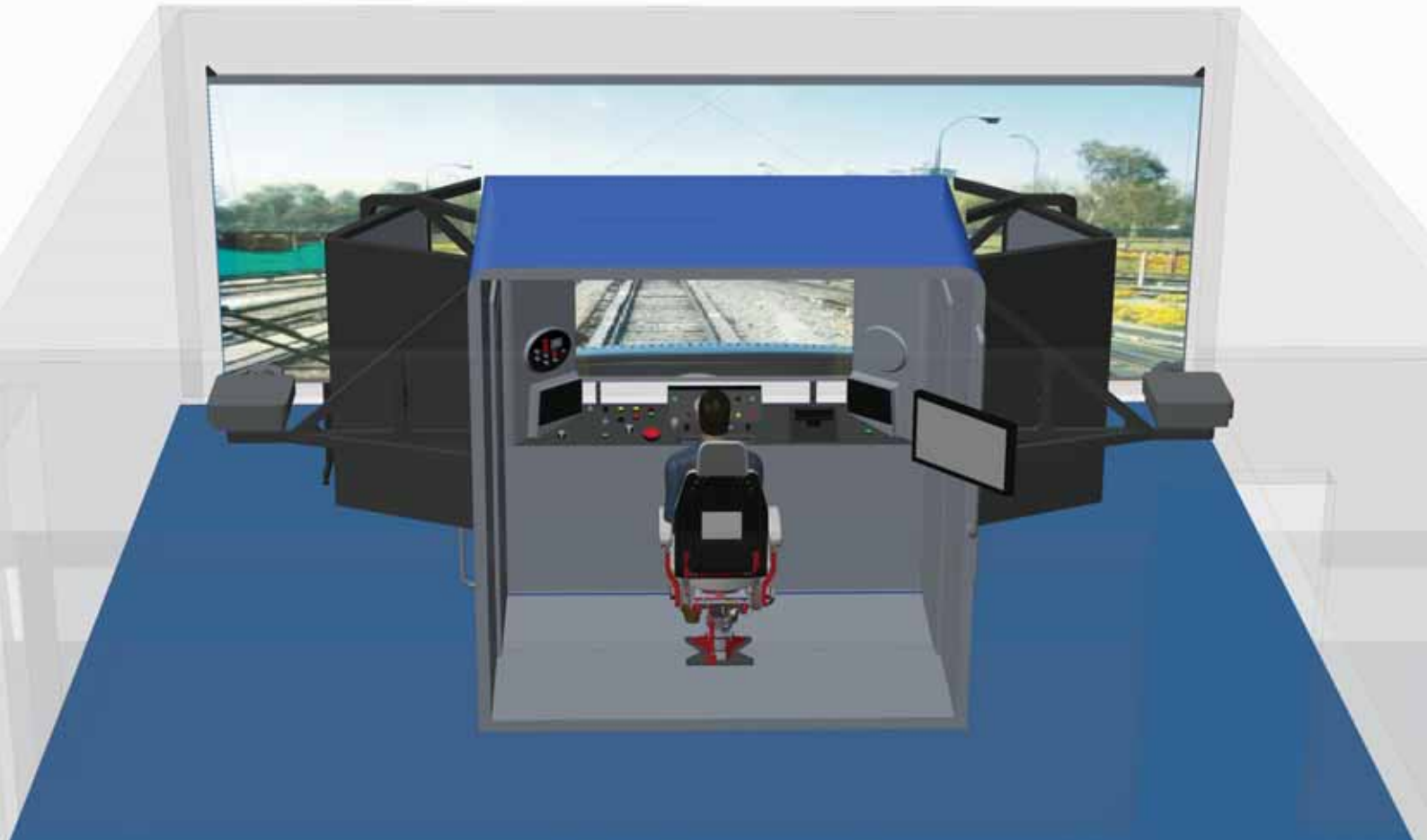
We differentiate ourselves by:

- Customized Engineering & Manufacturing solutions
- Vertically integrated engineering and manufacturing
- Quick prototyping capabilities
- Superior engineering solutions and designs
- Meet military, railway, nuclear and commercial requirements/standards
- Flexible build cycles, low volume manufacturing and built to print
- Customized solutions to meet clients' needs
- High reliability & proactive product support
- Stand behind our product, 24 hour customer line



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Passenger information displays – Development driven by needs

A MODERN CUSTOMER INFORMATION SYSTEM (CIS) MUST SIMULTANEOUSLY MEET THE NEEDS OF TWO CLIENT GROUPS; FIRSTLY THOSE OPERATING THE STATIONS AND, SECONDLY, PASSENGERS USING THOSE STATIONS.

Through continuous innovation, famous reliability and highly respected customer service Infotec Ltd. has continued to meet the needs of both, and as a result is the leading supplier to the UK rail industry.

We pride ourselves on the high levels of customer service that we provide across all aspects of our business.

As the market leader who continues to demonstrate commitment to product and service innovation and outstanding customer care, Infotec is, literally, a winner.

Drivers of change

The two customer groups have a common demand - each requires up to

date, accurate information on legible displays, whatever the environment. But each has its own desires; some shared but with different motivations, others exclusive to them. It is these motivations that drive changes in CIS provision.

Legislation has also impacted. For example, compliance rules under the Equality Act 2010 demand that LED displays have 9-pixel high tiles, permitting upper and lower case characters with full ascenders and descenders. This ensures the 'shape' of the word is recognised by people with impaired vision.

To meet this, Infotec designed replacement 9-pixel high tiles with

exactly the same footprint as the previous tiles. This has allowed retro-engineering to update existing displays at minimum cost.

Customer expectations

One of the most powerful reasons for changes in recent times has been audience demand. Infotec's very latest displays, the T Series, take account of the expectations of an Information Age audience.

The range gives viewers sharp HD contrast, brilliant colour rendition and excellent viewing angles. The multi-core processor enables the T Series to display crisp HD (1920 x 1080) stills and video at up to 60 frames per second

without affecting passenger information delivery.

Speakers can be included in the form of an integrated 'sound bar'. This feature can utilise Infotec's text to speech (TTS) engine to provide local PA messaging. Alternatively, the sound can be synchronised with video for a full multimedia experience.

While taking account of the user, the T Series is also designed with overall station management and location-specific operatives in mind. It employs power management control to reduce power consumption.

The range is fully serviceable via the hinged front panel, allowing routine checks, maintenance and component replacement on site. Diagnostics, firmware upgrades and other software maintenance can be performed remotely, reducing downtime and maintenance costs.

Communication

One of the most important building blocks in the development of today's displays is how data is derived and sent to them. Eleven years ago Ashby-based Infotec worked with ATOS Worldline to implement the EDF protocol that could be generated generically by their control system. This is now one of the most common protocols for driving displays in the UK rail industry.

The success of the first major concourse display at London Euston using the EDF protocol led to its nationwide use, with projects at Charing Cross, Paddington, Edinburgh Waverley and Liverpool Street among those that followed. Over 10,000 displays are now driven using this protocol.

There is a variety of differing protocols used on the UK rail network which raised its own challenges. To overcome this and to ensure system independence, heavy investment into the new generations of controllers was necessary. Infotec's range of controllers

has always been able to automatically recognise UK rail industry standard protocols; communicating via Ethernet TCP/IP, RS485, Wireless and GPRS/3G.

Innovation

A second significant innovation is the way that displays are driven. Prior to advances in controller technology customers had to source the data they wanted to display and carry out the complex task of formatting it.

The new generation of controllers allows users to send data-only packages to the signs. The display's on-board controllers then decipher the data - from whatever source - and format it. This reduces staff resources and the amount of bandwidth required.

Beyond these developments in data delivery, further progress has been made in display management that improves display functionality and reduces expensive downtime. Infotec's AIM (Advanced Information





Management) system is a simple but effective web-based content management system which, in addition to Ethernet, RS485 can also use GPRS to deliver data to displays.

With the AIM system deployed, customers can access displays from any web-connected computer in the world. They can view their estate asset register, check performance, update firmware, carry out diagnostics checks, send messages, receive fault reports via email, view what is being displayed (display mimic) and assign RSS (Rich Site Summary) feeds.

AIM is currently deployed by train operating companies including Southeastern, East Midlands Trains, Northern, Eurostar, First Great Western, Cross Country, London Midland and ScotRail.

Cost-effective use

Ensuring systems are cost-effective is key and various developments have addressed this; some making CIS an option in locations where previously

the outlay required could not be justified.

In smaller stations the lack of communication options has been a barrier to installing customer information hardware. But now, using GPRS technology, displays can receive data in the way a mobile phone does. This, used in conjunction with AIM, enables displays to be updated, diagnosed and maintained remotely from any Internet-connected device.

Cabling across the tracks at smaller stations is a time-consuming and expensive option. This can now be overcome using robust and secure wireless radio technology. Standard cabled displays are fitted with a wireless transmitter, then additional remote displays with receivers can be added.

There is no loss of functionality and normal remote diagnostics are unaffected. Brighton station has dozens of wireless displays, with other locations including East Midlands Trains stations and Paddington.

The future of CIS

As explained earlier, recent developments are driven by audience demands for screens displaying a variety of HD media

The Linux/Android platform used by the T Series is open for customisation whilst an optional SSP (Infotec's Software Support Package) allows programmers to use standard languages such as C/C++. Infotec's Genius scripting can be used for ultra-low bandwidth applications such as passenger information displays whilst the HTML5 compliant browser offers numerous possibilities to today's programmers.

This is seeing much wider use of Infotec's displays in terms of physical location – retail outlets, first class lounges, coffee shops and pub/restaurants are among places they can be found.

The final development to have transformed displays relates to sound. Infotec developed its microPA systems as a viable alternative to other



automated PA and Long Line PA (LLPA). Its system uses a sophisticated Text To Speech (TTS) engine to create announcements, rather than the segmented speech used by others.

The display technology receives textual information from the CIS system central computer and interprets this to produce the visual output. This same textual information is used as the TTS input, allowing the microPA units to create audio announcements directly.

Spoken words comprise small sound segments called phonemes and these

are created for use in the TTS engine using actual recorded voices.

Over 2000 UK place names were analysed and optimised for Infotec's TTS library with emphasis on ensuring place names – including complex Welsh ones – are pronounced as correctly as possible.

Next time you see a customer information display you will realise there is more to it than meets the eye – and ears!

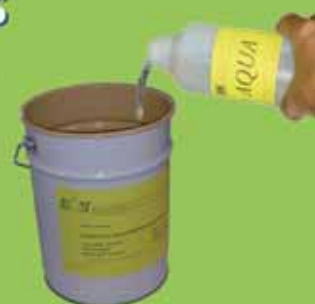
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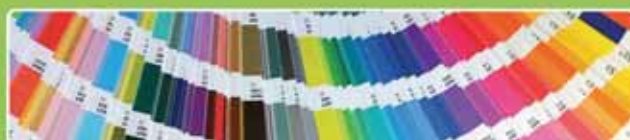
We help Operators, Manufacturers, OEMs, Designers and Maintenance Companies cut the costs of their new build or refurbishment projects.

Our headquarters in the center of Europe, our facility in the USA and our global network of local agents, distributors and representatives allows HSH to provide the best service worldwide.

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water borne coatings



The UK's leading manufacturer of passenger information displays



Infotec is an award-winning manufacturer of passenger information displays, public address systems, display content and asset management software.

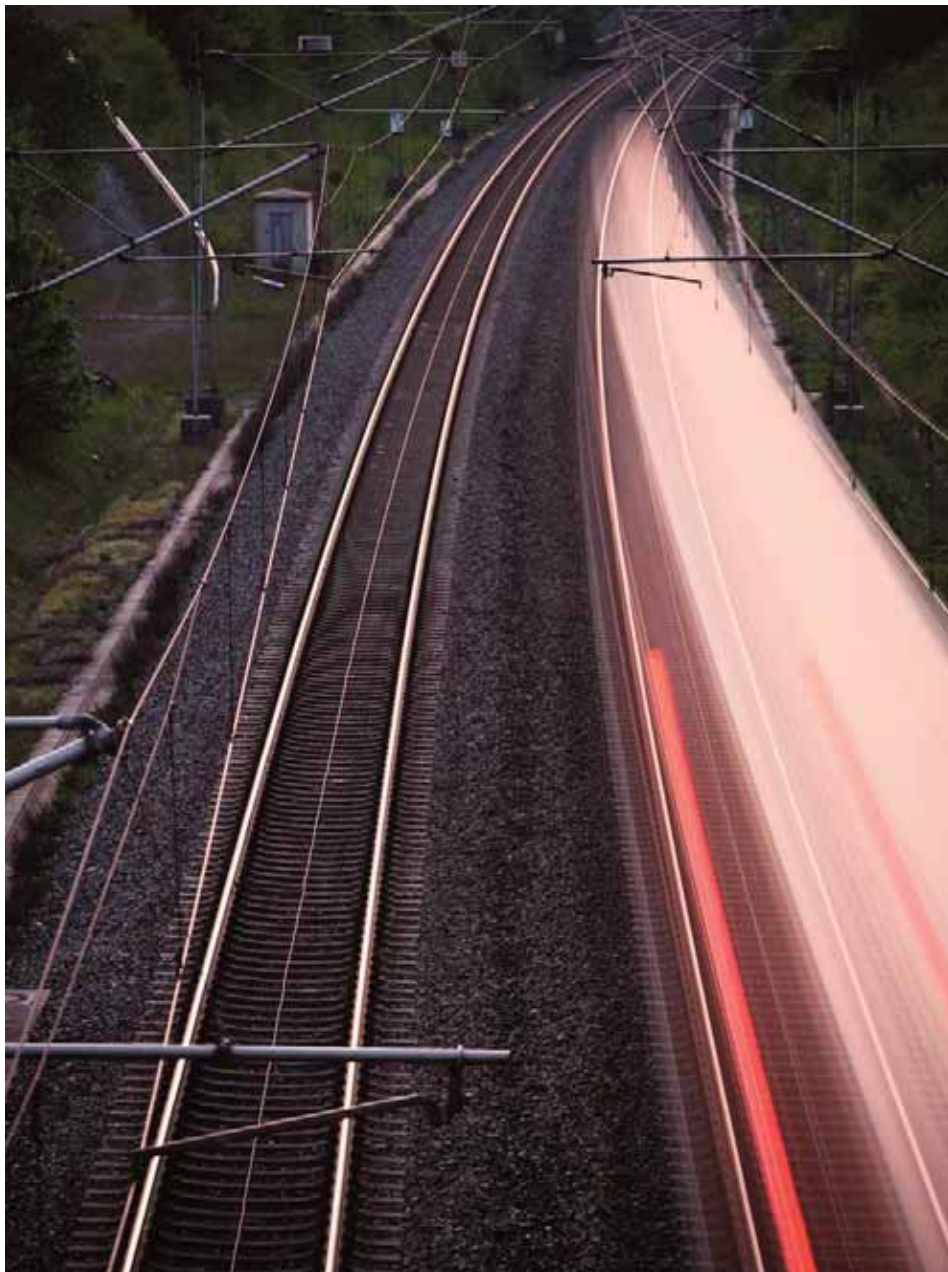
Today, over **8,000 Infotec display solutions** are in use on rail, bus and metro systems at over **1,000 locations across the UK**.

Internationally, Infotec displays are being deployed at a growing number of locations worldwide.

BT Cables – Who are they?



BT CABLES MAY BE A NEW NAME TO SOME BUT IT HAS A LONG AND PROUD TRADITION OF CABLE MAKING



BT Cables may be a new name to some but it has a long and proud tradition of cable making from its manufacturing facility in Manchester, North West England, which nestles conveniently at the heart of the UK motorway network enabling speedy access to the whole of the UK, Ireland and continental Europe via major shipping ports. In fact, the Manchester facility will celebrate 120 years of cable making in 2015, no mean feat in an extremely competitive manufacturing environment. BT Cables is the last major manufacturer of copper telecommunication cables in the UK and a major supplier into the UK rail network having manufactured and delivered over 1.4 million metres of rail cables in the last 18 months.

BT Cables is a wholly owned subsidiary of BT Plc having been acquired in July 2012. Since then the business has benefitted from significant investment in both equipment and resources from its parent company. Coupled with the investments is access to BT's Global infrastructure which has a presence in over 170 countries and is supported by expertise drawn from across BT's network of complementary business units.



BT Cables commits to enter the European Rail market.

The next stage in the development of BT Cables is a clear commitment to enter the European Rail market. This activity is already underway and BT Cables is currently actively pursuing the necessary product approvals to enable its products to be installed in the European rail infrastructure. In addition to its expanding range of manufactured products, BT Cables will be able to offer European rail companies a full package of additional services including logistics, drum management, cable cutting and other added-value services all supported by world class customer service to make the whole process simple and efficient. BT Cables has also demonstrated its expertise in project management and value engineering, the latter producing reductions in whole life costs, the benefits of which it shares with its blue-chip customer base.

Responsible Manufacturing

BT Cables prides itself on its record of responsible manufacturing. It is one of the few companies within the industry to have an Environmental Manifesto. The company is ISO 14001 certified and fully compliant with RoHS requirements. Amongst its other accreditations BT Cables is ISO9001 and ISO18001 (Occupational Health and Safety) certified and is pleased to have been awarded its ninth straight gold award for making ongoing improvements to health and safety. BT Cables received the Gold Medal at the Royal Society for the Prevention of Accidents (RoSPA) Occupational Health and Safety Awards in Birmingham on 14 May 2014.

Business Philosophy

The BT Cables business philosophy is simple:

Understand its customers' needs!
Develop solutions to meet those needs!

Ensure it delivers first class quality product, on time, every time!

BT Cables operates world-class manufacturing facilities and has designed and delivered a host of innovative new services and solutions. As an extremely customer centric business, these services are specifically designed to take cost and overhead out of the supply chain.

So why choose BT Cables?

- **Confidence** – As a sole supplier for many years to BT's local network business, Openreach, BT Cables has proved itself as a capable and reliable business partner.

- **Competitive prices** – industry benchmarking by BT means all BT Cables customers can be assured of best value for money.

- **Products and Service** – a comprehensive range across key market sectors

- **Cable handling and logistics** – providing end to end solutions

- **100 years plus** – experience and expertise. We know better than most how to make cables!

- **Philosophy and promise** – you know what to expect from BT Cables

- **Supply chain efficiencies** – keeping costs under control

- **Protected** – Business Continuity Plan to ensure supply to our customers in any event.

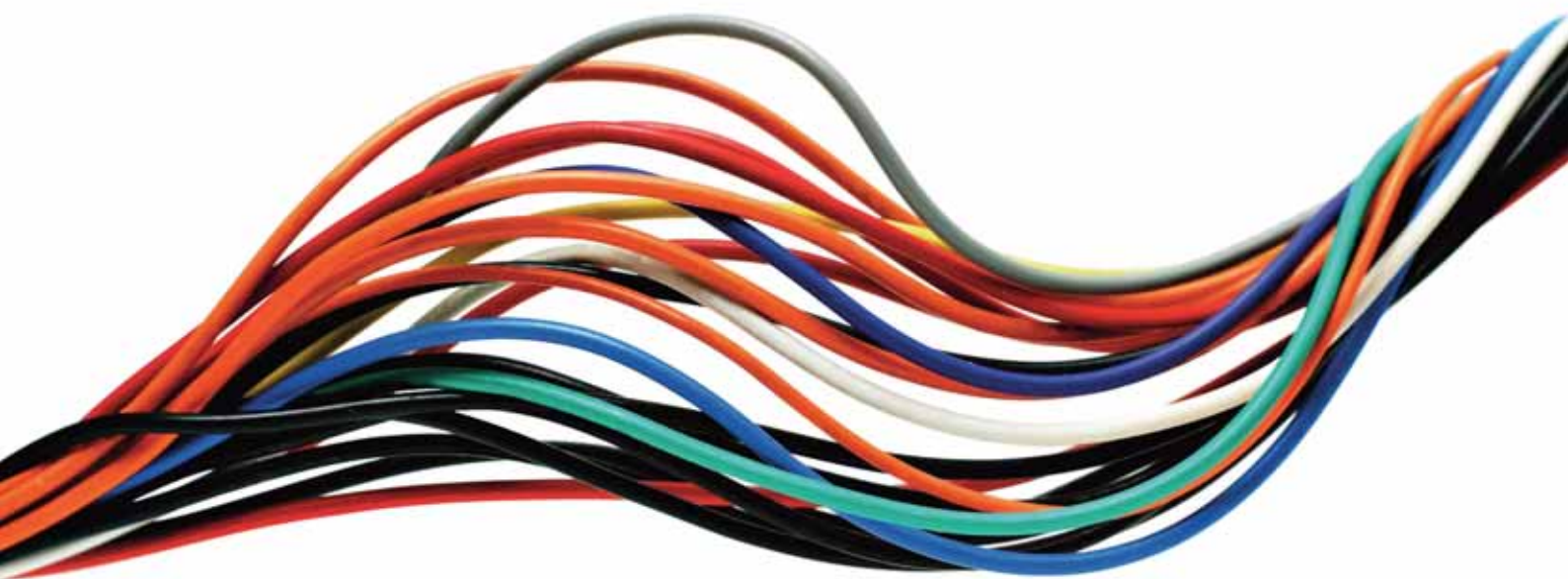
BT Cables

A subsidiary of



BT Cables

A world leader in cable manufacturing



As a world-class cable manufacturer and supplier of cabling products, we also offer one of the strongest support networks in the industry.

We serve a prestigious, blue-chip customer base with our cables and outstanding value added services.

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- Trackside communications
- Optical fibre
- Signalling
- Low voltage power

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Cytec–The solution for light weighting and fire protection

MARK STEELE, CYTEC R&D DIRECTOR INDUSTRIAL MATERIALS, DESCRIBES THE BENEFITS OF CYTEC PREPREGS.

Cytec is a leading supplier of composite materials, process consumables and tooling to industries that demand rapid response, short lead times, flexibility and strong customer support. From global manufacturing and distribution to local sales and service teams, Cytec partners with its customers to deliver the right solution to meet their needs.

The benefits of composite materials

The benefits of advanced composites have long been exploited by the Aerospace, Defence and High Performance Automotive industries. At a time when light weighting is becoming more important for rail

rolling stock, it seems a logical progression for OEMs to move from metal or GRP to more advanced engineered prepreg technology.

A properly designed advanced composite panel can weigh as much as 40% less than one made out of GRP, 50% less than aluminium and a massive 80% less than steel. Light weighting offers the rail operator reduced running costs thanks to greater energy efficiency, reduced track wear and the potential to increase capacity within the carriage.

For the rail industry both fire performance and cost are key requirements and Cytec has developed cost-effective prepregs which enable the manufacture of thin and complex structures with good mechanical performance and meeting international fire regulations.

Prepregs can be used across a wide range of interior and exterior structural and non-structural applications including: wall panels and window frames, floors, ceilings and decking, bulkheads and standbacks, front end





fairings, doors and inspection covers, roofs and carriages, bogie leaf springs, frames and fittings amongst others.

New ground breaking products

Cytec's two new ground-breaking products are the only prepregs on the market meeting the new European fire requirements of EN45545-2:2013.

MTM® 348FR is a versatile curing epoxy resin prepreg offering fire protection to category HL2. MTM348FR, in combination with glass or carbon fibres, offers excellent mechanical performance and is ideal for the manufacture of lightweight composite components for both interior and exterior structural and non-structural applications.

XMTM 30 is a development product produced from a bio-renewable sustainable source that meets the requirements of category HL3. If used in combination with natural fibres, it creates a truly bio sustainable system. It is particularly suitable for the production of non-structural interior components and in special applications where higher fire performance is demanded.

Recent projects

Recent projects have included a collaboration with Ipeco Composites on the manufacture of 960 standbacks for Bombardier Class 379 Electrostar EMU

passenger trains which are operated by National express. Ipeco used Cytec's MTM® 82S-C phenolic prepreg (meets BS6853 Cat.1a). Prepreg, in comparison with wet layup, offer improved surface finish and dimensional tolerances and an overall weight reduction. The robust composite standbacks were installed without rework, reducing onsite labour costs and contributing to the quality and timely delivery of this fleet of trains. National Express benefit from reduced in-service operation and maintenance costs thanks to a significant weight saving.

Another recent collaboration was with DK Composites who used Cytec's MTM® 29SFR epoxy prepreg to manufacture the skin of sandwich constructions for the cab masks and apron doors of the new, lower weight, trains for the Kuala Lumpur monorail system. MTM® 29SFR meets the fire requirements of DIN 5510 for rolling stock, has the added advantage of being able to bond directly to core by vacuum bag processing alone and without the need for any additional adhesive film, thus significantly reducing manufacturing costs and part weight, can be moulded to complex shapes and offers good surface finish.

Looking ahead

The future looks promising for a wider adoption of prepregs by the rail industry as Cytec is involved in a

number of projects looking at using carbon fibre for major structural applications in rail rolling stock but also some very interesting structures with Cytec's bio-system XMTM30 on flax.

Contact details

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industrialmaterials@cytec.com
www.cytec.com

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Light weighting and fire protection

Cytec's epoxy and phenolic, glass and carbon fibre prepregs comply with the latest European fire requirements of EN45545-2:2013, categories HL2 and HL3.

If you are focused on weight savings then choose Cytec's prepreg technology and let us help you build your structures with the latest light weight and cost effective materials.



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CYTEC

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Railway Driver Training

Train Simulators - the most efficient way to learn and practice



"By using simulators the content and quality of train driver training could be enhancement, while at the same time training time will be reduced, and a constant high level of proficiency over the long term is guaranteed."

Airbus DS Simulation & Training

- offers a fully comprehensive line of training products and associated tools for education and assessment of train drivers and maintenance staff
- is an innovative leader in simulation technology and training services for railway operators and manufacturers.

The train driving simulators have been optimized to be used for the practical content of reproducible exercises in a virtual world, close to a real, typical railway operational environment.

Education and training of train drivers is increasingly carried out by the means of train-driving simulators. Such simulators provide a perfect virtual working environment allowing exposing train drivers to various different situations in surroundings that emulate their daily working environment or even a future workplace. Furthermore simulators can be used in training to handle malfunctions, incidents and operating sequences in hazardous / emergency situations.

Cost-Effective Customised Solutions

Our goal is to support our customers in reaching their goals.

Our Approach

- Providing platform-independent training solutions, modular and cross-organizational usable

- Covering the whole life-cycle of the systems, from design to commissioning, as well as In-Service Support (ISS) to optimize their availability during the entire operational phase

Your Benefit – Low Risk

- With a strong background in developing and operating training systems, Airbus DS offers low-risk solutions based on modular training system design, combined with the flexibility for changing requirements.
- We guarantee high efficiency and cost-effectiveness. Airbus DS prides its self on Reliability, Safety, Attractiveness and Efficiency – a benefit to the operators and the environment.

Due to the high level of detail in terms of

vehicle replica in hardware and software, operational training for drivers on specific locomotives and cross-border training are possible to enhance the introduction of a new fleet. Our train simulators have been developed to meet specific customer requirements; they cover all type of trains, and respective operational procedures.

The product portfolio includes railway simulators for locomotive hauled trains, EMUs/DMUs, multiple units, high-speed trains, as well as metros, LRVs and streetcars/trams.

The simulators are offered with any kind of signalling and safety system in operation at the individual customer, i.e. KVB, ZUB, LZB/PZU, RSC, SCMT, GSM-R bi-mode, PTC, ATO/ATC, CBTC, PTC, ECTS and ERTMS all levels, etc..

With its simulator and simulation-based training solutions, commitment and engagement Airbus DS provides a valuable contribution to public safety

Training Simulator Portfolio

desktop to full mission replica cab simulators



Airbus DS Simulation & Training

- field proven products cover the whole range of training media from CBT, desktop, portable part-task trainers up to full mission replica cab simulators (motion/fixed based) and maintenance trainers.
- offers a fully comprehensive line of simulators and training products and associated tools for driver education and assessment, based on the same true fidelity software.

DID YOU KNOW THAT 50% OF PROFESSIONAL TRAINING TODAY IS PERFORMED ON SIMULATION BASED MEDIA

As for any training media it is important that trainees and instructors can be confident in accuracy and close-to-real-world level of detail of the simulation. We deliver simulation-based training media and systems in quality, accuracy and level of detail allowing you to reach your training goals for secure and safe operation in your real life daily work.

Simulator-based training is especially suited for training situations which are impractical, difficult, dangerous or expensive to be conducted and reproduced in a live environment

Education, Assessment & Research

Our training system features e.g.:

- **Accurate and authentic simulation** of train, safety & signalling system
- Training on **vehicle operation** and operational rules & procedures
- **Route familiarisation** training
- **Fault finding, diagnosis** and **maintenance training**
- **Testing of driver competence** and **knowledge of Rules** and **Certification & Licensing**
- Achievement of **uniformity in behavioural pattern** of all drivers
- **Decrease of equipment damage** and **track loading levels**
- **Increase of efficiency** and profitability **of training results** through quality and content, reduction in training time

Training System Features

By means of the implemented exercise editor, the instructor can easily define appropriate driving lessons based on the student's individual skills and knowledge. Online setting of events and malfunctions brings further training benefits. An implemented fault-finding station allows the driver to inspect, check and operate any

system of the entire train and to practice complete recovery procedures as prescribed by the train operating instructions.

Computer-aided assessment and evaluation of driver performance by the means of the instructor station facilities.

High Level of Detail Databases



We offer a high level of detail databases allowing even the conducting of route familiarisation exercises. A database editor including a large, customized library of track elements and scene objects is available to the customers.

Due to the high-level of detail and accurate simulation of all train, control, safety and signalling systems operational training of drivers on specific tasks including cross border training or introduction to new fleet is possible, before real world daily operation starts.

Full Scale Replicas of Driver Cab & Desk



In order to ensure fidelity and to provide a very realistic training environment, simulator cab replica and desk will authentically replicate the cab interior and desk of the real train.

For highest level of immersion, dynamic simulation of train acceleration/deceleration and movement will be realized by the means of an electrical motion system.



Airbus Defence and Space
Claude-Dornier-Strasse / 88090 Immenstaad
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Simulation-based Training Solutions

Railway Simulators

High-Speed Train ♦ Locomotive ♦ DMU/EMU ♦ Metro ♦ LRV /Trams

the most efficient way to learn and practice

Airbus Defence and Space program unit Simulation & Training provides Driving Simulators for railway and wheeled vehicles. Combine modern training methods with live and virtual-reality simulations of vehicle systems and benefit from realistic simulation of your daily operational & working conditions for training of rail vehicle operators under regular and extreme & emergency situations. Implementing driving simulators will improve the quality of your training to assure safety & secure operation according to your standards. The simulators are suitable for licensing & assessment of drivers.



High-Speed Train Driving Simulator

Visit us in hall 11.2 – stand 207



Real Rail Solutions™

GREX® IS HARNESSING NEW TECHNOLOGIES TO SOLVE THE INDUSTRY'S TOUGHEST CHALLENGES.

Grounded in Experience

When Ned Snead founded the Georgetown Rail Equipment Company (GREX) in 1993, he was aware that while technology was transforming a number of industries, railroads were slow to adapt. That led him to invent the DumpTrain® aggregate delivery system. It was a breakthrough in productivity, capable of delivering more than 2,000 tons of ballast per hour with pinpoint accuracy – and do it all with a single operator. Since then, GREX has evolved into one of the rail industry's leading think tanks. CEO William "Wiggie" Shell has more than 35 years of experience in the rail industry. He's assembled a team of some of the best and brightest minds in the industry around him. Together, they continue to pursue the mission of creating real rail solutions that boost the safety and efficiency of track maintenance for their customers.



GREX® MATERIAL HANDLING

Above: The SPS® self-powered work platform travels to a work zone without using a work train.

Left: SPS® provides a continuous platform from which to work – up to 428 feet in length.

Integrated Solutions

GREX products are designed to work together to form complete track maintenance solutions. The Aurora® track inspection system is a perfect example. Using state-of-the-art imaging technology mounted on a hi-rail vehicle, Aurora® scans your track to reveal the exact condition of every tie along the way. It evaluates ties on more than 20 variables and assigns a grade to each, so you can prioritize which ties to replace based on that grade.

Aurora® data integrated with SPS® via proprietary software determines how best to optimize the drop off and delivery of replacement ties. A single operator assigned to the SPS® self-powered work platform can offload ties right where they're needed using a new location-based app. The excavator operator uses a custom joystick to pick up and offload the

specified number of ties when prompted by the app.

Also integrated on a hi-rail vehicle, BallastSaver®—a LIDAR-based track inspection system—seeks out deficiencies in your ballast profile. BallastSaver® data works in tandem with GateSync® software to automate ballast delivery. GateSync® works by operating the remote controlled gates on your existing ballast cars, dropping ballast with pinpoint precision while your ballast train travels at up to 10 miles per hour.

Reduce Costs. Increase Safety & Efficiency. With Aurora® and BallastSaver® reports in hand, you'll know exactly how much ballast to buy and how many ties to order. They can even give you an idea of the lifespan of track components so you can plan your capital maintenance programs out well in advance.

By taking the guesswork out of track maintenance, GREX solutions enhance the safety of your railway. Solutions like Aurora® and BallastSaver® give you a crystal-clear picture of the condition of your track. You can pinpoint potential problems long before they cause issues. Plus, solutions like DumpTrain® enable you to work far more efficiently and have fewer workers on the job site so there's less of an opportunity for accidents.

Custom, Collaborative Answers

GREX is a true collaborator for custom solutions tailored to each and every customer. That's especially important when a problem arises. When flood waters washed out tracks in Missouri, Oklahoma and Colorado in September 2013, freight operators relied on GREX to get ballast and work platforms delivered on-site quickly and efficiently. As a result, their tracks were back in business in no time.

GREX isn't just collaborating with customers, either. They're working side-by-side with other industry innovators. GREX is currently partnering with the University of Florida's Nuclear Engineering Department to develop a backscatter x-ray system to supplement Aurora scans by looking below the surface of rails and ties.

To learn more about how GREX can streamline your railroad maintenance, contact one of their representatives today.

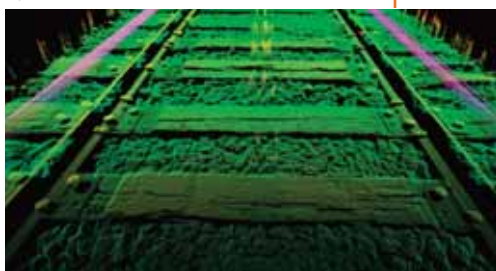
111 Cooperative Way, Suite 100
Georgetown, Texas 78626
Phone: 512.869.1542
Fax: 512.863.0405
www.georgetownrail.com

GREX TRACK INSPECTION

Below left: Aurora® reveals the exact condition of every tie and every inch of rail along the tracks.

Below right: BallastSaver® uses advanced LIDAR technology to find deficiencies in the ballast profile.

Bottom: Aurora® is mounted on a hi rail vehicle capable of scanning track at up to 42 miles per hour.



Aurora®

A GREX Solution



Real Rail Solutions™



We're on a mission. To employ the best and brightest in our industry. To tame technology in order to explore new visions. And most importantly, to meet your challenges with collaborative, custom solutions. We think between the rails, beneath the ties and outside the box. At GREX we're all in, all the time, to deliver real rail solutions.

+1 512.869.1542
georgetownrail.com

Inspection Technology

- **Aurora®** 3-D tie inspection
- **Aurora Xi™** 3-D tie inspection with backscatter technology
- **BallastSaver®** ballast profile assessment
- **SENSR** bridge response monitoring

Material Delivery

- **DumpTrain®** aggregate delivery
- **GateSync®** automated ballast delivery
- **Solaris®** manual to remote gate conversion
- **HydraDump®** hydraulic conversion for side-dump cars
- **SlotMachine®** mobile work platform
- **SPS®** self-powered work platform

G E O R G E T O W N R A I L E Q U I P M E N T C O M P A N Y



Arthur Flury AG is an international active Swiss company and leader in the development and production of overhead line components.

Grown, over 90 years, from a simple craftsman's business into a modern and dynamic industrial manufacturing company.

The name Arthur Flury AG is guarantor for innovative high quality products fulfilling the customer's requirements all over the world. The range contains three product lines.

Railway Technology

with high-quality section insulators, phase breaks (neutral sections), composite insulator rods, complete range of fixing components, a comprehensive overhead contact line earthing program and specific overhead line solutions

Earthing and Lightning Protection System

with the product range lightning protection components, earthing components, over voltage protection and equipotential bonding

Power Distribution Technology

with the product range screwed couplers, conical couplers, compression sleeves, cutting and compression tools, voltage detectors, short-circuit indicators. A wide range of products for power lines and cables.



The products are developed and produced at Arthur Flury's ISO9001 - approved factory in Deitingen/Switzerland and then shipped direct to site from the factory. The overheadline material of Arthur Flury AG is used in over 40 countries.

Highlights at InnoTrans

Arthur Flury AG shows the whole range of their electrical connecting components from the Railway Technology Division.

We offer forked collar sockets for a wide range of application possibilities, numerous types of dropper clamps for any combination of droppers that might be required, various splices for connecting all types of contact wire, earthing and safety material for maintenance activity and a whole range of Section Insulators and Neutral Section Insulators, applicable for any railway system in the world.

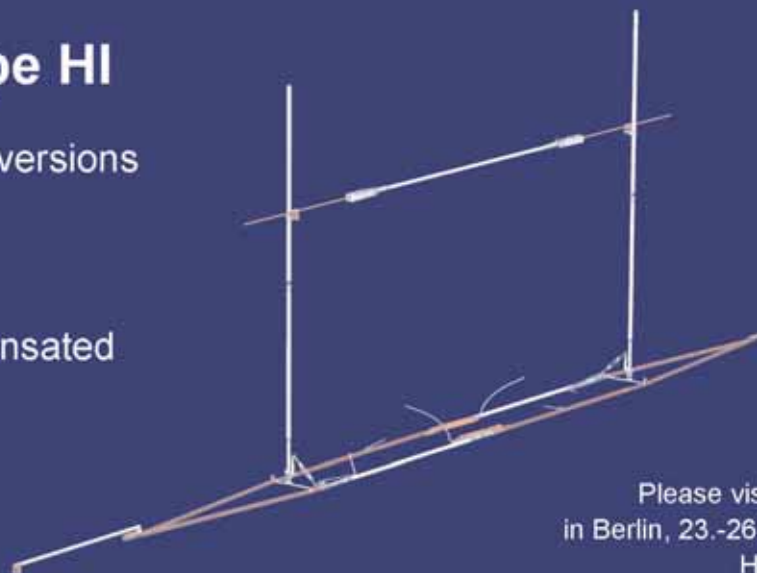
Our Earthing and Lightning Protection Division and Power Distribution Technology Division complete the three manufacturing pillars within Arthur Flury AG.

The following highlights will be exhibited :

- New Section Insulator, type HI15 / HI 25 with a skidless design
- Pendiflex dropper, to take hard points out of the line
- Earthing components, for tunnel and earthing and other applications

Section Insulator type HI

- available in 15 kV and 25 kV versions
- for speed up to 250 km/h
- closed system
- rotatable insulator rods
- weight of the insulator compensated through spring droppers
- easy installation
- low maintenance



Please visit us at InnoTrans
in Berlin, 23.-26. September 2014
Hall 26 - Stand 221



Train Communications: Less is more



WHEN DEALING WITH TRAIN COMMUNICATION MUCH IS TALKED ABOUT CONNECTING DIFFERENT ELEMENTS SUCH AS IP CAMERAS, WI-FI, PASSENGER INFORMATION SYSTEMS, VOIP PHONES ETC.

But as the different types and more importantly the bandwidth that each becomes more demanding of the Ethernet train backbone then one of the less talked about areas starts to become more important, Inter-Car communications, there have been a number of solutions available to establish connectivity between carriages, these are some of them:

Wireless – Cost, setup, availability of LOS, half duplex, possible interference, bandwidth limitations, Latency

DSL - Low Speed and poor bandwidth ~10M Interference, not designed for IP video

CAT5 - Jumper cable with a minimum of 4 pins required in the same block, more liable to interference when not screened or twisted, cabling access.

Oring Industrial Networking have come up with an innovative approach to this problem which is to bring proven

technology from the Automotive arena, as used by General Motors, Honda & Jaguar to name but a few, with it's use for connecting a range of entertainment systems through to engine management and diagnostics with the development of 2 wire Ethernet in cars (including the engine bay) has come a long way in proving it's self.

This particular technology has been developed from the ground up with Video in mind and it's completely transparent to the user with no latency or bandwidth degradation and in full duplex, so you can operate exactly as if you were using tradition Cat 5 cable. The big differences being only 2 wires and very high noise immunity without the need of screening this can all be achieved up to 200 Meters in distance between switches, breaking the traditional 100 Meters distance.

If that was not enough we have packaged this with our exiting 8 port 100Tx PoE+

switch with electrical bypass to deliver a first in the industry a EN50155 PoE+ fully managed switch operating on two wires TPS-B3082TXET-M12-BP1! This provide POE+ to your Camera and Wireless devices and an with the knowledge that the Backbone is also secured with our fast (<10mS) pass-through in the event of failure or power loss!

Oring Industrial Networking 2 Wire PoE+ Managed switch incorporating the data bypass



TPS-B3082TXET-M12-BP1

Oring Industrial Networking 2 Wire PoE+ Managed switch incorporating the data bypass.

The two specific markets of New Train / Tram and Retrofit have different needs and therefore advantaged of using such as solution will provide different benefits for example Retrofit when existing cabling is used proving the whole installing has significant time and cost benefits and can be made.



As an example of choosing "2 wire Ethernet" as an alternative to the tradition method of CAT5 cabling benefits become interesting from a number of perspectives, using TE Connectivity as a company which produces rail qualified cabling to EN50306, EN45545-2, Din 5510-2 this comparison is with the new 100G signal cable

• **O/S diameter 3.09mm compared with 7.25mm traditional 4 core CAT5**

• **Weight 50% reduction**

• **35 % better at radius bends**

• **Price 50% less**

Summing up, as the demands from individuals on Wi-Fi and the need for greater security coupled with the other advances of products that need IP connectivity there are more challenges to ensure a stable and reliable backbone is

available, although this solution is obviously not aimed at the 1G backbone solutions, the cost and installation needs of the general operation all have to be balanced this provides fast and very low effective solutions setting apart this from any other solution currently available.

This will be one of a number of exciting new products being launched at Innotrans this Year, Oring has over sixty five EN 50155 products available ranging from Switches up to 10G, media converters, Router and Access Points.

ORing



Example of the 2 wire Ethernet backbone with the TPS-B3082TXET-M12-BP1 providing data and power all at 100Tx.



Take the direct cOnnection

Over 60 EN50155/121 certified products - Solutions for a connected world



Single & Dual Bypass Ethernet Switches

Ethernet Switches upto 10G | Single & Dual Wi-Fi Access Points

Single & Dual 3G /4G Routers | 2 wire Ethernet upto 1.4Kms | Gigabit POE+



ORing
Oring Industrial Networking

TIRED SLEEPERS?



See us
at InnoTrans
Hall 5.2/Stand 101

The 25 minute solution that can add
at least 5 years* to your timber life!

*Based on 14 years data following the introduction of the product on high MGTPA infrastructure



STEP 1

0mins

Remove loose screws and
fill holes with **SPiKE FAST**



STEP 2

20mins

Drill as new timber



STEP 3

25mins

Replace screws and
open to traffic



For product information, samples and demonstrations, contact:

T: +44(0)1159 395992 E: spikefast@dwguk.com www.dwguk.com



VISIT US ON STAND 210

Hall 23 at InnoTrans in Berlin
23 - 26 September 2014

415 RAILROADS
100+ COUNTRIES
2bn FASTENINGS

We carry great responsibility as the world's No.1 supplier of resilient track fastenings.

In over 100 countries Pandrol product quality ensures the safety and efficiency of high-speed passenger trains, frequent interval commuter services and heavy haul freight operations.

With over 2 billion resilient rail fastenings sold and 75 years experience...

OUR REPUTATION IS ON THE LINE

Colour and design dominate rail interiors

RAILWAY INTERIORS
HAVE EVOLVED
CONSIDERABLY IN THE
PAST DECADE:



From a mainly utilitarian approach in the past, to radical new layouts where the travelers experience becomes the key determining design feature. Designers develop interiors which support the public image of the operator, using specific colors and surface textures in line with the Corporate Identity.

Thermoplastics open up new possibilities to achieve these goals, without limitations on design or durability. Bayer MaterialScience offers polycarbonate(Makrolon®) and polycarbonate blend sheets (Bayblend®) which are colored not only on the surface, but throughout the substrate. This eliminates the necessity for secondary operations like painting and reduces the visibility of scratches. But that's not all: these materials also reduce the total weight of railway cars

and can be recycled, contributing in that manner to cost savings and ecological goals.

Thermoplastics for railway interiors

Bayblend® sheets offer a solution for mass transit interiors which meets all aesthetic, functional and engineering requirements. They can be thermoformed into ceiling panels, window masks, seat backs, and many other applications. Focused R&D has resulted in new materials which can comply with the diverse fire regulations in vigour around the globe. Depending on the requirements, different material grades are available.

Bayblend® FR3030 sheets are made of a halogen-free, flame-protected, highly

impact-resistant PC / ABS blend. They satisfy stringent fire protection regulations for use in public transport vehicles (NF F16-101, DIN 5510). Bayblend® MTR is a highly impact resistant and rigid PC / ABS blend developed for the interior trim in railway vehicles with focus on the US market. The product satisfies the current requirements with regard to fire behavior, smoke density and toxicity such as Docket 90A/ASTM E 162 (radiation test on the fire behavior of floor coverings) and Docket90A/ASTM E 662 (smoke density).

The introduction of EN 45545-2 has drastically sharpened the fire requirements in European trains. The newly developed Bayblend® MTX sheets comply with EN 45545-2 HL2 requirements for interior components such as ceiling panels, side walls and

seat backs. The material can be easily thermoformed and fabricated. Thermoforming allows for faster cycle



Makrolon FR DX allows for bespoke light fixtures based on LED technology

times compared to fiberglass lay-up, with no VOC's. The material can be recycled, and can be fabricated with standard tools.

Makrolon FR DX is a white translucent, fire retardant polycarbonate sheet which meets EN 45545-2 R4/HL3 requirements. This novel development combines fire retardant properties with the latest technology for LED luminaires. Due to its advanced diffusion technology, it provides the optimum combination of brightness and uniformity. Offering excellent hiding power for LED hot spots, but still

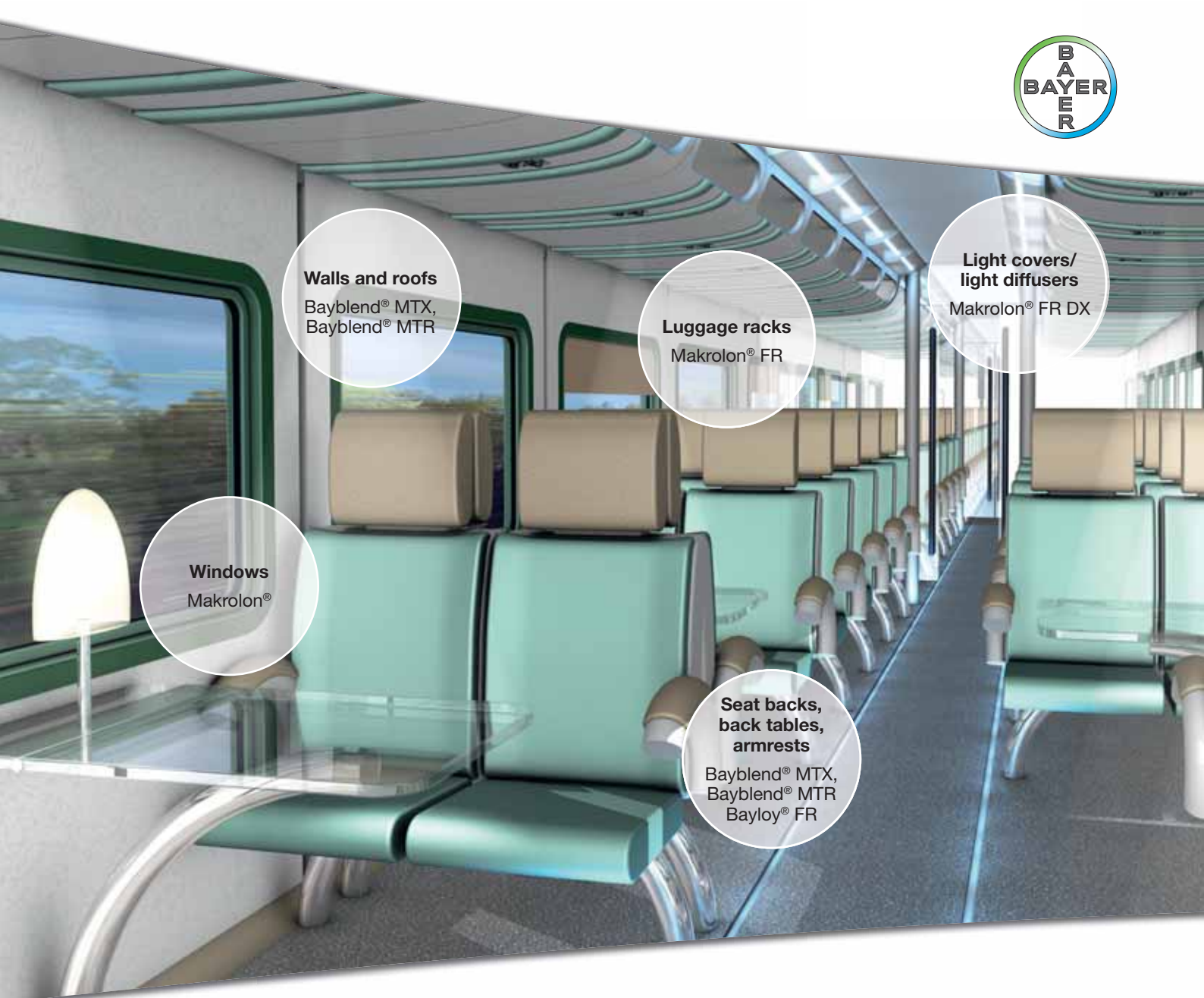
high light transmission, it allows for very slim designs. Makrolon FR is also available as a clear transparent sheet material.

As one of the world's leading manufacturers of polycarbonate, Bayer MaterialScience has a special know-how regarding extrusion processes, uses high-quality raw materials and a stringent quality management system to ensure the comprehensive control of all of its operations.

www.bayersheeteurope.com

Please visit us at Innotrans,
hall 5.1, stand 102



**Walls and roofs**

Bayblend® MTX,
Bayblend® MTR

Luggage racks

Makrolon® FR

**Light covers/
light diffusers**

Makrolon® FR DX

Windows

Makrolon®

**Seat backs,
back tables,
armrests**

Bayblend® MTX,
Bayblend® MTR
Bayloy® FR

Makrolon® and Bayblend® Sheets

The Solution for Mass Transit Applications

Whether it is windows, lamp covers, signage, seat backs, luggage racks, walls or roofs – You can rely on our high-quality polycarbonate or polycarbonate blend sheets for railway interiors. You'll benefit from important weight reductions, exceptional design freedom, high impact resistance and a wide range of colors and textures.

Many years of extrusion experience of high-quality sheets combined with a stringent quality management helps you to meet all your aesthetic, functional and engineering requirements for a variety of applications.

For further information please get in contact with:

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makrolon®



BAYBLEND®

Cutting edge technology for rails



GOLDSCHMIDT THERMIT GROUP PRESENTS NEW PRODUCTS AT THE 2014 INNOTRANS TRADE FAIR

The Goldschmidt Thermit Group, worldwide leader in the area of joint welding and the servicing and maintenance of rail systems will present numerous new products at the 2014 InnoTrans trade fair. The focus will be on high-tech solutions which offer the highest precision and quick implementation in the field.

RAILSTRAIGHT APP- Only the best is good enough



The precise measurement of longitudinal rail profiles is set to become easier. Programming specialists from TheAppGuys company have developed an app especially tailored to the requirements of the Goldschmidt Thermit Group. The app allows Android-based devices to control RAILSTRAIGHT precision measurement devices for the measurement of rails and rail joints in order to determine straightness and corrugation. During the development of the **RAILSTRAIGHT app**, TheAppGuys worked closely with experts from the Goldschmidt Thermit Group and product users. The result is an app which is designed for practical use and is able to output the measurement results according to the European and Chinese standards, the guidelines of the German (DB) railways and the quality index of the Netherlands. The app can control RAILSTRAIGHT precision measurement devices and also enables measurement of the rail temperature with an external Bluetooth measurement device. All the measured values are represented as interactive graphics, extensively evaluated and automatically prepared as a record in pdf format ready to send by email. The RAILSTRAIGHT app received an award for its participation in "Innovationspreis-IT", a competition dedicated to innovative IT products, and received the title "BEST OF 2014".



SMARTWELD SPARK- For more safety

The time has come for an alternative that removes the need of hot burning ignition rods to ignite Thermit® portions. The innovative **SMARTWELD SPARK** ensures reliable and precise initial ignition of Thermit® portions. **SMARTWELD SPARK** significantly increases operational safety through the use of acoustic and visual signals to indicate a successful ignition. This robust and long-lasting product increases competitiveness due to the use of cost-efficient consumables. A special,

high performance rechargeable battery provides reliable ignition for at least 20 ignition operations which ensures its suitability for use in the field. The **SMARTWELD SPARK** is a reliable substitute for igniters which are considered to be a hazardous substance.

Substantial expansion of the range of tools

The product range of safe, ergonomic and reliable tools and machines for railway construction and maintenance was considerably expanded. This was firstly achieved by the takeover last year of PortaCo, Inc. the US machine producer well-known for its hydraulic and innovative tools and power units and secondly by the development of new high performance, petrol and diesel-driven products as required by customers. "Last year we achieved a lot and will continue to further develop our product portfolio of special devices for the maintenance and repair of rail systems in the interests of our customers", explains Dr. Hans-Jürgen Mundinger, CEO of the Goldschmidt Thermit Group.

State-of-the-art: Efficient tools for your track works

The state-of-the-art **GP 4000 Rail head profile grinder** with petrol or diesel engine allows the precise and user-friendly reprofiling of rail heads and rail joints after rail joining, recharging and repair welding on rail surfaces and edges. The GP 4000 profile grinder is a proven machine suitable for all types of track superstructure, also in tunnels. A tilt angle of up to 90° enables excellent precision and backlash-free grinding wheel infeed. An ergonomically formed steering bar provides a pleasant working posture and perfect view of the grinding position. A quick-fit mechanism for the grinding disk enables low downtimes.

The TB 5000 P Ballast tamper guarantees quick and easy tamping of railway sleepers and efficient ballast tamping. The TB 5000 P with a petrol engine is a robust product which impresses with its



excellent practicality and suitability for working with track ballast and is available with a specially designed tamping blade or optionally with a vibrating plate. The tool uses a quick-fit mechanism to allow a rapid change. The innovative suspension system and cushion grip handles serve to considerably reduce hand-transmitted vibration of the machine and therefore ensure ergonomic working.

The newly developed **WT 1400 P Torque wrench** with a petrol engine enables the powerful and precise loosening and tightening of sleeper screws and nuts with the opportunity to electrically adjust the torque. The maximum torque of 1400 Nm gives the machine a large reserve of power. The exact adjustment of the torque is made using an electric switch. The operator can choose between two gears to ensure optimum speed and power delivery.

About the Goldschmidt Thermit Group: Thinking global – acting local

The Goldschmidt Thermit Group, consisting of more than 20 middle-sized companies is a worldwide leader in the

area of joint welding and the servicing and maintenance of rail systems. The roots of the company go back to the invention of the Thermit® process by Prof. Hans Goldschmidt at the end of the 19th century. Thanks to the efficient networking of our group companies and worldwide partners we serve the international growth market of the rail-mounted traffic infrastructure – and this very successful on all continents. With local presence, technological innovations, high quality consciousness and years of experience we are always at your side.

The spirit of the inventor of the Thermit® welding process, Prof. Goldschmidt, remains with us today: through the drive to do things better, improve existing processes, and develop new ideas. We can offer you a unique range of products and services for more efficiency, more safety and more travel comfort on your railway tracks. Whether construction, repair, maintenance or renovation of railway tracks – with us you're moving on safe tracks.

Further information is available on the internet at:
www.goldschmidt-thermit.com



GOLDSCHMIDT
THERMIT GROUP

VISIT US

Hall/Halle 25
Stand 325

FA/19

INNOVATION THROUGH TRADITION

In 1895 Prof. Goldschmidt invented the Thermit® process for the continuous welding of railway tracks and today we continue to remain committed to this spirit of innovation and develop products and services to make railway tracks as comfortable and safe as possible for your customers. We offer a unique range of services for the construction, repair, maintenance and renovation of track systems. You benefit from the power of our global group with more than 20 companies and numerous partners around the world.

RAIL JOINING

RAIL SERVICES

MEASUREMENT

TOOLS & MACHINES

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PortaCo



els SPOOR



Getting on board with wireless

SAMUEL BUTTARELLI, VICE PRESIDENT WIRELESS DAS AND IN-BUILDING SOLUTIONS, COMMSCOPE, DISCUSSES THE CHALLENGES FACING UBIQUITOUS WIRELESS COVERAGE ON EUROPE'S RAIL NETWORKS



COMMSCOPE®



In July this year it was revealed that the UK government would invest millions of pounds on mobile broadband on trains for passengers, with a new service that could be made available within the next three to four years improving connectivity by 10 times. The upgrade will cost £53m, and stop passenger's connectivity being 'constantly disrupted by poor signal'. The investment will mean trains will be upgraded to better pick up mobile signals that are then distributed via Wi-Fi within the trains.

In some countries, such as Sweden, in-train connectivity has already been upgraded enabling commuting experiences with seamless coverage, there are some markets such as the UK where the most travelled commuter routes where wireless connectivity is either non-existent or severely limited.

The recognition and the initiatives by governments show the opportunity and anticipated expectation for trains to provide flawless connectivity for its customers, in particular business customers. With the UK undertaking massive transport infrastructure building projects, including Cross Rail and High Speed 2 (HS2), the issue of demand for wireless connectivity on

board trains and track-side across rail networks is set to become even more important.

The wireless ecosystem

Ensuring wireless access for commuters on trains is a complex ecosystem to balance. It is the responsibility of the wireless operator to drive investment of infrastructure along the track, though operators may not be happy supplying coverage and capacity that can then be used by others supplying different services, e.g. Wi-Fi. On board Wi-Fi services in fact uses as backhaul capacity from existing 3G sites located nearby the track.

To date, it has primarily been the wireless operator that has been prepared to make investment to improve coverage by deploying base stations closer to the railway line. Unfortunately, the usual features of urban public transport systems are often the enemy of dependable wireless coverage. Operators face the challenge of providing wireless coverage in what amounts to high-speed Faraday cages, sometimes deep underground or running through many

kilometres of tunnels. Even for trains aboveground, perfect coverage along the track often does not translate to wireless connectivity inside the train.

For cellular coverage, the main challenges are related to bringing the available mobile network signal along the track side into the train carriages themselves. Unfortunately, train structures, particularly the metallised windows of high-speed trains, can dramatically reduce wireless signal penetration into carriages. Even if mobile coverage is perfect on the track side, users inside the train often cannot be reached by an outside signal at all.

European railways

Another country that has taken the lead in developing wireless access on its rail networks is Switzerland. InTrainCom, the consortium made by the Swiss mobile operators, has been focused on driving significant investment in broadband train connectivity in partnership with the national rail provider. Switzerland was one of the first countries to deploy wireless services on board trains, which has, in turn, driven the appetite and usage figures of wireless connections.

In Eastern Europe, rail companies are investing in WiMAX – a technology that is different to that used commercially but which has other benefits. In Germany and Italy, investment to date has primarily been on board the train and is driven by both wireless operators and rail operators. Based on rail operators requirements, train manufacturers have recently started building new trains already equipped with on-board wireless systems. The track-side investment is still in the hands of the wireless operators.

In Denmark, Sweden and Finland, investment is being driven by wireless operators. One project in the Nordics is Öresund-train service, a rail link between Copenhagen in Denmark and Malmö in Sweden. The link travels across the Öresund Bridge and through nearly 20 kilometres of tunnels. The complexity of providing wireless

connectivity is heightened when taking into account that the joint inter-country train service is run in cooperation with seven train providers across Veolia Transportation (Sweden's rail operator) and DSB Öresund (Denmark's rail operator).

The need for cross-operator cooperation

It's clear that the technological challenges of providing wireless coverage to public transport systems can be overcome with current technology. Yet, despite this, wireless systems on trains are far from widespread. Many major metro systems around the world do not currently support wireless coverage across the whole network – perhaps most notably the London Underground (though the platforms do have Wi-Fi connectivity).

While part of the problem has been a question of engineering, deciding who should actually pay for and install the system has been another. This is primarily a problem for underground deployments, since these are more expensive and present the greatest logistic difficulties.

It is illogical for railway networks to opt for single operator infrastructure as they must consider the implications of excluding a large number of their customers from being able to use the network. Similarly, host neutral systems deployed by third-parties can prove very expensive for operators and can make future network expansion a very complicated business.

The solution

In addition to Wi-Fi connectivity, much of today's coverage is based on 3G spectrum. However, with the launch of 4G networks, operators are now able to offer Long Term Evolution (LTE), so by using the same amount of sites along the track you can have significant improvements in capacity. There is also discussion around the growing use of Multiple Input Multiple Output (MIMO), which doubles the

capacity you can get out of the spectrum. This technique is starting to be used in in-building projects. Early studies are looking to understand if this technology can be used for track side coverage.

One interesting solution, being trailed in Hong Kong, uses two radiating cables inside the tunnel, one on each side of the tunnel, in order to provide the best opportunity for signal penetration inside the carriages.

The optimum solution is cooperation between a number of operators and stakeholders, who can share the costs of deployment across the three primary methods of improving coverage and/or capacity, namely improving the sites along the track, upgrading to 4G spectrum, and using new technologies like MIMO.

If mobile operators are able to directly cooperate amongst themselves and with the railway operator, installations tend to happen more quickly, at lower costs and result in higher service quality at the end of the project. By sharing the network infrastructure deployed on public transport networks, carriers also share the costs, which can substantially reduce CapEx and OpEx. These savings can be then be used to subsidise further network improvements, expansion and next-generation deployments. Such multi-carrier models also mean that

commuters can expect ubiquitous connectivity, whatever their network operator.

However, this process of cooperation can be complex and require significant negotiation. For example, one operator might take the lead from a technical perspective, another might cover the initial CapEx investment, while still another might take on the burden of on-going OpEx. Nevertheless, the benefits are clear and such joint projects are becoming increasingly common. For example, we have installed in-train repeaters across a high speed rail network in Italy as part of a common project between Trenitalia and the Italian mobile network operators.

Whilst the details of the government's plans are yet to be shared, it is clear there are many considerations and hurdles for all interested parties to overcome in order to make in-train connectivity trouble-free. But despite the hurdles of deploying public transport wireless coverage, the benefits are wide-ranging. Subscribers benefit from the ability to work or play on the move, operators can harness a new lucrative revenue stream and train operators can promote their networks over those of competitors by advertising their wireless connectivity. Given these advantages, the many interested parties are set on the right track.



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InnoTrans Hall 10.1/ Stand 222

AN UNTAPPED OPPORTUNITY FOR WEIGHT LOSS

Paul Croft, Global Product Manager for TE Connectivity, shares his views on how rail operators can make major financial, environmental and operational savings by adopting wire and cable products with modern thin wall insulation materials that save hundreds of kilograms per car.

The weight of rolling stock has a major influence on operating costs of a railway. Every extra tonne of mass needs energy to transport it and leads to additional wear and tear of both track and rolling stock.

Operating companies are increasingly turning to a whole life cost approach when specifying rolling stock and demanding that rolling stock designers explore every avenue to reduce weight with the decisions they make today having an impact over a 30+year lifetime. Up to four fifths of the energy consumption on commuter and metro rail systems is in powering the repeated acceleration of trains out of stations and so there are huge financial benefits to cutting out weight on passenger services. Train builders have already introduced weight-saving and energy saving measures such as lightweight high tensile steel and regenerative braking systems. Designers have also explored the potential to save weight in most of the major train components but TE Connectivity believes that high performance thin wall cable is the next great untapped opportunity for reducing the weight of rolling stock.

A typical commuter train with eight cars will carry around 30 km of cable that transmit signals, power and instrumentation to essential on-board

systems. This builds up to a total of around 500 kg in weight.

A significant proportion of this is in their electrical insulation and by switching to an alternative insulator, there is potential to make significant savings in weight.

Safe cables for the rail industry

Wire and cable for rail applications must meet stringent safety standards for Low Fire Hazard (LFH) performance. Broadly speaking, two types of products are available on the market today and they are designated by the thickness of their protective insulation: thick wall and thin wall cable.

Conventionally thick wall cable has been the most widely used. Its insulating material has a low unit cost and is manufactured using polyethylene resin mixed with mineral fillers that provide the LFH properties of low flammability, low smoke and low toxicity. But adding the fillers also creates a thick wall of insulation that surrounds the copper conductor and the overall product is relatively heavy and bulky.

To save weight, TE Connectivity pioneered the introduction of thin wall cable. It is insulated with polymers that have flame retardant properties that meet LFH standards without the need for mineral fillers. By eliminating the mineral fillers, TE Connectivity's polymer scientists cut out their weight and bulk, creating a product with a much smaller cross section.

On a typical 1 mm² wire, thick wall cable will have a wall thickness upwards of 0.7 mm, whereas thin wall can be 0.2 mm thick. And as bundles of wire and cable are built up, the low cross section becomes significant.

Value of energy savings

The result is a saving of 30 – 50 % in weight and 50 – 100% less bulk, adding up to a saving of several hundred kilograms per car. The weight reduction leads to a corresponding saving in energy every time the train accelerates and over every kilometre it runs throughout its entire lifetime.

In terms of energy saving, every 100 kg of weight is equivalent to 36 MWh energy and 5 tons of CO₂ in the lifetime of a commuter or metro service. And while the price of energy varies over time and between countries, assuming a unit cost of 10 cents per kWh, the lifetime saving in energy costs could amount to more than \$60,000.

But the advantages do not stop there. Less weight means less wear and tear on components like axles, wheels and brakes, as well as less wear on the tracks themselves.

An alternative way to look at it is that because thin wall cable is more compact and lightweight, it opens up more options for cable routing.

On one hand, designers can open up spaces that would previously have been used for cable runs, giving more space for

passengers and luggage. And on the other hand, they could take the opportunity to build in more connectivity for more sophisticated systems: a key consideration as the trend continues towards more automation, including passenger infotainment systems and driverless cabs.

A pure polymer

The other major benefit of thin wall cable is down to the mechanical and chemical performance of its insulation. While the primary role of insulation is to prevent short circuits, it also protects conductors from damage during installation and operation.

The material properties of thin wall and thick wall insulation are very different because of how they are made. Thin wall insulation is a LFH product by its nature but thick wall insulation needs mineral fillers to lend LFH properties to standard polyethylene.

Adding these minerals not only gives the LFH properties and adds weight and bulk, but it also brings the minerals' mechanical and chemical properties. And because minerals are essentially rocks, thick wall insulation can perform poorly in some

conditions, for example poor bending in low temperatures or cracking in hot conditions. Both of these can cause major headaches in the long term in the extremes of the rail environment. Thin wall insulation, on the other hand, is a pure polymer product without mineral additives. This means it behaves like a polymer and maintains its mechanical properties throughout an operating range of -40 °C to 120 °C.

Essentially, the simplicity of its structure means that thin wall insulation offers better protection from mechanical wear and tear than thick wall product. It also delivers outstanding protection against the fluids found in the rail industry, such as diesel, oil and other chemicals.

In operation, these superior properties mean that the cables are less vulnerable to damage, reducing the need for inspection, maintenance and replacement and delivering value over a longer life.

Handling and installation

Train manufacturers also stand to benefit and the obvious advantage for them is that lower weight of thin wall cable means that it is physically easier to handle during installation.

But other aspects of handling are also better. The polymer doesn't wrinkle on bending and has a low surface friction, which has a big impact in the workshop. Conventional insulation has a relatively high surface friction and will not slide over itself when bundled together. Improved sliding motion means that it's easy to bend a bundle of thin wall cable to pass it through ducting or confined spaces. Another aspect that's not immediately obvious is that because TE Connectivity works to tighter parameters in the manufacture of thin wall cable, the manufacturing process calls for the copper conductor strands to be perfectly circular and compact to ensure a standard insulation thickness. This means that the conductor is easier for installers to strip, crimp and terminate faster.

One aspect to note however is that care should be taken to treat thin wall cable with respect while it is waiting to be installed. It is not designed to withstand crushing or rolling loads that it will not experience during its operational life.

Specifying true thin wall cable

To reap the benefits of true thin wall cable, engineers should take care when specifying to ensure that they are buying cable insulated with genuine LFH polymers. Unwary buyers may inadvertently order thick-wall type product that has been scaled down. By ensuring cable meets the EN50306 standard, engineers can achieve the major operational and installation advantages of thin wall cable. The commonly used EN45545 and DIN 5510 standards apply to LFH cable that can be either thin or thick walled.

An engineering component

The rail operators and manufacturers who still view cable as just a commodity to buy at the lowest price are missing a trick. Already in operation on many metro and urban rail services throughout the world, it's no wonder that thin wall cable is growing in popularity. As demand on board air conditioning, automation, entertainment and safety systems grows, thin wall cable can help train manufacturers meet demand without a major impact on space and weight. High performance thin wall cable is an engineering component and by switching to it, operators can make savings in energy that will pay back the entire purchase price of the cable itself quickly, not just the price differential between the two cable types.





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The New Track Sprinter: Precise and Efficient



AMBERG TECHNOLOGIES DEVELOPS UNIQUE RAIL SURVEYING SYSTEM

Fast, exact and cost-efficient: Amberg Technologies, the Swiss specialist for railway and tunnel surveying, is expanding the well-tried rail surveying system GRP System FX with the new Amberg IMS 1000 and Amberg IMS 3000 system configurations. These

configurations provide reliable and highly precise geometry information during the construction and

maintenance of railway track systems – while achieving unparalleled productivity.



IMS 1000 and IMS 3000 measure the inner and outer rail geometry of ballast tracks and slab tracks using a new, high-performance sensor – the Inertial Measurement Unit (IMU). Measuring 4000 metres of track per hour, the system's performance is twice as high as of devices available on the market today. It furthermore ensures that the track will be measured reliably by providing a typical positional accuracy of ± 1 mm. "With this system we set a new standard for the speed for hand-pushed measurement carts while nevertheless achieving greatest accuracies", explains Marius Schäuble, Product Manager Rail at Amberg Technologies. The IMS 1000 / IMS 3000 software processes the measurement data, analyses the quality of the track and reports the deviations to a design centerline. Correction data for tamping machines can also be generated directly. Advantage for the system's users: the greater productivity and accuracy during track measurement reduces costs, enables efficient track maintenance and thus contributes significantly to the quality and safety of railway lines.

The new IMU technology replaces the tachymeter for measuring track geometry and therefore only requires a single measurement cart, operated by a single operator only. Until now, up to four persons were required for comparable track geometry surveys. The "Track Sprinter" also requires only little logistical effort and can be used flexibly and at short notice. Consequence: the costs for track geometry surveying decrease up to 90 per cent compared to traditional methods.

Thanks to the IMS 1000 and IMS 3000, Amberg Technologies is further extending its leading position in developing highly performing measurement systems for rail construction and maintenance. "We continuously work on improving the technology and functionality in order to optimally meet the increased market expectations", says Schäuble.

Premiere of the new IMS 1000 / IMS 3000: Amberg Technologies presents the System at the InnoTrans from the 23rd to the 26th of September in Berlin (hall 25, stand 201). The systems will be available for worldwide delivery as of February 2015.

About Amberg Technologies

For over 30 years, Amberg Technologies has been among the leading providers of specialised system solutions for the recording and processing of geo-referenced construction infrastructure information. Thanks to its profound knowledge and its consistent focus on the area of infrastructure, especially in

the field of railway and tunnel construction, the system solutions and services of Amberg Technologies AG are held in high esteem across the globe.

For additional information, please contact:

Amberg Technologies AG
Hugo Grauf
Trockenloostrasse 21
8105 Regensdorf-Watt
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The built-in Arcontia smart card reader makes the Nautiz eTicket Pro II an extremely fast and accurate tool for contactless payment data collection. This powerful reader supports ISO/IEC and ISO14443 type A/B RFID devices, and has two integrated Secure Access Modules (SAM) for secure transactions. The contactless electronic link between the card and the reader allows for the fast interface that is needed in security and payment systems.

The Nautiz eTicket Pro II has all you need for work on the go. Its high-brightness resistive touchscreen provides a generous and practical mobile workspace, without sacrificing portability — this ultra-rugged unit weighs just 335 grams (11.8 ounces).

The device comes with a high-performance 2D imager for scanning and barcoding tasks, and an integrated u-blox® GPS receiver offers built-in

navigation functionality. It also features a 5MP camera with auto focus and LED Flash. Multiple connectivity options including high-powered 3G and Wi-Fi keep you connected wherever you go.

The feature-rich Nautiz eTicket Pro II runs Windows Embedded Handheld 6.5, including all the Office Mobile apps you're used to using. Its high-speed 1 GHz processor, 512 MB of RAM and 1 GB of Flash memory make sure this device keeps up with every task you throw its way.

Not only is this unit a computing workhorse, but it's also built to withstand rough use, such as drops and tumbles, and it's passed stringent industry and military-standard durability tests against environmental factors such as extreme temperatures, vibrations, dust and water. The Nautiz eTicket Pro II is IP65-rated and meets stringent MIL-STD-810G test standards. So you can use the Nautiz eTicket Pro II in heavy rain or bright sunshine, fog or dust, inside a train car, on the platform or back at the office.

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Handheld Europe AB Kinnegatan 17A •
531 33 Lidköping, Sweden

Tel +46 510 54 71 70
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info@handheldeurope.com
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Cyclosystem – Bulox Equipment in InnoTrans 2014

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The 10th International Trade Fair for Transport Technology (InnoTrans) will be held in Berlin, Germany from 23rd to 26th of September 2014.

InnoTrans is an established international industry showplace focusing on railway technologies, interiors, infrastructure, public transport practices and tunnel construction.

Cyclosystem-Bulox Equipment will showcase its latest range of Railway Depot Equipment at **Hall 7.2C, Stand 217**. For the second time, Cyclosystem-Bulox Equipment will be the only Singapore-based company taking part in this exhibition.

During the fair, Cyclosystem-Bulox Equipment stand will offer live presentation of its Cyclojet Series using Spray Jet Cleaning Technology. This will allow the visitors to witness our Cyclojet Heavy-Duty and Cyclojet Inex Series live in action. Bulox Equipment on the other hand will also promote its wide range of Railway Depot Equipment such as **Standard and Customized Test Rigs, Specialized Test Systems, Component Cleaning Machines, Customized Cleaning Systems, Lifting and Handling Systems, Customized Railway Maintenance Vehicles**, and more.

BULOX EQUIPMENT, currently trading under **Cyclosystem Pte Ltd**, is a rapidly expanding division of BULOX Corporation. The evolution of BULOX Equipment comes as a result of the success of Cyclosystem Pte Ltd – an established company involved in the design, manufacturing and distribution of a wide range of quality standard and customized equipment for the process and cleaning industry. This business has since outgrown itself to such a level that it is now necessary to establish a separate

entity to fully focus in this business and respond to the changing needs in the Railway industry so as to serve our customers better.

Bulox Equipment is one of the very few if not, the only company in the world that fully focuses on the design, manufacture and distribution of the most comprehensive range of Depot equipment in the Railway industry. Most of Bulox-Cyclosystem equipment are designed to be simple, modular, practical and reliable, yet much emphasis has also been put into its aesthetic appearances and quality.

Booth Details:
Cyclosystem Pte Ltd
Hall 7.2C, Stand 217
InnoTrans 2014
Messe Berlin, Berlin, Germany

Contact Information:
Mr. Jason Zou
sales@cyclosystem.com



We hope you have enjoyed our latest Innotrans Magazine and that you have a fantastic 2014 Exhibition.

We are now producing a magazine on a quarterly basis so please do not hesitate to contact at al@railway-news.com if you would to feature your latest technology in an upcoming edition and also please take a look at www.railway-news.com for all that latest Rail news, events and technology.



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Office Tel: +44 (0) 1392 580002

Mob: +44 (0) 7432 725001

email: al@railway-news.com

A2B Global Media

Third Floor

11-15 Dix's Field

Exeter

EX1 1QA

United Kingdom

www.railway-news.com