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SHOW ISSUE 2012

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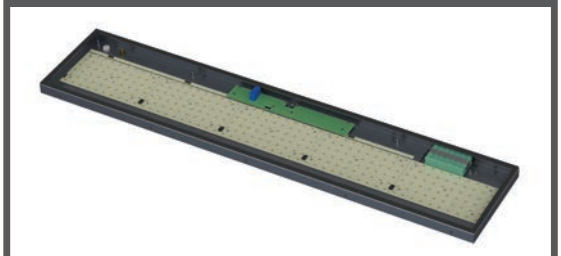

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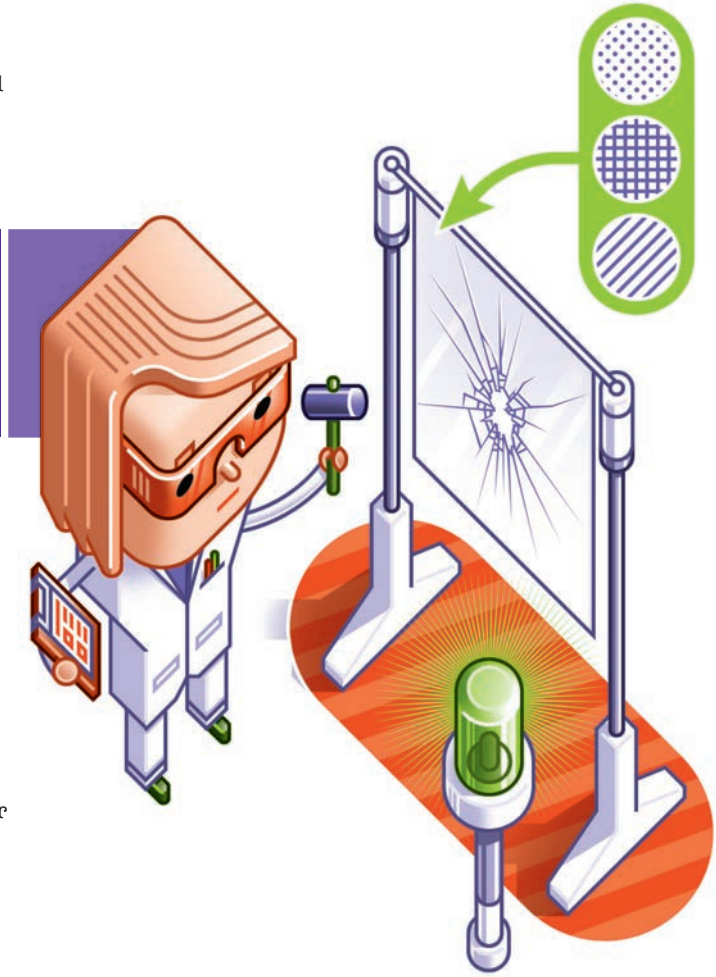

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In the build-up to the London 2012 Olympic Games, doubts were expressed about the city's ability to cope. Two of the key points of concern centred around security, and the tube network. These fears came to the fore only the day after London's Olympic bid was accepted in 2005, when the city was hit by the tragic events of 7/7 – a coordinated series of suicide bomb attacks involving three tube trains and a bus. But a lot has been achieved since then in the country that tries to 'keep calm and carry on'.

NewRail, for example, has spearheaded research into how to prepare trains to better cope with bomb blasts – gleaning potentially life-saving information from these and other tragic events around the world (*see page 20*). Thankfully, these are freak, rare occurrences, but NewRail believes very simple changes could make a big difference.

Conor O'Neill of NewRail will speak about the project at the 2012 Railway & Mass Transit Interiors Technology/Design Expo & Forum, which will be held on 24-26 October 2012 in Boston, MA, USA. It's set to be a must-attend event, enabling experts from around the world to share their innovations and insights with others across the industry – indeed our preview on page 44 is just the tip of the iceberg.

Elsewhere in this issue, designers discuss how to boost capacity, mainly by increasing standing spaces (*page 12*); lightweight material experts outline trends and advances in their field (*page 34*); and we find out how Russian Railways is preparing for its Olympic moment in 2014 (*page 28*).

London's Games have not been blighted by the problems that were feared. I'm happy to describe my own trip to the Olympic Park as remarkably trouble-free; despite leaving the stadium in a crowd of thousands, and on a Sunday night, I found the tube ran smoother than ever. I even got a seat!

Izzy Kington, Editor

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Space race

Amtrak's head of design fights an endless battle against physical constraints in a bid to beat the airlines

Few rail designers have such a wide brief as Duncan Copland, Amtrak's director of industrial design. "If you see it, touch it or sit on it, we do it," he explains. In practice, that includes not only the obvious items such as seats and fabrics but also galleys, rest rooms, lockers, carpets and bedrooms. He even gets his hands on the US giant's next-generation, high-speed trains, which are currently under development.

Right now, Copland's design team is working on the shape of the new power cars with Amtrak's engineers. They're aiming for a unique and thrilling look to stir the hearts of rail passengers who are flocking back to the company's trains in record-breaking numbers.

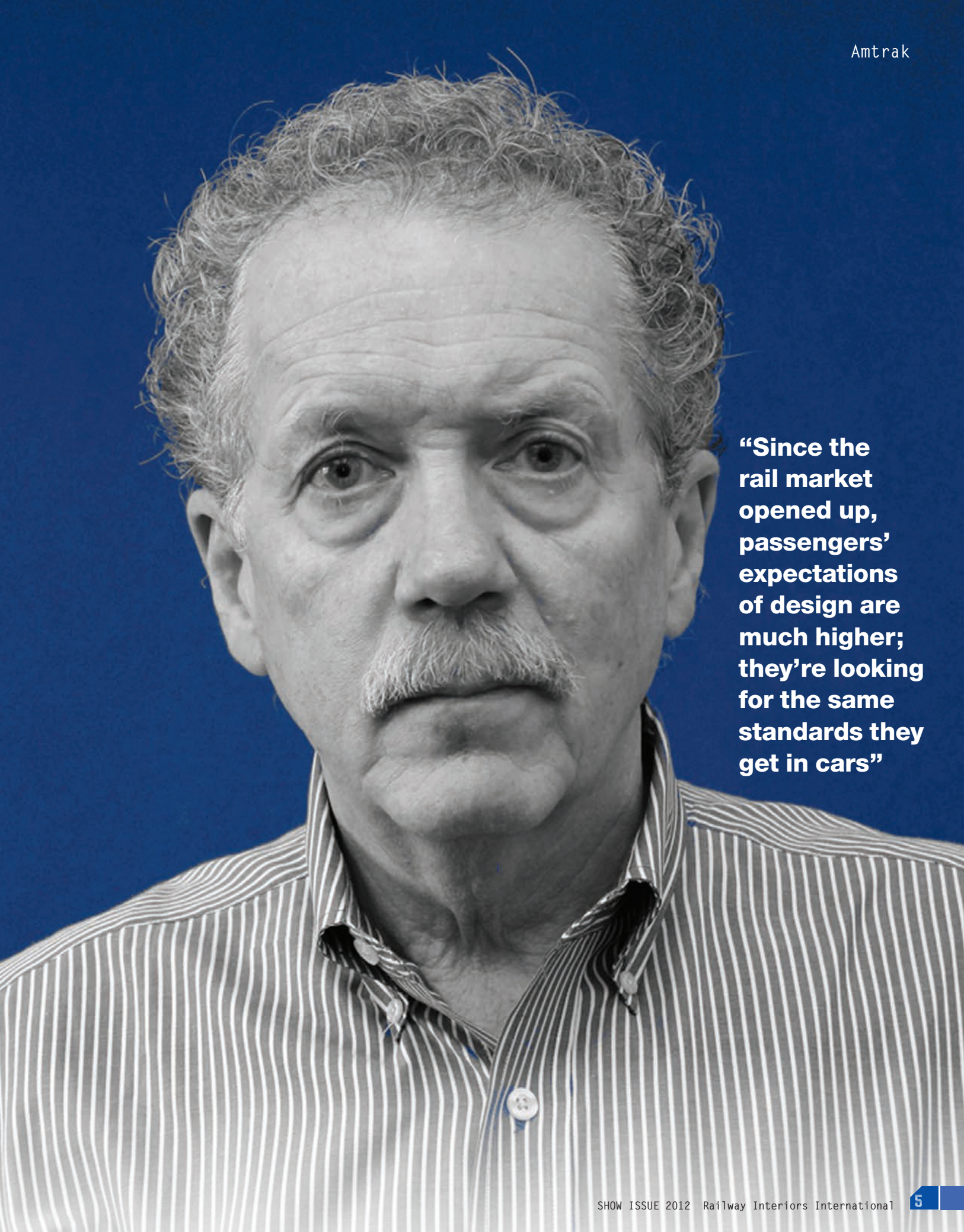
The next-generation trains, travelling at sustained maximum speeds of 345kph (220mph), will cut the Washington-Boston trip down to three hours. In the next 15 years, passenger numbers are expected to jump by 60% on this corridor. With a capacity of 400 passengers seated in eight coaches drawn by two power cars, the trains are at the forefront of Amtrak's grand plan to steal Americans from the highways and airways. It expects nearly 75% of its future new ridership to come from cars and aircraft. The investment is immense – all in, the 427-mile high-speed train project will cost about US$117billion (in 2010 dollars).

Thus it's a showcase project for the design team and clearly one of Copland's favourite assignments. "The locomotive is the first thing passengers see and the visual takeaway is very important to us," he explains. "Amtrak is aiming for a fast, modern and sleek look."

Don't however expect an American version of the TGV. "It will look different from France's high-speed trains because of our crash management regulations," adds Copland. "The rail authorities require higher crush loads than in Europe, so the front of the locomotive will be less angled than the TGV."

Air strike

Amtrak won't release a date for the unveiling of America's first homemade bullet train. But it will be a red letter day for a railway company that is fighting – and on some routes beating – the airlines. Perhaps this success is in part down to the company's seats, which it promotes heavily, pointing out that most airline seats offer a seat pitch of 30-36in in economy class, compared with Amtrak's minimum of 42in. This pitch increases up to 54in on the Acela Express, which runs on the northeast corridor, where Amtrak has been particularly successful in picking up passengers from other carriers. "You can lean your seat back without getting


Amtrak
“Since the rail market opened up, passengers’ expectations of design are much higher; they’re looking for the same standards they get in cars”

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PASSENGER PRIORITIES

Because Amtrak runs a range of services for families, businesspeople and tourists, Copland has a lot of people to please, and he believes it's getting harder to please them. "When I came to the USA 30 years ago as an industrial designer, the quality of product was, quite honestly, very poor," says Copland, who comes from Hamilton, near Glasgow in Scotland. "But since the rail market opened up, passengers' expectations of design are much higher; they're looking for the same standards they get in cars."

Amtrak takes a lot of notice of its customer surveys and finds passengers are "extremely articulate" about what they want. In a network-wide survey in 2011 they made it clear that they value space, comfort and cleanliness most of all. "Passengers don't want pinks and blues," says Copland, with some vehemence. "We're not a branch of the fashion industry."

But as well as seat space, passengers also want to be able to communicate (as they now can on many airlines). Copland is always trying to shoehorn more of everything into the same area to keep rail-goers happy. "Business passengers want more WiFi, more power outlets, more private spaces for meetings," he says somewhat wearily. "All passengers want the same standards, whether high- or low-speed or regional train. But we do like to distinguish high-end from regional services."

"If we can steal 2in per seat, we could put another four seats into a 74-seat carriage"

in the way of the passenger behind you," is the company's pitch.

Amtrak also sells on its seat width – 23in in first class and 21in in business class. The express services also feature double- and single-seat rows with wider central armrests, leather cushions and bigger fold-out seatback trays.

But in Copland's constant battle to do more with the same space, he's now engaged in the challenging task of reducing passengers' space without them realising. It's all about being more efficient with the space that passengers want to create around themselves. "We're trying to shrink the volume of the envelope without taking away comfort," explains Copland. "If we can steal 2in per seat, we could put another four seats into a 74-seat carriage." The design team would not be taking away from the width of the seat, only the area that the seat occupies.

ABOVE: AND LEFT: The Acela Express cabin includes power outlets, conference tables and adjustable lighting

Full renewal

Scotland-born Copland certainly has plenty of projects on his plate. Amtrak is in the first phase of a long-term plan to renew its entire fleet, starting with 130 single-level rail cars to support long-distance services. The interior look and onboard facilities are vital to the renewal programme.

One of the design team's biggest current projects is a new galley system. Reflecting airline practice, the built-in, stainless steel format is being replaced by load-on, load-off chillers, ovens and food carts as the new carriages enter service. Although Amtrak has installed the system in its

ABOVE: The lounge on a Superliner train

ABOVE RIGHT: A sleeping berth on a Superliner

first-class café cars, a full diner system is another challenge altogether. Crews are working in mock-ups and carrying out tasks such as stacking, plating, serving, heating, washing, binning and closing down. "We're studying workflows in the galley while the crew does the role playing," explains Copland.

Meanwhile, Amtrak's new generation of toilets will be virtually touch-free with automated hand dryers, taps and soap dispensers. At the same time, adds Copland, they will look less industrial as the railway sheds the public urinal look in favour of wipe-down surfaces made of composite material and rubberised flooring. The lighting will be brighter and warmer. "We're moving right away from stainless steel to a nicer, less utilitarian look," enthuses Copland.

But the design team's biggest headache is the sleeping berths – bedrooms, in Amtrak talk – on long-distance trains. "It's the most complex packaging task we have," says Copland. He explains that the difficulty lies in meeting the berth's two main functions. By day, it is a sitting or standing space with a restroom, sitting room and sometimes a study complete with seats, fold-out table, power points and lighting. By night, it has to be converted to a prone environment for sleeping with different lighting for reading, all to a high degree of comfort. And day and night, it's a storeroom.

"We're a hotel on wheels; passengers want to work, sleep and eat on the train"

"Passengers want to bring more and more luggage and, although the carriages are tall, we can't put storage spaces up high because many passengers just aren't able to lift 40-50 lb suitcases above their heads," explains Copland. Thus every available nook and cranny has to be utilised – seats, sinks and anywhere else an object can be tucked out of the way. Passengers don't want to stumble over their luggage, but at the same time they also want it to be easily accessible.

"We're a hotel on wheels," summarises Copland, a very happy industrial designer indeed. "Our passengers want to work, sleep and eat on the train. It's a very nice, fun challenge."

MORE ON THIS TOPIC: Duncan Copland will make a presentation on Amtrak's new diner cars at the free-to-attend Railway & Mass Transit Interiors Technology/Design Forum 2012, to be held in Boston, Massachusetts, USA, on 24-26 October 2012.

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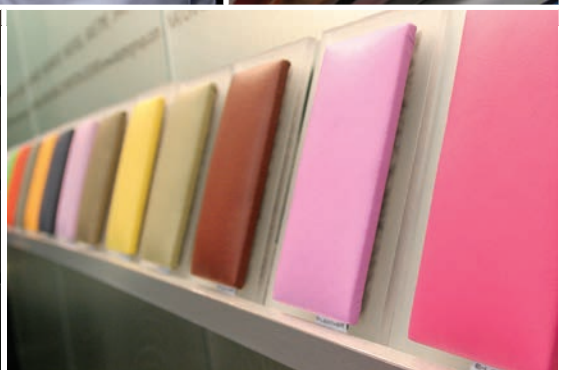

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Crowd control

Commuter train designers are coming up with clever ways to increase capacity without alienating passengers

LEFT: SNCF'S Francilien trains have 'buffer zones' with lots of standing space around doors

BELOW: The trains also have a long through view

With problems of capacity on commuter lines only increasing, the battle is on to optimise interior space, through trends such as continuous-articulated trains and fewer seats, and the onus on making crowded conditions more acceptable through a typical design mix of technology, ergonomics and psychology.

Benoît Gachet, sales director of Bombardier Transportation Switzerland, believes more sophisticated analysis of passenger behaviour can lead to better repartition of space: "A classic method of studying train capacity is to say there are four people per square metre," he says. "For me, that method is intrinsically flawed. When you film passenger behaviour inside a train, you notice that that is not how it happens. At the start, when the train begins to fill, people will deliberately go towards the seats. Afterwards, once the seats are occupied, people will still go into the corridor with the hope that when someone gets off they'll manage to get a place, so they stand up in the hope of sitting down. Whereas there are other people who don't have that idea, who practically always stay in the vestibule. So a train's capacity might be four people per square metre in the seating area, but for people standing it depends on the distance from the door area. When you're directly by the doors, six people per square metre isn't shocking, it's not uncomfortable; at eight you're squashed; at 10 you're very squashed."

For Bombardier's recent Francilien (NAT) train, serving routes in to northeastern Paris, the solution was large vestibules around the doors, allowing quick boarding so that the doors can close without creating jams. All technical equipment has been

“There are areas around the doors where you don’t really want people sitting, but need to offer some support”

placed above or beneath the train, while thanks to evenly distributed bogies, extra-short 13.24m-long carriages permitted an extra-wide 3.06m body. The flat floor and continuous articulated or ‘boa’ interior facilitates egress as passengers can easily spot vacant seats – with a through view more than 100m long – but access and seating zones are clearly defined. “We deliberately chose to have a very large vestibule to maximise the capacity for people standing and getting on and off,” explains Gachet. “The doors are almost 2m wide and the vestibule almost 3m. It means that when someone is seated and knows they will get off at the next station, they can move to the vestibule so that they can get off very quickly. Thus in the NAT, the vestibule serves also as a buffer zone where people can prepare to get off, and when people get on, the doors can close quickly and they can then move off to find a seat.”

In the seating area, with its 2+3 configuration, the wide body effect is accentuated by a profile where the maximum curve coincides with shoulder height, and by large windows with bases that double as armrests, saving valuable centimetres. Meanwhile the cantilever-mounted seats allow room for feet and bags.

An alternative solution was used for Bombardier’s Regio2N. This has an adaptable layout with a rail-mounted system for the seats, which makes it simple to change the trains from a 2+2 configuration with 58cm-wide seats to a 2+3 layout with 49cm-wide seats, to suit both regional services and commuter use. There’s a clear distinction between the two-storey seating cars, free from door noise, where passengers can sit or stand peacefully, and the single-storey access cars containing double sets of doors, with options for a toilet, bike storage, wheelchair access or seating bays.

Making a stand

With an undeniable trend towards reducing the ratio of seats to standing places, imaginative solutions are necessary to improve the passenger’s lot. “The holy grail is a flexible interior that enables it to adapt,” says Paul Rutter, senior associate at UK-based DCA Design, who helped draw up the brief for London’s forthcoming Crossrail trains (currently under tender), as well as creating flexible multipurpose areas for commuter trains in Northern Ireland. He favours a configuration offering very high density at the end areas, and lighter areas in the middle. “These days you have to design so it works under full loading conditions and provide so people can feel comfortable standing up, which means somewhere to lean on or to hold onto,” says Rutter. “There are areas around the doors where you don’t really want people sitting, but need to offer some support. You could do something creative where people could perch. Space can also be saved by the way people sit. I think advances could be made with a smaller seat with a form that encourages you to sit very upright, so you don’t put your legs out and sprawl. With a well-designed upright seat you can save on legroom.”

ABOVE: The Francilien’s seats are cantilever-mounted so bags can be put underneath

ABOVE RIGHT: The Regio2N seats are mounted on rails for quick layout changes

ON YOUR BIKE?

For all the claims by rail operators to favour cycling as an environmentally friendly complement to train travel, it’s still a thorny issue in commuter and suburban trains. Virtually all ban bikes during weekday rush hours, except for folding bikes.

But there are some exceptions. Inspired by transit authorities that do make it work, most notably in New York City, San Francisco’s Bay Area Rapid Transit (BART) is trialling a scheme that allows passengers to travel on board with their bikes during the Friday rush hour. The success of the trial will rely heavily on passengers’ common sense – stipulations include not allowing bikes on ‘crowded’ trains, in the first carriage, in the way of aisles or doors, or on escalators. BART cyclists must also yield space to the elderly and disabled.

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NUMBER CRUNCHING

Number-counting systems are increasingly being installed on commuter trains. Most use infrared sensors over the doors to count passengers and distinguish between boarding and alighting, which connected to a central control box can help analyse passenger flow and enable operators to refine their timetabling and stop times. On Siemens' Desiro City train, to be introduced on the UK's Thameslink route between 2015 and 2018, information will be transmitted to platforms in central London to advise people where to stand so they can board the carriages with the most room.

Number-counting systems also have a role in environmental and energy control, regulating the ceiling heating system on the Francilien, while sensors in the Francilien and the Desiro City monitor CO_2 inside the carriage to control the fresh air intake and save energy by reducing unnecessary heating or cooling when the train is empty.

Likewise, for Stéphane Pottier of MBD Design in France, who has worked on recent RER A and B refits for Paris and projects in Hong Kong and China, the focus of the capacity problem has shifted to conditions for standing passengers. "Before we used to put lots of emphasis on the seated passengers and how comfortable the seats are," he says. "Now we treat all passengers – seated, standing all the time and immobile, those who are standing and circulating within the train (whether they are going towards the doors or looking for seats) and those who get on at the front and move along the train. It's mainly a question of support rails – of providing continual rails to hold on to. Either long horizontal bars (if possible always at the same height) or vertical posts, which should be regular but not so numerous that they block the route." He is also increasingly looking at intermediary forms of seating, such as the *appuie ischiatique* or perch, which despite being difficult to adapt for different heights, can provide some support to a person leaning against it.

The RER B is a complex mix of commuter train, urban metro and airport shuttle serving both Roissy and transit passengers between Roissy and Orly. For this project MBD, in association with Compin, removed overhead luggage racks that weren't really used, designed new baggage racks near the doors (with space for large suitcases below and smaller bags above) and replaced tip-up seats (which had previously encumbered the doors) with perches. "It's always a question of juggling the different factors," elaborates Pottier. "The more people there are, the less comfort there is. On the other hand, you can improve the quality of decoration, lighting and noise reduction to create a more agreeable ambience. The addition of air conditioning is a recent element in France and it immediately makes crowded trains more acceptable."

A sight for sore eyes

Serge Govindin, a designer at seat manufacturer Compin, has seen a trend towards making commuter trains more aesthetically pleasing, with "softer forms". "Effectively, we have gone from trains that were largely designed by technicians to be easy to clean and where people could get on and off easily, to trains that are perhaps less easy to maintain but more welcoming," adds his colleague Frédéric Komajda, group sales director at Compin Group. "We think of voyagers who return after a difficult day at work or who get up early in the morning and have no desire to find themselves in a hostile environment. Thus the idea we had (for the Francilien) was to use colours that are very contemporary, knowing that there has not been a great technological leap between what we proposed before and today. It's really above all about perception and the pleasure of

"The addition of air conditioning is a recent element in France and it immediately makes crowded trains more acceptable"

RATP/Jean François Mauboussin

ABOVE AND RIGHT: For RATP's RER B, MBD and Compin added perches and redesigned baggage racks

SNCF/Christophe Recoura

"In off-peak periods people won't sit three aside, but in rush hour, I'd prefer to be on a triple seat than standing up"

ABOVE: The Francilien trains have some triple seats

RIGHT: MBD's design for a Chinese train features lots of handrails for standing passengers

the senses. Physically it has not changed all that much, but visually it is much more comfortable."

Compin tests its seats with the Cogitobio programme, analysing ergonomics according to biomechanic stress, and the appropriate degree of comfort for commuter journeys that rarely exceed 45 minutes, where seats have to meet intense usage and high risk of vandalism. Commuter seats typically have lower backs (around 1m) than intercity trains (1.2m or 1.3m) to allow space for standing passengers carrying shoulder bags and to provide good visibility along the train – essential both so passengers can spot vacant seats and to improve the sense of security.

Triple whammy

Govindin also believes you can make unpopular triple seats acceptable. "We resolved the problem of the triple seats in removing the old bench seats," he says. "Now we have individualised the voyage and we have individualised the seat, there is a precise fabric zone where you can sit and a metal zone – that is a cold zone – that creates the limits. When you press on it, the sensation is different, which has the effect of personalising your place, and allows you to focus the person on the comfort."

Bombardier's Gachet also believes the triple seat has its place. "The reality is that without enormous investment in infrastructure, you often cannot lengthen the station platforms," he points out. "So is it better to have a 2+2 layout and lots of people who remain standing up, or better to have 2+3? In any case, in off-peak periods when there aren't many people, people won't sit three aside, but in rush hour, I'd prefer to be on a triple seat than standing up. It's for commuter trains, and applies to them."

DCA's Rutter disagrees. "I think you're better off having two seats plus space for someone to stand," he says. "People don't like to be hemmed in. I think there's scope for an alternative, or perhaps two seats and a perch area at the end of the seats." He thinks there is room for new forms of seating: "They need to look at this with a fresh approach; people haven't been innovative enough yet."

INCREASING CAPACITY ON A LONDON LINE

UK operator South West Trains has signed an agreement with Porterbrook to take on lease 24 two-car Class 456 Electrical Multiple Units (EMUs). The units are currently operating with the Southern franchise and will transfer to South West Trains in January 2014. They will then undergo a refurbishment costing more than £10 million, which will include making the interiors similar to the Class 455 units already operating with South West Trains.

The introduction of these extra carriages will mean five-, six- and eight-car trains can be lengthened to run as eight-, nine-, 10- and 12-car services. The interior layout will also increase capacity, with more standing spaces and measures to improve egress around doors. The trains will enable the operator to carry around 8,000 more passengers into London's Waterloo station every morning during peak times.

This is the second phase of a capacity enhancement programme that should see the introduction of a total of 108 carriages on the South West Trains network between May 2013 and December 2014. Phase one, announced in December 2011, will deliver an additional 60 carriages through the refurbishment of former Gatwick Express Class 460 Juniper vehicles, combined with refurbished trains from the South West Trains fleet. The refurbishment work will be undertaken by Railcare at its facility in Wolverton near Milton Keynes, UK.

MORE ON THIS TOPIC: Several speakers at the Railway & Mass Transit Interiors Technology/Design Forum 2012 will tackle the subject of capacity. Dr Neil Mansfield of the UK's Loughborough Design School will address the ergonomic issues involved, while Selby Coxon of Australia's Monash University will share research into the reconfiguration of metro carriages for the Melbourne rail network. See page 44 for more details, or visit www.railwayinteriors-expo.com. The event will be held in Boston, Massachusetts, USA, on 24-26 October 2012.

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Safety first

Several projects are currently looking at how train interior layouts, components and materials can be optimised to improve safety in the event of a bomb blast, fire or other danger

In the wake of the Madrid bombings in 2004 and the 7/7 attack in London in 2005, the anti-terrorism focus widened from air to rail. It was realised how vulnerable trains – particularly busy metro and commuter trains – were to bomb or arson attack, and governments, industry and academia began work to learn lessons and mitigate the threat. The research has been painstaking and has, inevitably, taken time. Even when complete, the findings will have to be incorporated into European and national standards and regulations.

One project looking at developing blast- and fire-safe metro vehicles is called SecureMetro and is being led by NewRail, a railway research centre based at Newcastle University in the UK. "What we are doing is assessing how current vehicles respond to blast," says Conor O'Neill, rail vehicle manager at NewRail. "We're looking in particular at shrapnel and the sizes thereof, the trajectory of it, looking at the interiors to see what fixtures and fittings get moved or displaced, and then seeing what can be done at a design level or through retrofit so that the response of the vehicle can be improved.''

The SecureMetro project has looked at a number of areas of the carriage to reduce or mitigate the effects of blast, including windows, equipment detachment, fragmentation and the potential for the structure and fittings to absorb blast energy.

It was learned from the London Underground bombings that none of the handgrips suspended on springs became detached, and this raises the possibility of tethering other heavy equipment using similar flexible joints.

Another finding is that while carriages that are fully open from one end to another have been popular with passengers and manufacturers as a design solution, they do not seem to be ideal in the event of an explosion, allowing the blast wave to travel the full length of the vehicle. "There's an option of putting in, let's say, the kind

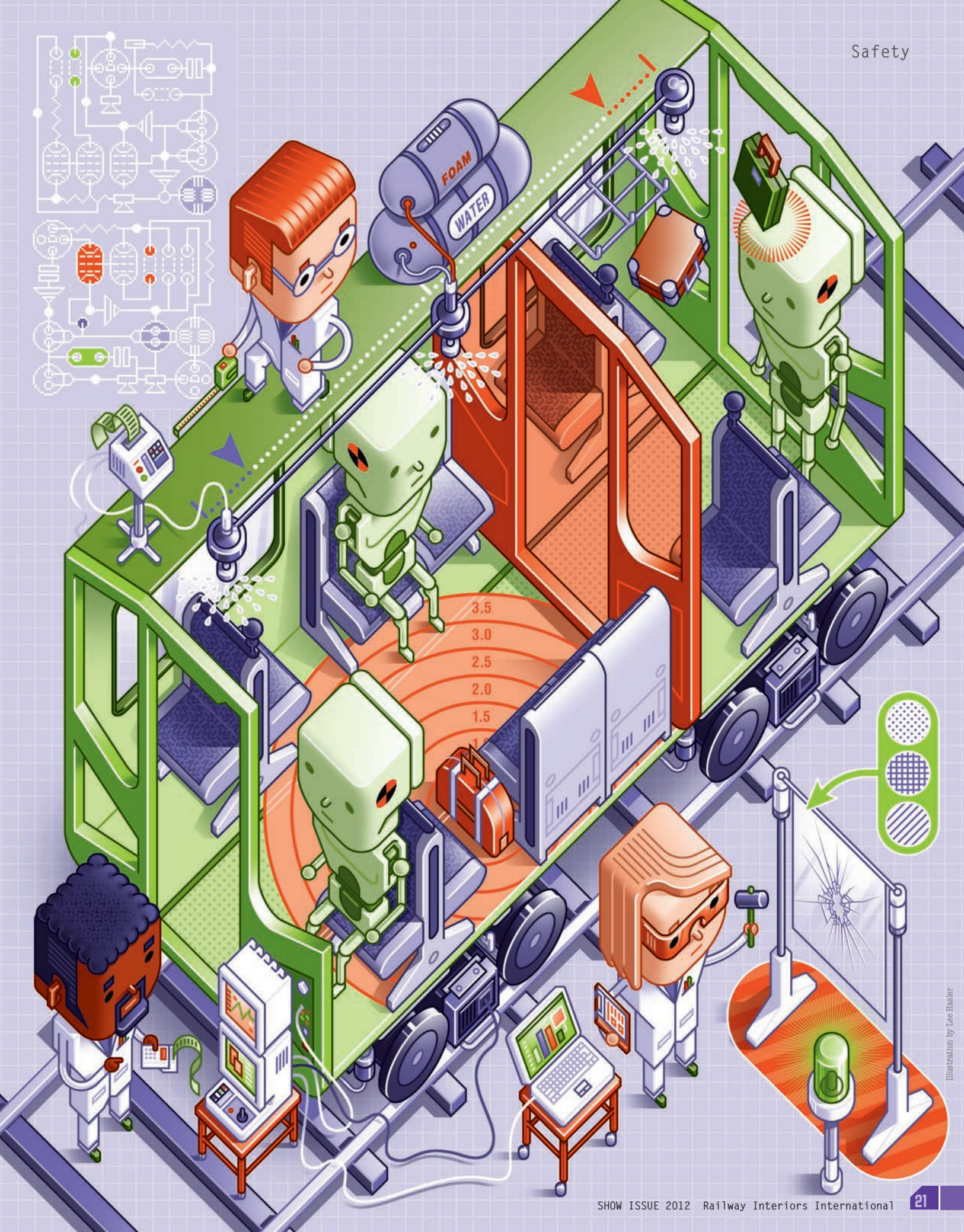

Illustration by Lee Hasler

of windshields that you find in gangways at the sides of seats, which do go some way to help protect passengers," says O'Neill. "That could be a middle ground.''

Seating is a vital consideration. "One of the things we found was that survivability within a vehicle can be based on the design of something as simple as whether the seats are open or closed underneath," reveals O'Neill. "If, for example, it's enclosed, the blast wave cannot penetrate underneath and shift the seats.''

Keep your head in a crisis

Another key aim is protecting the driver. Madrid and 7/7 revealed that following a blast passengers tend not to panic but do wait for guidance. The drivers can be trained to give this and they know and understand the vehicle, so their survival can help to save other lives too. Thus SecureMetro has looked at ways of strengthening the bulkhead to give protection with materials that resist penetration.

Most of the damage done by an explosion is to the floor of the vehicle, and because the driver's communications are so important, the NewRail team has looked to see if any form of protection can be given to wires running beneath the carriage.

"Survivability within a vehicle can be based on something as simple as whether the seats are open or closed underneath"

Much of the rest of the fittings tend to remain intact. "Blast attacks are very fast," explains O'Neill. "Often, physically, both the passengers and the structure don't respond, because it is so rapid. So you don't get people thrown through the air – it's not the big Hollywood blast and fireball style scenario.''

In looking at materials, there are complications. A material might be more ductile and better able to withstand stress than more brittle materials that break into splinters, but it might not be as fire safe. Furthermore, a material can perform well in a panel test but when applied to a particular design so that its shape is changed or it is joined to another material, its behaviour may change.

Having identified these key considerations and potential ways forward, NewRail is now conducting the testing phase of the project – involving controlled blasts on panels and on

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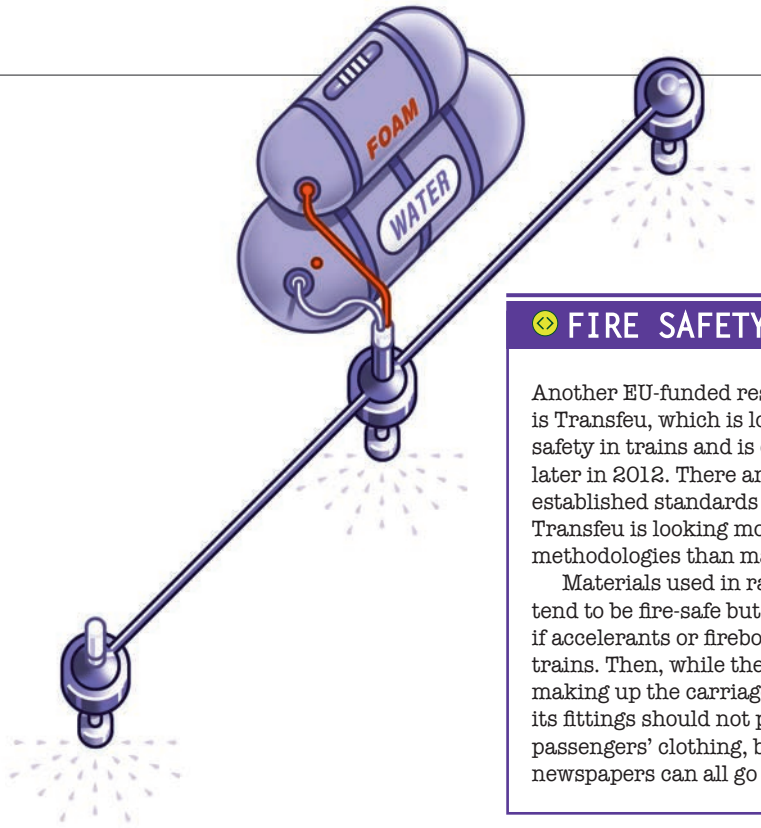


FIRE SAFETY

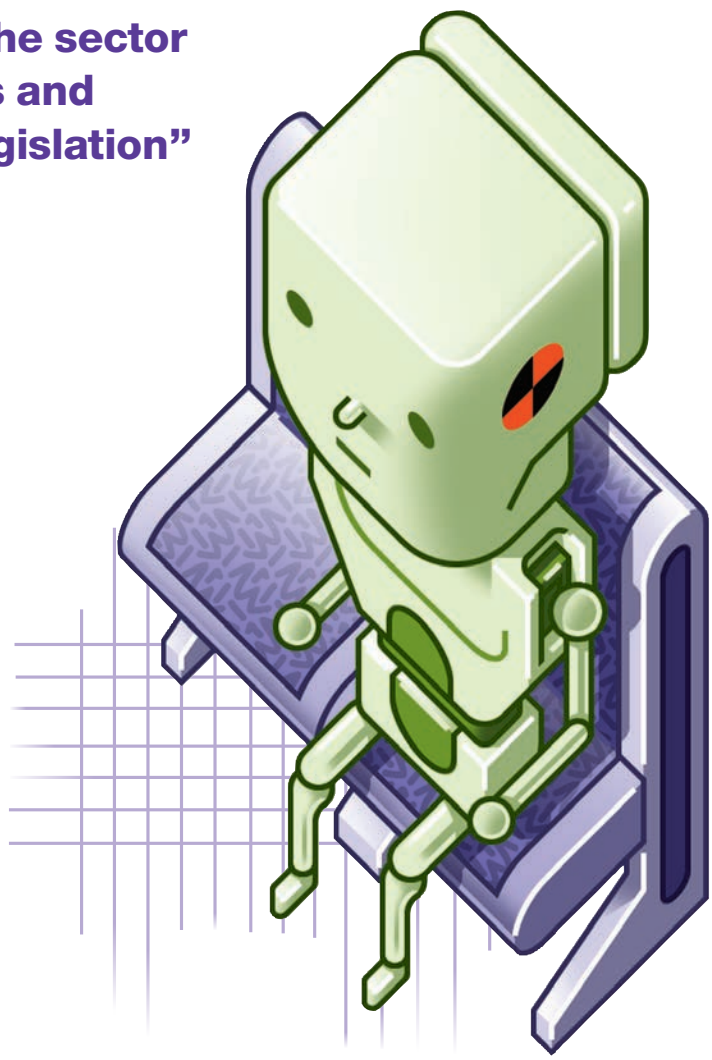
Another EU-funded research programme is Transfeu, which is looking at fire safety in trains and is due to complete later in 2012. There are long-established standards for fire, and Transfeu is looking more at assessment methodologies than materials or design.

Materials used in railway rolling stock tend to be fire-safe but problems arise if accelerants or firebombs are used on trains. Then, while the seats or materials making up the carriage structure and its fittings should not propagate fire, passengers' clothing, baggage and newspapers can all go up quickly.

Smoke is another danger posing a direct risk of death or injury and also creating problems of visibility, impeding escape. "Trying to develop systems that will put out the fire quickly and ensure that the accelerants don't continue their burn is critical to the safety of the passengers," says NewRail's O'Neill.

Metro Madrid is working on mist technology where fine water droplets create a cloud rather than a wetting effect, but which instantly puts out fire. Then the challenge will be to design a metro carriage that can carry a large amount of water ballast.

"From this research programme the sector is now trying to develop standards and these may be incorporated into legislation"



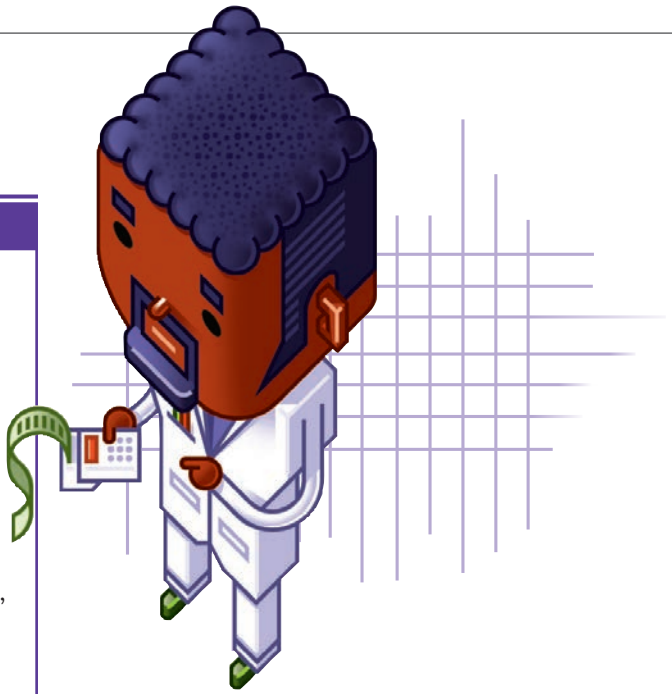
decommissioned and prototype vehicles. The final report is due by the end of 2012.

The conclusive findings of this study are likely to be incorporated into a European Rail Agency (ERA) technical specification as a requirement for future rolling stock – following the example of a previous research programme, Safe Interiors, which was also run by NewRail.

Collision avoidance

"Safe Interiors is about dealing with the secondary collision, a collision of a train occupant with something in the train," says Antoine Defossez, ERA's project officer for interoperability. "They have done some research and some sled tests with seats and they ended up with some recommendations that there should be a sled test for every seat and the same for tables. From this research programme, the sector is now trying to develop standards and these standards may be incorporated into legislation."

A lot of the findings from Safe Interiors were incorporated into the UK standard GMR 2100. The project was led by NewRail's Roberto Palacin, who explains that it resulted in new methodologies for using crash dummies and some recommendations. "Generally speaking, the assumption in all of this is that you want to control



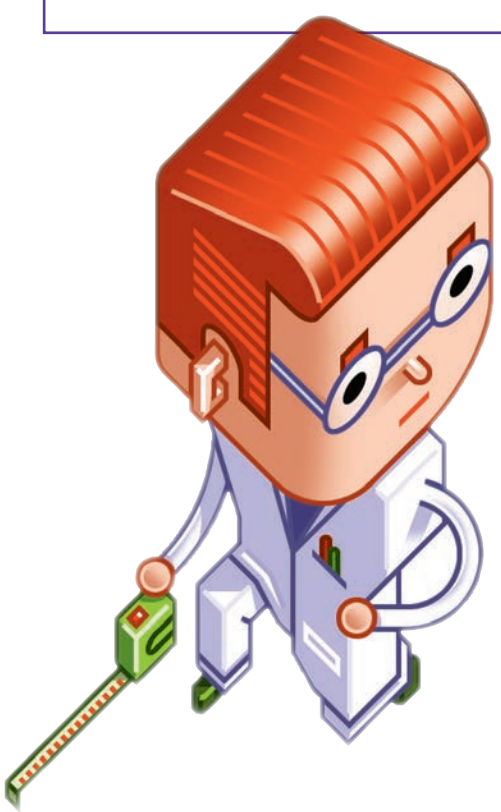
SHARING RESEARCH ONLINE

The International Union of Railways (UIC) recently entered into a partnership with the UK's Rail Safety and Standards Board (RSSB) that aims to make sharing the findings from rail research and innovations easier. The partnership will give SPARK – the online knowledge sharing platform initially developed by RSSB on the behalf of the UK's rail industry – a new international scope, linked to a new railway research web portal hosted by UIC on behalf of the International Rail Research Board (IRRB).

SPARK will provide a platform for the rail sector and others to work together and share knowledge more efficiently online, with the aim to reduce duplication, speed up innovation and maximise value. Researchers, designers and decision makers in rail companies, universities and the wider industry will be able to upload and share information. This could be work they encounter, own or are undertaking, and means users can find answers to their challenges from others who have already faced them.

"To innovate, the industry needs to have efficient access to what it already knows, whether that's existing reports, sources of data, details of centres of expertise and so forth," says Guy Woodroffe, RSSB's head of research and development. "Yet knowledge sits with different people in different organisations, who may not be well connected. SPARK is like an online library and social network all wrapped into one."

During the development phase in 2012, access to SPARK is available to RSSB members, knowledge-sharing partners and registered researchers in the Rail Research UK Association (RRUKA). From January 2013, the IRRB will have a platform in SPARK for sharing between its members and more widely. In addition, a new reader access level in SPARK will be opened up to all.



"You could build a vehicle that would be completely bomb-proof, but it would be a big steel box with steel panels in it and it wouldn't go very far or very fast"

the distance that a passenger will travel on free flight," he says. "If you can control free flight by the way furniture is arranged and helping soak up the energy of the impact, that's what you want."

Balancing act

Between some of the factors in rail interior safety there are some conflicts – most obviously, cost and practicability. "You could build a vehicle that would be completely bomb-proof, but it would be a big steel box with steel panels in it and it wouldn't go very far or very fast," says O'Neill.

Also, although an open carriage may be less safe in a crash or blast, recent developments in fire sprinkler systems have led to suggestions that spaces between fire partitions might be increased from 28m. In a blast, free flight is not the greatest danger, but in a collision it is.

These potential conflicts will eventually have to be reconciled by the various regulatory bodies, but it seems the results from current research will not find their way into regulations for some time and then will only apply to new rolling stock. "Our legal requirements don't need to reflect state-of-the-art research at any time," says Defossez. "But safety is the main concern of the railway industry and we are proud of the record we have because it's a really safe means of transport."

MORE ON THIS TOPIC:

Conor O'Neill, rail vehicle manager at NewRail, will speak about the SecureMetro project in detail at the 2012 Railway & Mass Transit Interiors Technology/Design Forum, to be held on 24-26 October 2012 in Boston, Massachusetts, USA. See page 44 for more details, or visit www.railwayinteriors-expo.com.

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Game on

Russian Railways' new Lastochka trains have been designed specifically with the Sochi 2014 Winter Olympics in mind

Sochi's Olympic Stadium will be the focal point for the 2014 Winter Games

BELOW: Siemens' Desiro ML is the platform for RZD's Lastochka train

In 2014, Sochi – a city nearly 1,000 miles south of Moscow, Russia – will host the Winter Olympic and Paralympic Games, swelling its modest population with thousands of athletes and spectators. To ensure these visitors can reach the city and its various sporting venues quickly and safely (at a top speed of 160kmph) Russian Railways (RZD) has ordered 54 new Desiro RUS trains from Siemens.

RZD's initial order for 38 trains was placed in December 2009, with the contract for another 16 units – to be partly built in Russia – signed in September 2010. With Siemens undertaking all design work, production of the units began in Krefeld, Germany, in April 2011 and the first train was ready for shipment to Russia for testing in February 2012. The trains should officially enter service in Kazan and Sochi later in 2012.

Siemens will also provide maintenance services for this rolling stock, over a period of 40 years. In total, the manufacturing and maintenance contracts are worth almost €1.1 billion (£0.86 billion/US$1.35 billion) to Siemens.

Called the 'Lastochka' (Russian for 'swallow'), RZD's new train is based on Siemens' successful Desiro ML platform, but customised to meet the unique needs of the Russian market and the Winter Olympic Games. For example, it is designed to operate at much lower temperatures than other Desiro models – between 40°C and -40°C. Special care has also been paid to the heating and ventilation system, to ensure pleasant, ambient conditions for passengers and to enable swift temperature control. There are also some unique storage solutions on board for winter sports equipment.

Sochi 2014 Winter Games

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During the Games the Lastochkas will carry passengers on the Adler-Sochi Airport and the Sochi-Adler-Alpika-Olympic Park routes. Once the Games are over, some of the trains will remain in service on the North Caucasus Railway, while the rest will be redeployed in Moscow to serve lines linking the capital's major railway stations and airports. Thus flexibility was a key criteria in the interior design. All components – from ski-holders to luggage racks and even passenger seats – are installed on rails so they can be mounted or dismounted more easily to suit future needs.

"Thanks to the flexibility of the interior partitioning, the train is in a position to deal with the special demands that will be placed on it during service for the Winter Olympic Games in 2014," explains a spokesman for Siemens. "The interior layout and functionality of the Lastochka can easily be adapted to meet specific requirements. A perfect example of this are the ski racks that will be in place in the end cars during the Games – designed to prevent skis from tipping over."

Adding to the flexibility, the trains have multifunctional areas with folding seating and space for four wheelchairs, as well as two restrooms for people with reduced mobility, and space for bulky baggage. A ramp ensures trouble-free boarding for wheelchair users, to all coaches.

Seat success

The trains will have two types of cabin – first-class and regular. "It was necessary to provide passengers with seats for use on the regional rail lines," says an RZD spokesman. "So the train is equipped with two types of seats (first-class and regular), which should be clearly distinguishable from each other by their degree of comfort."

The first-class compartments are laid out in a 2+2 configuration, while the regular cabins have a 2+3 format. The distance between backrests of seats arranged face-to-face is no less than 1,600mm, while in multirow arrangement that distance is at least 980mm.

"Passenger feedback ultimately led to changes in both the seat and the overhead rack arrangement"

ABOVE AND BELOW: The trains will feature two classes of seating from Kiel

Siemens sought customer feedback to fine-tune the seating, among other elements. "A mock-up of the end car was presented in a railway station in Moscow and visitors were invited to comment on what they thought of the train," says the Siemens spokesman. "This passenger feedback ultimately led to changes in both the seat and the overhead rack arrangement."

The seats are supplied by Kiel and are based on a steel construction mounted on an aluminium rail, with the backrest screwed to this metal

SKI LIFT

Storage for athletes and spectators attending the 2014 Winter Olympic and Paralympic Games in Sochi has been a key concern for RZD and Siemens from the very beginning of the Desiro RUS design process. Many will require space and racks for skis, warm clothing and other equipment.

So how have the Lastochka trains been developed to meet this unusual brief? "A rack for storing skis is located in each end carriage, near the rear entrance way," says an RZD spokesman. "This consists of a folding rack, which prevents the skis from falling while the train is in motion. If the rack isn't being used, it folds against the wall."

There is also plenty of space for more conventional paraphernalia. "Luggage racks are mounted above the seats along the length of the carriage, and divided by partitions, although there are no luggage racks above the multifunctional area that has folding seats," says the RZD spokesman. "All of the storage racks' surfaces are smooth and designed to prevent dirt from accumulating, to facilitate cleaning. They also incorporate hooks so passengers can hang jackets."

There are also two luggage shelves, "to accommodate the required volume of 0.11m^2 of luggage for each seat in each car," he adds.

LEFT: The information system will update passengers in Russian and other languages as required

"Internal flooring is a homogeneous, slip-resistant, resilient safety floor"

base. The backrest, with integrated headrest, is inducted into the structure from above with the seat cover (made of Zelupur foam) screwed to the base. Both covers are secured to each other. The seat dimensions accord with Russian standard NB ZhT CL 111.

Everything in the train has been developed "according to state-of-the-art technology, aesthetics, safety and flexibility" states the Siemens spokesman. "Our production suppliers for the project were all selected according to Siemens' high-quality standards."

These suppliers include Altro for flooring. "Internal flooring is a homogeneous, slip-resistant, resilient safety floor," says the Siemens spokesman. "It is a dense and impermeable PVC floor with an EasyClean surface and an integral 'bacteriostat' to ensure hygiene and permanent antibacterial performance. It includes aluminium oxide throughout the thickness of the flooring, complemented by silicon carbide and coloured quartz for lifetime slip-resistance and durability."

ABOVE: Entry/exit zones will be separated from seating areas by glass partitions

LEFT: The driver's cab

Meanwhile ITSA is providing side linings. "All side- and front-wall cladding is made from fibreglass, aluminium and durable laminated plastic," says the RZD spokesman. "Externally, the car bodies are made of extruded aluminium profiles and feature air suspension, giving a high level of passenger comfort at any speed."

Lighting the way

The functions and characteristics of the internal lighting system, meanwhile, are split into two systems – emergency lighting and operating lights. "This is firstly designed to adequately provide light to all of the compartments, service areas, restrooms, entrances, passageways and driver cabs," says the RZD spokesman. "It also facilitates a variety of activities including reading, working and recreation." The lights are not controlled on an individual basis, but are designed to be muted enough that passengers are not dazzled by any light source or reflective surface.

"Elements of the ceiling – which visually complements the rest of the passenger compartment – include integrated light fixtures, speakers, electric lines and air vents," continues the RZD spokesman. In terms of other features, internal doors are located at the end of each carriage. These open manually, swinging out in a 155° radius, and can be locked in an open position. These are all double doors, with corresponding frames, fireproof glazed glass panes and the appropriate sealing. Glass partitions, made from a single layer of safety glass, separate the entry/exit zones from seating areas. These are adjacent to the doors and in the entryway, with the partitions flanked by handrails.

Aesthetically, the trains will feature a modern design with light colours, and have been designed to offer excellent all-round visibility. Other passenger-centric additions include an automatic coffeemaker above the trolley storage area, with coffee-making supplies placed directly above it; and a passenger information system. This will provide updates not just in Russian, but in other languages (including English and French) when required – just one hallmark of a train designed specifically to help ensure Russia's first Winter Olympic and Paralympic Games run as smoothly as possible.

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Illustration by Tim Ellis

Could rail's love affair with lightweighting deliver the benefits witnessed in aerospace? Maybe… if you choose your partners carefully

When analysing current trends in materials for mass transportation, it doesn't take long for the topic of 'lightweighting' to meander its way into the discussion. It's been a strong focus of the auto sector for many years, the key enabler of improved fuel efficiency and CO_2 reductions, as well as driving performance gains. Cost, performance and emissions benefits have been experienced in aerospace, too, with an estimate from Enviro.aero calculating that – across the 57 million flying hours of the total commercial fleet – cutting 1kg per flight could save around 1,700 tonnes of fuel and 5,400 tonnes of CO_2 annually.

Perhaps more pertinently, these transportation weight-loss diets (the focus of a brand-new conference to be held alongside Railway & Mass Transit Interiors Technology/Design Expo 2012 this October in Boston) are especially crucial in the face of rising oil prices. As Bombardier Transportation North America's R&D chief, Jacques Belley, will inform delegates in his session, in an aircraft every kilo of weight saved can be critical to an airline's bottom line. So in a world where even silicone sealants are scrutinised for their impact on an aircraft's overall weight, isn't it about time the rail sector follows suit, particularly when faced with much the same pressures?

Behind the times?

Composites are nothing new to railcars, of course, having been used for around 30 years. But while admitting the pace of change has been much more sedate than in other industries, experts in rail dedicated to their advancement nevertheless report gathering interest in recent times, especially for interiors, but challenges, too.

One of the widely acknowledged hurdles to instigating a materials revolution in rail has been convincing an industry that for so long has doted on heavy metal that inherently combustible plastics can deliver all of the safety, cost, durability and mechanical properties they expect – and legislation demands. Certainly the hotly debated CEN/TS 45545-2 will smooth the way for manufacturers, fabricators and resin suppliers to get their innovations approved for rail use, which could initiate a domino effect that spurs future generations of high-speed rail. As you will read over the next few pages, a truly viable alternative to air travel is a sustainable must. And that will be good news for suppliers, OEMs, TOCs, the environment and passengers alike.

MORE ON THIS TOPIC: Held by the publisher of *Railway Interiors International*, the Transportation Weight Loss Diet Conference will take place in Boston, MA, USA, on 24-25 October 2012. Visit www.TransportationWeightLossDiet.com for more info.

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Seppo Virtanen from Finnish company Metsä Group is on a mission to convince railcar designers and engineers to take a fresh look at wood – specifically birch plywood – as a cost-effective, sustainable and high-performance alternative to what he describes as "sexier" composite pretenders.

"People have forgotten how biomechanically strong wood is – it's a really high-tech product," insists the VP of sales for transport vehicle industry at the Lahti-based forestry giant. "For applications such as floors, subfloors and walls, a cross-bonded birch plywood is economical, its price is more predictable and stable than oil and aluminium, and as we're a cooperative owned by 125,000 private foresters [50% of the privately owned forest in Finland], we can guarantee its supply even when our competitors are finding raw materials hard to come by.

"The further south you go, to Estonia and Poland, for instance, the more the birch loses its strength properties," Virtanen is keen to stress. But his message isn't only that Metsä can offer a reliable, durable, high-quality and high-strength Nordic birch; the technical know-how of the Metsä Group is such that the raw material can be engineered to meet some of the rail industry's most demanding safety standards. "We have been supplying our plywood to subcomponent suppliers in the rail sector for years – end customers actually started specifically requesting our product from their suppliers," Virtanen reveals. "The challenge was having to continuously fine-tune the plywood's properties for each contract in order to meet different certifications and regulations. We decided that it would make more sense for us to develop a homogeneous product that met all European and US regs from the outset."

"We can guarantee supply even when our competitors find raw materials hard to come by"

Seppo Virtanen, Metsä Group, Finland

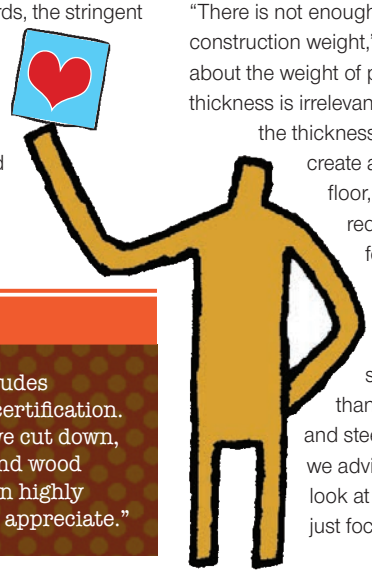
ABOVE: Noise can be controlled with Sonex plywood

ABOVE: Cross-bonded birch offers excellent stiffness

Enter Phoenix and Sonex. The former, a birch plywood product, features a flame-proof aluminium surface and has been tailored to meet the German and Spanish standards, the stringent French standard and the British BS-6853, and Virtanen is currently awaiting the thumbs-up to certify Phoenix meets the future CEN/TS 45545-2 standard – the one on everybody's lips.

Metsä Wood's Sonex brand, meanwhile, is a comfort plywood that has been designed to reduce the propagation of noise between the exterior and passenger spaces. "Resulting from our in-house manufacturing and engineering expertise, we possess a unique flexibility when it comes to serving our customers' needs; we can engineer a wood to any requirement in terms of size, strength and overlays," the Finn says. The Sonex plywood panels include Isokon between the birch layers to really isolate the noise from the outside world. Sonex Light, meanwhile, features an Amorim cork rubber product, which is ideal for railcars where lighter weight is a prerequisite. A further product in the range is Sonex Double, which combines the best properties of the two former Sonex products at both high and low frequencies. Sonex and Phoenix can even join forces to create a product that ticks fire and sound insulation requirements.

But can wood seriously compete with a composite plastic or metal in terms of weight? "There is not enough emphasis on the total construction weight," Virtanen feels. "Discussion about the weight of plywood per m^2 in a certain thickness is irrelevant because by increasing the thickness of the plywood you could create a much stiffer and stronger floor, so you might potentially require fewer metal supports, for instance, making your total construction lighter. In terms of density, at 700kg/m^3 birch plywood is a much stronger and lighter material than aluminium [2,700kg/m^3] and steel [7,800kg/m^3], so that's why we advise construction designers to look at the bigger picture and not just focus on one element."



GREEN STREET

Part of the bigger picture alluded to by Metsä Wood's Seppo Virtanen includes sustainability, which prompts the Finn to highlight the company's PEFC certification. "We source responsibly, we manufacture responsibly and for every tree we cut down, we plant another one in its place," he concludes. "Even our waste [bark and wood dust] is used in energy generation. It's a very positive message that's been highly successful for our brand and is something OEMs are definitely starting to appreciate."

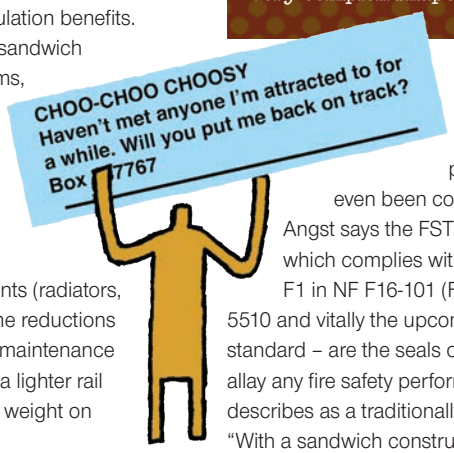
Designers shouldn't look to an off-the-shelf approach for optimal composites performance

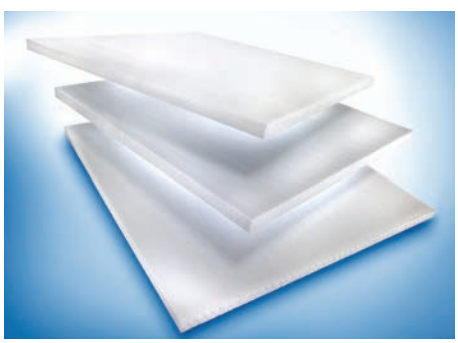
Railcar designers face mounting challenges, not least maximising passenger comfort without increasing vehicle weight. "Enhanced comfort usually means more insulation, more electronics and more acclimatisation, all of which can lead to a heavier railcar and increased energy consumption," says Philipp Angst, product manager at 3A Composites Core Materials. The use of a lightweight material – in 3A's case its AIREX (PET foam) and BALTEK (balsa) core products for use in sandwich constructions – is one of the ways that this challenge can be tackled head-on.

"With its thin, strong and stiff outer skin and lightweight core material, a composite sandwich can give weight savings of 50% over conventional, monolithic structures," continues Angst, who says the Swiss company's PET polymer-based AIREX T90 core material (engineered specifically for rail interiors) is continuing to gain traction.

"But weight is just one consideration," Angst notes. "A sandwich composite can bring about heat, noise and vibration insulation benefits. And with a flexible, modular sandwich construction, other subsystems, such as HVAC, and lighting can be integrated into floors, ceilings, etc."

This "functional integration" can deliver savings, Angst says, by eliminating certain components (radiators, etc). It can also yield cost/time reductions during assembly, and future maintenance could even be minimised as a lighter rail vehicle could mean reduced weight on the bogies and rails.





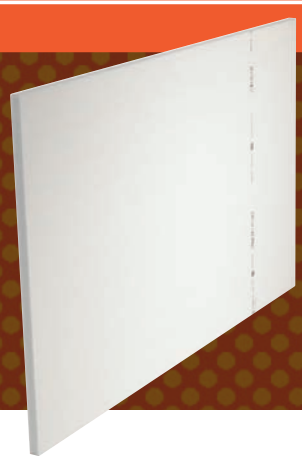
ABOVE: 3A's AIREX T90 structural FST foam

"Other subsystems, such as HVAC, can easily be integrated into components, such as floors"

Philipp Angst, product manager, 3A Composites Core Materials, Switzerland

TRIED AND TESTED

Joptek is convinced of the virtues of AIREX T90, the core material within its sandwich components. "In addition to the fire-safety benefits, mechanical properties, improved sound and thermal insulation, recyclability and cost efficiency of using PET as the raw material, Joptek finds T90 to be very easy to process," says Philipp Angst. "Joptek panels are either mechanically glued, vacuum-bonded or vacuum-infused, and they appreciate the way in which T90 can be thermoformed if very complex shapes are required."



Safety first

And that's all before passenger safety has even been considered. In this regard Angst says the FST properties of T90 – which complies with the stringent M1/F1 in NF F16-101 (France) and S4 in DIN 5510 and vitally the upcoming CEN/TS 45545-2 standard – are the seals of approval that should allay any fire safety performance fears in what he describes as a traditionally metal-minded industry. "With a sandwich construction, the choice of core material, face sheet and resin or adhesive greatly influences overall fire performance," he explains. "But EN 45545-2 requires that the subsystems – roof, floor, toilet module, etc – individually meet specific fire requirements, which presents a challenge for materials producers like us as we can only influence the material and not the overall system. That's why we can't say whether one material or another will meet 45545-2 as it depends on how it is used in the final design. But we can make a huge contribution to ensuring compliance by consulting successful material choices and sandwich designs."

Overall, though, Angst discourages a one-product-fits-all approach. "We have the know-how and tools to optimise structures to specific needs, so we first try to understand where a customer wants to go. Is overall weight the major consideration? Upfront cost? Is sustainability the driver? What about total lifecycle cost? We then engineer a bespoke solution to that financial, environmental or technical spec, and can often end up with disparate material combinations for different applications in a vehicle."

More complicated and time-consuming than an off-the-shelf strategy, it's nevertheless enabled 3A Composites to develop products for the gamut of railcar needs. The latest in this line-up is a 60kg/m^3 PET foam for semi-structural applications, which Angst suggests is ideal for compartment walls, doors, covers, etc, where high mechanical properties are not as important as they are for structural applications. A new sealing technology, meanwhile, offers what Angst says is a "dramatic reduction of resin uptake of the infused core material". This is important because depending on the sandwich design, resin uptake can constitute around 15% of the infused core.

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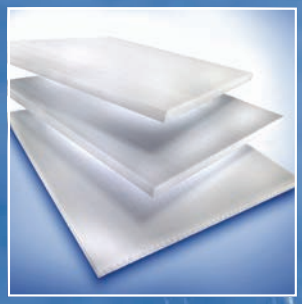

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- Solaris Tramino (Solaris tram, Poland)
- Shanghai, Bejing and Nanjing Metro (Qingdao Kangping Railway GRP)
- Chinese high speed train "EMU" (Qingdao Kangping Railway GRP)

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Experience and know-how is priceless when it comes to dealing with the intricacies of the rail industry

The fact that the UK's MTAG Composites was established just 4.5 years ago belies the combined 250 years' worth of rail sector experience of its most senior personnel.

This was clearly not lost on Alstom, which around three years ago awarded the Lincolnshire-based company a huge contract to produce all of the phenolic interior mouldings for four new Pendolino 11-car trains and a further 31 K and L car extension to the UK's Virgin Trains-operated west coast mainline fleet (106 carriages in total). "We supplied some 2,900 panels either direct to Alstom or to suppliers KTK in China, Saira in Italy and TRB Lightweight Structures in the UK," reveals managing director Nick Maltby, whose company has doubled in growth each year since it was founded in 2008. "The deal encompassed any composite product on the train."

The components are the same design as those on the original Pendolino a decade ago. Back then, they were handmade but now they're manufactured using a vacuum infusion process (VIP). "We basically suck the resins through the mould tool," he says. "This is more cost-effective, and provides an even, more consistent quality."

Contract talk

It's taken about three years to fulfil the Alstom order. "Out of the total contract we've hit a 99.41% quality and delivery success rate, so from 2,900 panels, just 17 have been returned," reveals MTAG's founder, who's worked in the industry for 32 years. "Alstom came to us with their design and asked if we could take on the job. We were obviously delighted, subsequently made the patterns, the mould tools, produced the parts, painted them, crated them up for delivery to Italy and China and then they were fitted to the carriages. It was a big contract, at the time around 70% of our total workload, but it wasn't demanding for us. The trains are on the rails now and the additional cars – which extend the west coast mainline fleet by two – are slowly going through."

As you would expect for Alstom, quality was a vital aspect so MTAG's accreditation to ISO 9001:2008 went a long way in satisfying the train builder's exacting standards. "We produced the first train and as a result of our quality of service and the reliability of the parts delivered on time, they had faith in us for the next three trains,"

"I think the CEN/TS 45545-2 standard is a bit of a relaxed standard compared to BS"

Nick Maltby, managing director, MTAG Composites, UK

FLYING START

MTAG's Nick Maltby thinks the rail sector could do a lot worse than keep a close eye on developments in the aerospace sector. "We've just secured a large order for aircraft seats," he confirms. "Nowhere is weight such a paramount consideration as on board an aircraft, where seats are below 10kg. I think in the future you'll see a lot more of this lightweighting in the rail sector, with lighter seating structures and so on. It helps us and our rail customers that we have our foot in the aerospace door already."

Maltby enthuses. "GRP phenolic mouldings are also our specialism, which in the case of the Pendolino for the UK had to comply with BS-6853:1999 (Class 1a) as well as BS-476 (Part 6 – Fire Propagation; Part 7 – Surface Spread of Flame). I think the upcoming CEN/TS 45545-2 standard is a bit more relaxed than BS so we're fully expecting to satisfy the new European norm, too," Maltby confidently predicts. Although MTAG also works with epoxy and polyester glass-fibre-reinforced products, for railcars Maltby says there's really no substitute for phenolic. "Some polyester suppliers are trying to get 45545-2 downgraded slightly so polyester complies with the standard, but there is quite rightly resistance in terms of weakening any safety standard," he says. "Polyester tends to give off high levels of toxic fumes and smoke, whereas phenolics give off low levels and are well within Category 1a specifications."

ABOVE: Phenolic window panels for Alstom's Pendolino

The demand for more lightweight products and what Maltby terms smart composites will proliferate in the years to come. "But in the end it all comes down to cost. I envisage the incorporation of sensors and electronics that could report back collision damage from a nose cone, or within the interior, speakers or noise-cancellation systems. Ultimately, though, the lighter or smarter you make them, the more expensive they become and then you get into the whole upfront-cost-versus-lifetime-cost debate. People may come to you with a wishlist and when it comes to what's possible in terms of complex shapes, etc, we can do pretty much anything – and composites will always fare favourably against steel or aluminium in terms of cost.

"As fuel costs continue to rise, public transport will become ever more important but it needs to be cheaper, which doesn't seem to be happening at the minute," Maltby cautions. "Composites, by virtue of their many benefits such as reducing operating costs, can play a large part here."

A new player in the rail interiors market hopes to replicate its success from architectural design

Premier Composite Technologies (PCT) is somewhat of a success story in the field of advanced materials, having produced one of the world's first composite-based aerodynamic nose cones (for the German ICE train). Since that flagship rail project, though, PCT has forged itself something of a reputation in the field of architecture, working with Foster + Partners among others. If PC Praveen has his way, though, the company's presence in the railcar market will soon be equally revered.

"We started around six years ago with just five or six employees, and now we're an 800-strong team," says the business development manager of the Dubai-based composites specialist. And while acknowledging the disparities between the two fields, Praveen says there are parallels to be drawn when developing composite parts for building structures and making components for the interior of railcars. "We're currently involved in the Mecca and Medinah rail stations for the Haramain high-speed rail project, providing the advanced composite roof and interior ceiling panels," he reveals. "We began production in June 2012, having worked with Foster + Partners during the initial design phase to create a prototype panel that would meet their complex designs yet also meet the stringent fire and safety regulations."

"Our process team has been actively involved in the testing of FRP samples to meet any requirements"

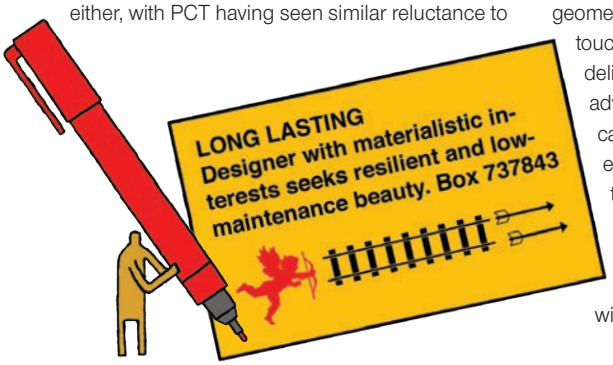
PC Praveen, PCT, Dubai

ABOVE: PCT's flagship ICE train composite nose cone

Demand and supply

The demands in the rail sector are not dissimilar, with high performance levels needed in terms of FST, sustainability, maintenance, durability and more. "Our process team is actively involved in the testing of FRP samples to meet any FST requirements, such as NF F 01-281, NF F 16-101, DIN 5510, BS-6853 and CEN/TS 455455-2."

The rail industry's long-standing preference for metal-based solutions is not alien to Praveen either, with PCT having seen similar reluctance to composites in the construction sector. "For years designers have been constrained by a relatively small selection of materials so they haven't been able to turn their futuristic concepts into reality," he says. "But we can now mould complex, fluid and creative forms and produce some really efficient geometric designs. We can even simulate the touch and look of traditional materials, all while delivering important weight savings. An advanced concrete cladding, for example, can weigh as little as 10% of its concrete equivalent." For the rail vehicle market, though, PCT can deliver components that weigh 50-80% of the weight of parts made from other materials.



Ceiling panels, seating systems, window panels, partitions, vestibules, toilet modules, staircases and more can be tailored for any interiors project, with Praveen and his team particularly targeting the high-speed market for big growth. "Around 70% of the interior fittings here could be made with FRP composites, and upwards of 90% in metro railcars," he feels. "One day, even structural metal components currently on the interior and exterior could be composite.

"One of the big challenges facing our sector is competition from evolving, low-cost countries, but it's important for suppliers and train builders to remember that the cost reductions being discussed in some quarters cannot be achieved without compromising quality and safety. A further challenge is to find the raw materials that meet the highest standards yet are also economical to integrate, have no supply issues and are not detrimental to the environment.

"When composite raw material prices are linked to oil [for resin] and energy [for glass fibre], uncertainty will only ever lead to price fluctuations, but as with many other raw materials, generally the trend will be for cost increases."

Praveen is hoping that EN 45545 will sort the wheat from the chaff in the future from a safety perspective, however. "It's a positive standard for the advancement of composites, but only if you can comply with the requirements."

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Railway & MASS TRANSIT interiors TECHNOLOGY DESIGN EXPO

The only international exhibition dedicated to railcar and road bus and coach interior design and equipment, **Railway & Mass Transit Interiors Technology/Design Expo** will be held on 24-26 October 2012 in Boston, Massachusetts, USA, and is set to be **the most important event of the year.** Over the following pages you will find a small sample of the innovations on display, a full forum programme and exclusive previews of some of the presentations...

5 REASONS WHY YOU MUST ATTEND

1 **A bustling exhibition:** With around 100 exhibitors, the hall is set to be heaving with a wide range of product and service innovations – a small selection of which you can read about over the following pages. There is a strong core of American and Canadian exhibitors, flanked by other key suppliers from countries all over the world – including Finland, Germany, Russia, Taiwan and the UK.

2 **The free-of-charge forum:** A truly exceptional line-up this year includes Duncan Copland, director of industrial design at Amtrak (profiled on page 4), who will talk delegates through the design of the operator's latest diner cars; Lynn Lefebvre, product manager for long-haul trains at VIA Rail Canada, who will introduce a luxurious new 'all-suite' class (see page 48); and Jacques Belley, director of R&D, standardisation and innovation at Bombardier Transportation North America, who will share how the OEM is preparing for the future with lightweight designs. Other speakers will address passenger trends, ergonomics, lessons from the airline sector, high-speed design, the peculiarities of designing for the American market, noise control, material developments, fire resistance, infotainment,

GOT IT COVERED

Omnova Solutions will highlight its PreVaill Transit upholstery for mass transit seating. The company says that in addition to meeting all flame, smoke and toxicity requirements, this vinyl upholstery includes the proprietary PreFixx finish, giving the product excellent durability and cleanability.

PreVaill Transit with PreFixx is specifically engineered for high-use, mass-transit seating that needs extremely durable and easy-to-clean upholstery. Applications include new bus and rail seats, replacements for woven textile seats, and refurbishment projects.

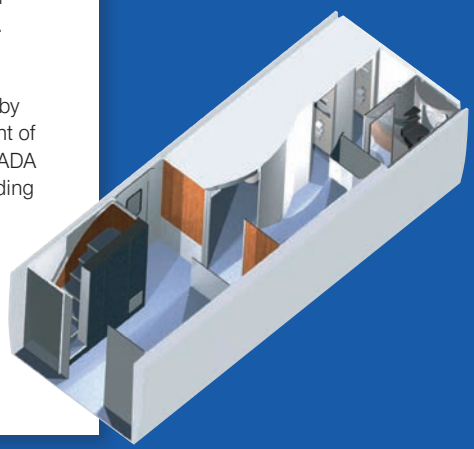
The product is available in five standard stock colours or can be custom designed to meet clients' required specifications. Omnova's library includes more than 500 embossing rolls and thousands of print cylinders. In addition to custom patterns, textures and colours, the company says it can design a product in line with customers' flame and smoke, durability, coating, weight and vinyl thickness specifications. **Stand 3042**

PLAN AHEAD

A leader in design and manufacturing in the American passenger rail industry over the past three decades, RailPlan International was commended at the Brunel Awards in Washington DC in October 2011 for its role in the redesign of Amtrak's Superliner I interiors. This commendation at the Brunel Awards was jointly accepted by Amtrak and RailPlan.

Since the Americans with Disabilities Act (ADA) was passed by Congress in 1990, RailPlan International has been at the forefront of design innovation for rail interiors. It produced a fully compliant ADA restroom on Metro North M-6 cars in 1991 and has been upgrading national rail transit fleets for numerous agencies ever since.

RailPlan will be exhibiting a train section with its Unisex restroom, ADA restroom and interior furnishings that were recognised at the Brunel Awards for design excellence. The company's products include a full range of modular interiors, and capabilities range from building prototype railcar mock-ups to full mechanical support for carbuilders and agencies. **Stand 4007**



FIBRE PROVIDER

A custom moulder of fibreglass composites for the mass-transit industry, Fiber-Tech will bring various types of panels for visitors to sample. The company tailors its resin systems to meet clients' specifications. For more than 25 years it has moulded interior and exterior panels and components for trains and buses, as well as construction and agricultural equipment. The company offers gel coat finishes, textured top-coat paint and anti-graffiti lamination. Its goal is to give customers a complete part, not just a fibreglass composite. Fiber-Tech says it can help clients looking for window masks, lateral ceilings, handle fairings, induction modules and any other miscellaneous parts made of fibreglass composites; meeting any fire, smoke and toxicity requirements. **Stand 2060**

lighting, flooring, CCTV, ancillary revenue, seats and seat coverings. Additional case studies include an in-depth look at the Alaska Railroad; easing congestion in Melbourne, Australia; and NewRail's SecureMetro project (also see page 20).

3 Composites & Lightweight Materials Pavilion: Optimising vehicle weight is hugely important to operators and engineers who want to make their trains faster and more efficient. If you're one of them, don't miss this dedicated area where a large number of innovative suppliers will showcase the latest breakthroughs in lightweight materials and composites.

4 Transportation Weight Loss Diet Conference: Railway & Mass Transit Interiors Technology/Design Expo 2012 will be co-located with the 2012 Transportation Weight Loss Diet Conference. Bringing you the benefit of viewpoints and expertise from the global aerospace and automotive industries as well as from rail, this conference features senior figures from Ford, Airbus Operations, Boeing, PSA Peugeot Citröen, BMW, Volvo Trucks North America, Tata Motors, Lockheed Martin Aeronautics, Lotus Engineering, Jaguar and Land Rover, plus many top universities. Topics will include lightweight materials and manufacturing, simulation and integration, passenger environments, safety, aerospace design developments and seating. Please visit www.transportationweightlossdiet.com for more details (including a full speaker list) and to book your conference pass.

5 Unrivalled networking opportunities: Railway & Mass Transit Interiors Technology/Design Expo 2012 is the networking opportunity of the year. Visitors will comprise key interiors buyers and specifiers from railcar and bus OEMs, rail and bus operators, departments of transport, vehicle-leasing companies, transportation catering companies and industrial designers/vehicle interior consultants. With more than 2,000 visitors expected, it truly will be the must-attend event of the year!

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LIGHTING THE WAY

Teknoware will share its recent successes. In 2010, the company received an order to supply all the interior (LED) lighting for 270 commuter railcars in Holland – from seat indicators to round and thin luminaires about 3.5ft in diameter, inspired by the opening in the dome of the Pantheon building in Rome, Italy.

Teknoware's latest task was to supply LED lighting for the UK's new Heathrow Express train. For this, the company developed round colour-changing RGB-vestibule lights that use special colour fade patterns. Stand 3030

SEW GOOD

BESI will highlight its expertise in sewing and RF heat-sealing, which enables it to provide a wide variety of products – from seating, upholstery and seatbelts to RF heat-sealed and fabricated products. In addition, Tie Tech (division of BESI) provides a full line of evacuation and safety products. Stand 5008

ABOVE AND BEYOND

Specialty Manufacturing Group (SMI) will showcase its Pretoria transit interior lighting, ducting, overhead parcel racks, Transpec escape hatches and bumpers for the transit bus and passenger rail markets. Standard and custom interior LED lighting solutions are available with a variety of LED colour ranges and dimming options for both new installations and retrofit projects. The company's overhead parcel rack designs are modular and include integrated LED reading lights, ventilation and speakers, with other accessories available upon request. Stand 4019

MATERIAL MATTERS

Fellfab will promote its extensive line of engineered textile products for railcar builders and transit authorities. With an in-house engineering department, the company works closely with its customers to develop and build products that suit their specific needs. Fellfab manufactures seat covers, new and refurbished seat cushions, curtains, carpet kits and a variety of customised interior items.

Established in 1952, the company manufactures products out of three North American ISO 9001:2008/ AS9100C:2009 registered facilities. It also provides its textile manufacturing experience to the aerospace, military, industrial, material handling and aviation industries. Stand 3025

SPEAKER SPOTLIGHT

Selby Coxon, deputy head of the Department of Design at Monash University in Australia, will share the results of research into how metro carriage interiors can be reconfigured to ease crowding on the Melbourne rail network

What is the aim of the research?

The project is an ongoing PhD study, which in itself forms part of a wider body of work considering the design issues of train accessibility, passenger dispersal and dwell time stability. The project began in 2009 and will be complete towards the end of 2013.

What have been the key findings?

The key findings have been provided so far by computer simulation. This indicates better passenger dispersal and boarding and alighting times for peak conditions. This has been achieved by radically changing the seating layout and introducing the concept of peak doors. These are doors at which there are folding seats that stow away when these extra doors are deployed. Split doors that stimulate dual passenger flow through doors are also part of the scheme. There is no really new technology as such; it is more about creating a culture change through using design to manipulate passenger movement.

Why is this such a pertinent topic?

Large cities in Australia, as in most parts of the world, have experienced rapid growth in patronage. This has made the peak period particularly onerous when it comes to extended dwell times. For operators, extended dwell times mean a reduction in network capacity and therefore revenue. By creating the conditions for timely boarding, trains pass through stations quicker and capacity can be increased on the network.

Where will the market be in 10 years' time?

I think urban populations are growing rapidly, putting more pressure upon metro systems to move large numbers of people efficiently. I think at the very least the sort of research undertaken at Monash University will point the way to re-evaluating the way passengers can be dispersed more efficiently.

Selby Coxon's presentation will be held at 2:15pm on Thursday 25 October 2012

FIRE FIGHTER

CCP Composites will present its Fireblock series of non-halogenated, fire-retardant resins and gel coats. These intumescent materials are designed to swell and produce an oxygen-blocking char layer on the composite's surface when exposed to flame/heat. The aim is that the low density and poor thermal conduction of the char protects the underlying material from damage with continued heat or flame exposure. The product is currently being used in many mass-transit projects, including Carlson buses and the new Bombardier Innovia Monorail 300 system in São Paulo, Brazil. Stand 4037

New Flyer and Carlson Engineered Composites

DRIVING AMBITION

NewRail, the railway research centre at Newcastle University in the UK, recently completed a technology demonstrator for a lightweight, crashworthy driver's cab, in partnership with Bombardier Transportation and AP&M. Named D-CAB, the full-scale prototype employs sandwich material technology for the main cab structure and crash energy absorption devices. NewRail says the design is lighter than a conventional steel-framed cab and has fewer components, yet retains the necessary performance levels for proof loadings, crashworthiness and missile protection. It also says the reduced mass and integrated nature of D-CAB's design yields savings in assembly and outfitting costs, as well as in-service reductions in energy consumption and operational costs.

A full-scale prototype has been made to demonstrate feasibility, and a scale model will be on display at the expo. To advance the concept towards commercial exploitation, the development team is hoping to produce a second refined prototype for full-scale crash testing. Stand 3016

SPEAKER SPOTLIGHT

Lynn Lefebvre, product manager for long-haul trains at VIA Rail Canada, will discuss the operator's upcoming 'all-suite' luxury class

What is this project all about?
VIA Rail Canada started working on an 'all-suite' project several years ago as part of a long-term vision of its services in Canada. The project began with a countrywide interior design contest, which was won by the firm Lemay Michaud in Montreal. A prototype was built inside a rail container, which then travelled across the country several times to show and promote the project. Funds were approved by the government for this project in part due to the innovative accessibility features in the Park car concept. We expect to have completed the first few cars by autumn 2013.

Why is VIA Rail introducing an all-suite class?
Customers around the world expect more every year and the hospitality industry continues to up the ante with more luxurious amenities and value-added services. VIA Rail already offers a unique experience and excellent service; this modernisation of our physical amenities will allow us to increase the attractiveness of our product for today's more discerning traveller.

Where do you see the market in 10 years' time?
The trend toward providing an all-round experience and a boutique hotel-type experience is one that seems to be holding, and growing in response to demand, in particular as more and more baby boomers retire and travel more. VIA Rail is uniquely positioned to seize the opportunities this trend presents, and intends to continue to innovate going forward.

What's special about the interior?
A total of 12 cars will be gutted and rebuilt. Eight Chateau cars will feature six en-suite cabins with a bathroom and shower, flatscreen TV with wide range of content as well as concierge service. Each car will also have a concierge cabin. The guest cabins will have a Murphy-style double bed, which will be stored inside the wall during the day to reveal an L-shaped leather sofa facing the large panoramic windows. The bathroom will feature heated floors.

What are you looking forward to at the forum and expo?
As we are currently working on expanding and improving our WiFi, onboard entertainment services and technology in general across our network, these types of presentations will be especially of interest.

Lynn Lefebvre's presentation will be held at 12:40pm on Wednesday 24 October 2012

HUGE RANGE

3M has more than 30 major technology and product platforms to showcase, as well as technical support and sales/distribution networks. The company's products range from bonding solutions to surface protection, thermal acoustic systems and lighting solutions. Stand 3022

PLASTIC FANTASTIC

A leading German manufacturer of railway interior systems made of thermoplastic materials, Lakowa will highlight expertise that includes design, tooling in its own tool shop, delivery and after-sales service. The company says it can offer solutions for nearly all standards of fire behaviour, starting with DIN 5510-2 up to the new EN45545 - HL3. Stand 2072

METAL WORKS

G. G. Schmitt & Sons will feature its expertise in the design and manufacture of stainless steel and aluminium products such as grab rails; safety rails; stanchions; storage shelves; luggage racks; footrests; table frames; partitions; electric locker enclosures; windscreens using plymetal, phenolic or safety glass panels; slide-up and fold-out sleeping bunks; washbasins; ADA sinks; recycling units; battery boxes; and component rail assemblies. Stand 3012

OPPOSITES ATTRACT

The star attraction on Nora Systems' stand will be the new noraplan unita floor covering. This product unites the company's rubber flooring with granite. They are two materials that could not be any more different, but Nora has found a way to make them complement one another perfectly. The company says this innovation does nothing to compromise the quality of the product – and that noraplan unita is an extremely tough and environmentally compatible rubber floor covering that is healthy to walk and stand on. Based in Weinheim, Germany, Nora Systems develops, manufactures and markets floor coverings, shoe components and steptreads. Stand 4006

PREVAILL™ TRANSIT with PreFixx®

#1 Choice

PreVaill Transit™ Upholstery for Mass Transit Seating

Engineered to meet the **flame, smoke and toxicity requirements** in mass transit seating applications, PreVaill Transit upholstery with PreFixx® protective finish can **reduce maintenance and cleaning costs** while **lasting up to 3x longer** than fabric seats. Designs can be **customized** to reflect regional themes. In a recent survey, San Francisco's BART riders preferred PreVaill Transit 7 to 1 over fabric seats. Improve your **rider satisfaction** with PreVaill Transit!

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As seen in the Bay Area Rapid Transit (BART)

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To learn more or to request samples,
contact OMNOVA Solutions:

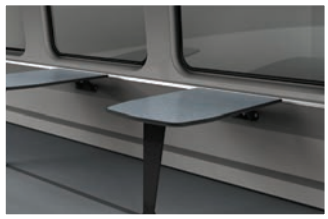
866-332-5226
upholstery@omnova.com
www.omnova.com

OMNOVA SOLUTIONS

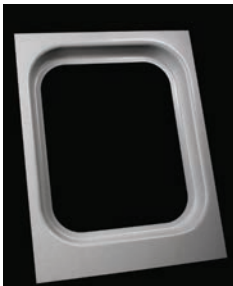
LIGHTENING THE LOAD

A prototype composite floor panel will be just one of the products featured on the Frank Ralphs stand, which the company says will offer lightweight properties and excellent resistance to moisture.

Other products on show will include an aluminium honeycomb drivers' cab door, curved aluminium honeycomb ADA toilet door and phenolic foam core panels for cove side ceiling panels and air duct housings. Table tops on display will include a recently developed crash management table that incorporates honeycomb pockets to save weight



and offer a crushable zone during impact. FEA report and load test results will be available at the show. The company will also promote products and services from partners, including FRP panels, handrails and engineering design. **Stand 2070**



CLEAN SHEET

Kydex will display the newest polymer sheet from its design lab, Kydex 2200LT. The product was created to meet the intense demands of the rail industry on four primary fronts: fire, smoke and toxicity credentials; a lightweight composition; the right mechanical qualities; and environmental friendliness. Kydex 2200LT is available in unlimited customisable colours, varied textures, geometries and undercuts. **Stand 4034**

LOCK STOCK

First-time exhibitor Adams and Westlake will promote its lock hardware, curtains, sunshades, sun visors and diaphragms, as well as its lock repair and refurbishment services. Established in 1857, the company works with materials such as steel, stainless steel, aluminium, brass, bronze, nickel bronze, rubber and curtain textiles. **Stand 3062**

RUBBER SOLD

Chamberlin Rubber will highlight its capability to supply custom die-cut gaskets, pads, strips and sub-assemblies as well as extruded and moulded parts. It supplies window extrusions, door seals, rubber cleats, bellows, strips, bumpers, roof panel seals, HVAC seals, batter door gaskets and various other materials. **Stand 4016**

SPEAKER SPOTLIGHT

Steven Ojalvo, North American business development manager for passenger information systems at Focon Electronic Systems, will address how the technology is evolving

How have passenger communication systems changed?

Ten years ago, communication systems were standalone segmented systems that provided the most basic audio and visual information to passengers using primarily analogue technology. In many cases, a communication system would have been supplied by multiple manufacturers, such as one for audio information (speakers, amplifiers, intercom, etc.) and another for visual displays (manual flip-dot signs or basic analogue LED mono-colour text-only displays, etc.) with little or no integration or interface to any other systems on board. Today's communications systems integrate multiple technologies including advanced visual displays (multicolour LED displays capable of displaying both text and graphics, advanced LCD TFT screens for advanced media content, etc.), public address, emergency intercom, video surveillance (CCTV), IP networks, wireless networks, and much more.

What challenges have these developments brought?

The challenge the industry often faces today is how to deploy the most relevant technologies available while at the same time implementing a service-proven low-risk communication system that responds to all the key performance requirements of a transit agency and its passengers. Focon has addressed this by changing our product design strategy from a custom-built solution unique to each and every project to a standard modular platform with high flexibility and seamless integration of functional modules, allowing us to address current and future technology requirements for the industry as a whole.

What's next for this technology?

Over the next 10 years, I see the demand for advanced technologies in communication systems evolving exponentially. Passenger communication systems will continue to leverage the latest in wireless technologies, using higher bandwidths to provide the most advanced information (from media content such as news, weather and local information to full video streaming, etc.) in real time.

Steven Ojalvo's presentation will be held at 1:30pm on Friday 26 October 2012

PANEL SHOW

Koshii Maxelum America will display ceiling, wall, cab partition, door, door pocket panel and sub-flooring components that are assembled and ready for installation. Panels are made using aluminium honeycomb core, plywood and balsa, bonded to decorative laminate and stainless steel surfaces, as well as anti-graffiti surfaces. New products include thermoformed window masks and interior panels. Also on display will be various materials designed to reduce weight and improve acoustic and thermal properties. **Stand 3060**

GET A GRIP

Bentech will show various handrail, windscreen and modesty panel assemblies. Other products designed and manufactured by the company include luggage racks, luggage bins and overhead parcel rack kits. Handrail fittings are produced by sister companies All Quality Aluminum Foundry and Transit Fittings of North America. Air, hydraulic and conduit piping are manufactured by parent company Philadelphia Pipe Bending Company. **Stand 5010**

FREE TO ATTEND!

TECHNOLOGY & DESIGN FORUM

The **Technology and Design Forum** is a unique feature of **Railway & Mass Transit Interiors Technology & Design Expo**, providing attendees with a three-day conference with top international speakers **giving an insight into new product and service innovations and case studies.** The free-to-attend presentations deliver content and great value to the event, and many seats are reserved well in advance.

Day 1

Wednesday 24 October

11:00 – The shape of things to come
Jez White, head of transport, Seymourpowell, UK

11:25 – Ergonomic design for low-mass, high-capacity transport
Dr Neil Mansfield, reader in human factors engineering, Loughborough Design School, UK

11:50 – Presentation title to be confirmed
Paul La Rouche, director of product planning, Bombardier Transportation, Canada

12:15 – Presentation title to be confirmed
Adrian Corry, senior consultant, strategic partnering – public transportation, BMW Group DesignworksUSA, USA

12:40 – Creating a luxury rail product in Canada
Lynn Lefebvre, product manager, long-haul trains, VIA Rail Canada, Canada

13:05 – Defining the North American high-speed train
Cesar Vergara, president and chief designer, Vergarastudio, USA

13:30 – Interior design and refurbishment of a prototype diner
Duncan Copland, director of industrial design, Amtrak, USA

13:55 – Rail design for the American experience
Christopher Scholz, architect, Elskop Scholz, USA

14:20 – Alaska Railroad: America's tourist railway of the far north
Michael Weinman, managing director, PTSI Transportation, USA

14:45 – The 21st century green transportation revolution
J. P. Mobasher, founder/CEO, SMT Rail, USA

15:10 - Shaping the passenger's experience
Christian Roy, design director, Labbé Designers, Canada

15:35 – What rail operators can learn from the airline customer experience
Michael Crump, consultant director, Honour Branding, UK

Day 2

Thursday 25 October

10:30 – A practical approach for lightweight design
Ravi Chilukuri, director, EASi, USA

10:55 – Lightweight, non-flammable noise-control methodology for transit vehicles
Peter Jackson, technical director, American Acoustical Products, USA

11:20 – Lightweight rail transportation
Jacques Belley, director R&D, standardisation and innovation, Bombardier Transportation North America, Canada

11:45 – Halogen-free, low-smoke UPR for composite FRP transportation applications
Richard Pauer, market manager, CCP Composites, USA

12:10 – Thermoplastic solutions for lightweight rolling stock
Celeste Dunn, segment manager rail, Bayer MaterialScience, USA

12:35 – Composite prepregs that display fire resistance and adhesive properties
Carl Varnerin, vice president research and development, Barrday Composite Solutions, USA

13:00 – Media4Rail: an infotainment solution for revenue-generating value-added services
Dr Francesco Prato, director, Siemens CMT, Austria

13:25 – LED technology applied to rolling stock interior lighting applications
John Hesketh, managing director, LPA-Excil Electronics, UK

13:50 – The evolution of lighting in rail transit
Labon Ruth, manager rail sales and business development, Luminator, USA

14:15 – An innovative approach to metropolitan train carriage interior configuration
Selby Coxon, deputy head of the Department of Design, Monash University, Australia

14:40 – Innovative lightweight window systems for trains
David Yogev, vice president, Oran Safety Glass, Israel

15:05 – Interesting case study reviews of four different flooring types
Stephan Plomp, international key account manager - transport, Forbo Flooring Systems, UK

15:30 – Advantages of composite floors versus traditional materials
Marco Zvanik, head of sales, BFG International, Bahrain

Day 3

Friday 26 October

11:00 – SecureMetro: inherently secure blast-resistant metro vehicles
Conor O'Neill, senior research associate, NewRail, UK

11:25 – Data connectivity project case study for Talgo trains in USA
Jay Saw, CCO of Nomad Digital, USA;
A *representative* from Talgo America, USA

11:50 – Current and future requirements for US rail and CCTV projects
Dave Gorshkov, CEO and chair of APTA's CCTV Standards Group, Digital Grape Business Services, UK

12:15 – From spending to earning – how to enhance the passenger's travel experience and generate income
Christoph H. von Uslar, president, Inova Multimedia, USA

12:40 – Engineered seating solutions improve passenger comfort, reduce bacteria and save money
Scott Gipson, global business director, general manager coated fabrics, Omnova Solutions, USA

13:05 – ISEAT: research and development of integrated components for railway seats
José Rui Marcelino, design manager, Almadesign, Portugal

13:30 – The evolution of passenger information system technologies in passenger rail
Steven Ojalvo, business development manager, Focon Electronic Systems, Canada

*This programme may be subject to change

View the full programme at **www.railwayinteriors-expo.com**

From the publishers of Railway Interiors International magazine

transportation weight loss diet conference 2012

The Transportation Weight Loss Diet Conference is a unique event that will bring together key innovators from across the automotive, aerospace and rail industries, as well as leading academics, to highlight major breakthroughs in mass reduction.

SEE FULL PROGRAM OVERLEAF

CONFIRMED SPEAKERS TO DATE:

Matt Zaluzec manager Materials Research Advanced Engineering Department, Ford Motor Company • Dr John Fish senior manager Airframe Technology Lockheed Martin Aeronautics Co • Tomasz Krysinski chief engineer PSA Peugeot Citröen • Robert McIntosh chief engineer - Weights Boeing • Jacques Belley, Director R&D, Standardization and Innovation Bombardier Transportation North America • Oliver Walter Responsible Product Manager BMW i3 BMW • Dr Srikanth Ghantae senior technology specialist - Plastics Volvo Trucks North America • Dr Ley Richardson principal application research associate - Aerospace DuPont Protection Technologies • Pradeep Kumar Manager - Global Bus & Coach Programme Ashok Leyland Limited • Toru Yamanaka General Manager Automotive Center Toray Industries Inc • Ramkisan Gite PAT lead - Weight Reduction Tata Motors • Phillip Bell product line manager Corning Incorporated • Scott Blake president Assembly Guidance • Byron Bloch director Auto Safety Expert LLC • Jonas Braam research engineer Sapa Technology • Mike Brock market development manager Rogers Corporation • Daniel Buckley manager of R&D AGFM • Ravi Chilukuri director EASi • Antonio Coelho R&D director Amorim Cork Composites • Freddie Colsoul account manager LMS North America • Prof Glenn Daehn professor Ohio State University Materials Science and Engineering • Nico Den Ouden sales and marketing director E-Leather Group • Dr Jorge F. dos Santos head of department Helmholtz-Zentrum Geesthacht • Ramkisan Gite PAT lead - Weight Reduction Tata Motors • Neil Gross president Acme Mills Company • Phil Hall managing director Caterham Composites • Georg Heidelmann president Adapt Laser Systems • Prof Santiago Hernandez professor University of Coruna • Prof Pete Hylton director of Motorsports Engineering Indiana University Purdue University Indianapolis • James Jones CCG manager - Americas Composites Consulting Group • Greg Kolwich manager Value Engineering Services FEV Inc • Prof Konstantinos Kontis professor and deputy director The University of Manchester • Oliver Kuttner CEO Edison2 LLC • Prof Khalid Lafdi professor Department of Chemical and Materials Engineering UDRI and Wright Brothers Institute Endowed Chair in Nanomaterials • Donald Lasell president and chief engineer Think Composites • Michael Lee Project Manager EASi • Mogens Løkke CEO ECOmove ApS • Dr Ralph-Dieter Maier manager Aerospace Technologies BASF Corporation • José Rui Marcelino design manager Almadesign • Cameron May director GfE Materials Technology Inc • Patrick McGowan vice president GT Alloys • Prof Shaker Meguid Professor and Director Engineering Mechanics and Design Laboratory. Department of Mechanical and Industrial Engineering University of Toronto • Dr Mohammad Moniruzzaman product development engineer SABIC • Dr Dries Moors innovation manager Bekaert • John Mowrey CEO ZD Metal Products • Anthony Norton senior director Global Automotive & Off-Highway Vehicles Altair • Ms Gulsen Oncul A350 Ailerons EPM TAI • Tony Padula product manager Amphenol Pcd • Vasant Pednekar senior engineer Application Development Lanxess Corporation • Gregory Peterson senior technical specialist Lotus Engineering Inc • Alexander Pozzi vice president Advanced Design Group Seating Products B/E Aerospace • Paul Priestman director Priestmangoode • Javier Rodriguez Director Vehicle Integration & E/E EDAG Inc • Alasdair Ryder business unit manager - High Volume Manufacturing Umeco Structural Materials • Greg Schroeder research analyst Manufacturing Engineering & Technology Center for Automotive Research • Gary Seale managing director Cobra • Steven Sopher technical director JSP • Richard Strout president Leading Edge Motorsport • Gerret Suhl head of Sales Car Trim GmbH • Manoj Surana manager - Engineering Research Centre Tata Motors Ltd • Ashutosh Tomar senior researcher Jaguar and Land Rover • Dan Williams product manager - Automotive Granta Design Ltd • Ingo Wuggetzer vice president Cabin Innovation and Design Airbus Operations GmbH • Dr Robert Yancey senior director - Global Aerospace Altair Engineering

If weight reduction, fuel efficiency or environmental impact matter to you, then you need to attend this conference!

OCTOBER 24-25, 2012 BOSTON, MA, USA

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Transportation Weight Loss Diet Conference 2012

The Transportation Weight Loss Diet Conference will bring together designers, engineers, program leaders, and heads of industry from the global aerospace, automotive, and rail industries for a two-day conference dedicated to cutting-edge research and technologies aimed at reducing weight without compromising safety, efficiency, or performance.

Presentations will include real examples of how challenges and compromises can be overcome and avoided through intelligent design choices and initiatives, as well as new materials and engineering practices.

The conference provides an unparalleled opportunity for a transfer of ideas between transport sectors, highlighting the best new approaches with the greatest potential to reduce weight, save fuel, enhance performance, and lessen environmental impact. Don't delay – make sure you book your place in Boston this October!

PRELIMINARY CONFERENCE PROGRAM

DAY 1 Wednesday, October 24

Setting the scene: the future of mass reduction

The opening session of the conference will highlight key trends and motives for mass reduction in the automotive, aerospace, and rail sectors, as well as examining potential future supply issues for lightweight materials.

Keynote presentation

Matt Zaluzec, manager, Materials Research and Advanced Engineering Department, Research and Advanced Engineering Center, Ford Motor Company, USA

Lightweight rail transportation at Bombardier

Jacques Belley, R&D director, Standardization and Innovation, Bombardier Transportation, USA

Less is more: automotive downweighting opportunities with mixed materials

Greg Schroeder, research analyst, Manufacturing, Engineering & Technology, Center for Automotive Research, USA

Lightweight materials

This session will look at a range of materials for use in vehicle mass reduction applications. New-generation meta and para aramids, intermetallic replacements for Ni-based superalloys, magnesium alloys, metal matrix composites, and 'fuzzy fiber' will all be profiled. The session will also cover manufacturing CFRP parts.

Advanced lightweighting materials: Nomex, Kevlar, and beyond

Dr Ley Richardson, principal application research associate - Aerospace, DuPont Protection Technologies, USA

Gamma Ti alloys: commercial solutions for carbon reduction

Cameron May, director, GfE Materials Technology Inc, USA

How metal matrix composites have been redesigned for more machinability and lower cost

Patrick McGowan, vice president, GT Alloys, USA

Magnesium applications for lighter-weight vehicles

John Mowrey, CEO, ZD Metal Products, USA

Passenger environments

Transportation needs to be attractive and easy to use. Transportation operators and manufacturers need to satisfy passengers and customers. Consumers must view mass reduction as an improvement to their transport experience. This session will look at how this can be achieved.

Designing efficient passenger environments

Paul Priestman, director, Priestmangoode, UK

Cabin Concept 2050 based on a bionic structure

Ingo Wuggetzer, vice president Cabin Innovation and Design, Airbus Operations GmbH, Germany

Employing new design techniques to deliver lightweight seats

Alexander Pozzi, vice president Advanced Design Group, Seating Products, B/E Aerospace, USA

Low-calorie light infotainment

Ashutosh Tomar, senior researcher, Jaguar and Land Rover, UK

OCTOBER 24-25, 2012
BOSTON, MA, USA

FROM THE PUBLISHERS OF RAILWAY INTERIORS INTERNATIONAL MAGAZINE

Low-cost multifunctional-use composite to reduce weight
Prof Khalid Lafdi, professor, Department of Chemical and Materials Engineering University of Dayton Research Institute and Wright Brothers Institute Endowed Chair in Nanomaterials, USA

Developing volume manufacturing processes for carbon-fiber reinforced automotive body structures
Donald Lasell, president and chief engineer, Think Composites, USA

Manufacturing with lightweight materials

This session sees presentations covering high-speed automated manufacturing processes and techniques using composites; and looks at how smartphones may deliver new, strong, lightweight glazing solutions to transportation, as well as new mixed materials.

High-volume, high-speed preforming for structural composites
Daniel Buckley, manager of R&D, AGFM, USA

The development of effective prepreg solutions for the transport sector
Alasdair Ryder, business unit manager - High Volume Manufacturing, Umeco Structural Materials, UK

Strong, lightweight glass laminates for transportation weight reduction
Phillip Bell, product line manager, Corning Incorporated, USA

EASI: steel cord reinforcement for injection molded parts
Dr Dries Moors, innovation manager, Bekaert, Belgium

Lessons from aerospace: integrating lightweight materials information into engineering workflows
Dan Williams, product manager - Automotive, Granta Design Ltd, UK

Objective composites manufacturing process control: reducing uncertainty, overdesign and weight
Scott Blake, president, Assembly Guidance, USA

Lightening the way ahead
Phil Hall, managing director, Caterham Composites, Germany

Lightweight design of composite structures
Dr Robert Yancey, senior director - Global Aerospace, Altair Engineering, USA

Technologies for lightweight design and performance verification
Ravi Chilukuri, director, EASi, USA & Michael Lee, project manager, EASi, USA

Polyetherimide-carbon fiber as metal substitute in aircraft food tray arms
Dr Mohammad Moniruzzaman, product development engineer, Sabic, USA

Innovative solutions for railway floors and interior panels using cork
Antonio Coelho, R&D director, Amorim Cork Composites, Portugal

Automotive case studies and applications

What are the major vehicle manufacturers achieving in terms of mass reduction? This session looks at specific case studies of vehicles and programs.

VSL Project: sustainable and affordable technology for CO_2 emission
Tomasz Krysinski, chief engineer, PSA Peugeot Citröen, France

Weight reduction lessons and achievements: product development
Ramkisan Gite, PAT lead - Weight Reduction, Tata Motors, India

The BMW i3: a battery electric vehicle – right from the beginning
Oliver Walter, responsible product manager BMW i3, BMW, Germany

Using alternative plastic materials for weight reduction on heavy trucks
Dr Srikanth Ghantae, senior technology specialist - Plastics, Volvo Trucks North America, USA

Use of composites in bus structures for significant weight reductions
Mukul Mitra, program manager, Ashok Leyland Limited, India. Pradeep Kumar, manager - Global Bus & Coach Programme, Ashok Leyland Limited, India

Weight reduction through value engineering
Manoj Surana, manager - Engineering Research Centre, Tata Motors Ltd, India

Light-duty vehicle mass reduction and cost analysis: midsize CUV
Greg Kolwich, manager, Value Engineering Services, FEV Inc, USA

Reducing vehicle weight with composite materials
James Jones, CCG manager - Americas, Composites Consulting Group, USA

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DAY 2 Thursday, October 25

Simulation and integration

The design and engineering challenges of integrating composite materials into structures and parts is addressed in this session, with presentations focusing on simulation, design optimization and process control techniques.

Intelligent adhesive bonds that provide an early warning system for structural failures

Prof Shaker Meguid, professor and director Engineering Mechanics and Design Laboratory, Department of Mechanical and Industrial Engineering, University of Toronto, Canada

Design and fabrication of multi-material structures

Prof Glenn Daehn, professor, Ohio State University, Materials Science and Engineering, USA

Laser cleaning pre-treatment for bonding of lightweight metals

Georg Heidelmann, president, Adapt Laser Systems, USA

Achieving weight reduction through design, material selection, and application-specific products

Tony Padula, product manager, Amphenol Pcd, USA

Mechanical performance of friction spot-welded joints in 2198-T8 alloy

Dr Jorge F. dos Santos, head of department, Helmholtz-Zentrum Geesthacht, Germany

BASF aerospace materials for aircraft lightweighting applications

Dr Ralph-Dieter Maier, manager, Aerospace Technologies, BASF Corporation, USA

Design-driven innovation and cross-pollination for lightness

José Rui Marcelino, design manager, Almadesign, Portugal

Parametric study and topology optimization for platform concepts

Anthony Norton, senior director, Global Automotive & Off-Highway Vehicles, Altair, USA

Lord UltraConductive film and coatings for lightning strike protection

Ross Zambanini, senior global market segment manager, Aerospace & Defense, Lord Corporation, USA

Experiences with the electrical use of carbon fiber

Walter Kiersch, CEO, Carbon Conduction Technologies (CCT) GmbH, Germany

Automotive case studies and applications

Edison2's Very Light Car: a new automotive architecture

Oliver Kuttner, CEO, Edison2 LLC, USA

Half-weight vehicle with new materials: chassis, body, and driveline

Mogens Løkke, CEO, ECOmove ApS, Denmark

Full vehicle lightweight designing based on CAE techniques

Javier Rodriguez, director Vehicle Integration & E/E, EDAG Inc, USA

Prospective view of CFRP as a technology for weight reduction of automobiles

Toru Yamanaka, general manager, Automotive Center, Toray Industries Inc, Japan

HiAnt simulation: simulating structural continuous fiber-reinforced thermoplastics parts

Vasant Pednekar, senior engineer Application Development, Lanxess Corporation, USA

Automotive safety

One of the key concerns in downweighting vehicles is the issue of safety. This session looks at the issue not from the perspective of how far we can compromise safety for mass reduction, but rather how mass reduction actually increases safety and what lessons may be learned from motorsport.

Enhancing vehicle safety and crashworthiness with weight-loss improvements

Byron Bloch, director, Auto Safety Expert LLC, USA

Designing a lightweight body structure meeting federal impact requirements

Gregory Peterson, senior technical specialist, Lotus Engineering Inc, USA

Characterization of crash properties in aluminum extrusions

Jonas Braam, research engineer, Sapa Technology, Sweden

New materials and design technologies for motorsports

Prof Pete Hylton, director of Motorsports Engineering, Indiana University Purdue University Indianapolis, USA

OCTOBER 24-25, 2012
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Aerospace design developments

Looking specifically at aerospace, this session considers specific examples of mass reduction developments and the lessons learned in significantly increasing composite percentages in aircraft structures, as well as some interesting designs for drag reduction and innovative uses of carbon fiber.

Future aircraft composite weight savings opportunities and challenges

Dr John Fish, senior manager Airframe Technology, Lockheed Martin Aeronautics Co, USA

Challenges, and opportunities, of introducing composites into the 787 airplane design

Robert McIntosh, chief engineer - Weights, Boeing, USA

Weight opportunities of wide-body aircraft composite ailerons

Gulsen Oncul, A350 Ailerons EPM, TAI, Turkey

Multimodel structural optimization of commercial aircraft

Prof Santiago Hernandez, professor, University of Coruna, Spain

Understanding weight reduction relationships for rotorcraft

Dr Daniel Schrage, professor, Georgia Tech, USA

Drag-reduction technologies for low-speed applications

Prof Konstantinos Kontis, professor and deputy director, The University of Manchester, UK

Multi-disciplinary optimization of a pylon for mass and drag reduction

Freddie Colsoul, account manager, LMS North America, USA

CLOSE

Lightweight seating

Safe, comfortable seats – sometimes in large numbers – are a key requirement for most vehicles, especially aircraft and trains. Hence seating can add significantly to vehicle weight. This session is dedicated entirely to looking at this critical area for mass reduction with a range of approaches and products discussed.

Weight reduction in seat cushions

Mike Brock, market development manager, Rogers Corporation, USA

The use of high-strength polymers for metal replacement

Gary Seale, managing director, Cobra, UK

Lightweight structural solutions for transportation seating using expanded polypropylene (EPP)

Steven Sopher, technical director, JSP, USA

Weight savings through the use of suspension textiles

Neil Gross, president, Acme Mills Company, USA

Weight-saving possibilities on dress covers

Gerret Suhl, head of Sales, Car Trim GmbH, Germany

Win, win, win: lightweight leather

Nico Den Ouden, sales and marketing director, E-Leather Group, UK

CLOSE

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One for all

The Universal Train concept enables operators to configure their trains quickly for any route or occasion

Train manufacturers and operators face a crucial question when it comes to new trains: how should the train's interior be configured? Lots of standing room to cope with peak times or large events can annoy passengers travelling for leisure purposes. In less full trains, they would prefer to sit, preferably at tables and in grouped seating. Yet a configuration with lots of seats reduces the capacity that is urgently required in peak times.

"It is a seemingly unsolvable dilemma, assuming one doesn't operate different trains at different times – but that would be an impossibly expensive luxury," says Matthias Fischer, managing director of Neomind, an internationally active design studio based in Munich, Germany. Fischer, who worked for many years with Alexander Neumeister, the designer behind Germany's ICE trains, among many other things, believes good design begins at the point where ingrained opinions and behaviours are fundamentally questioned. "It is actually an obvious step to design the train furnishings to be flexible enough to resolve this dilemma," he says. "We don't need different trains; we just need one train that with minimal effort can be furnished differently in the morning from in the evening, differently during weekdays from at weekends." And so the idea of the Universal Train was born.

A seat for every occasion

At the heart of this train concept is the multifunctional Multiseat. Through simple pushing and folding, the hand rest in the central aisle is transformed into a group of seats for four people. One more swivelling movement results in

ABOVE: The Universal Train concept in weekend mode

RIGHT: Vending machines can be restocked from outside the train

WEEKEND MODE: LOTS OF STORAGE SPACE

In weekend mode, the Multiseats are set up in such a way as to provide enough storage space for prams, bikes or skis. There are also plenty of seats, the majority of which face in the direction of travel so that passengers can enjoy the passing landscape, both via the large windows on the sides and through the continuous panorama window on the roof. Individual groups of seats with tables are specially provided for smaller groups of passengers. The mode provides 28 seats and 200 standing spaces.

EVENT MODE: MAXIMISING CAPACITY

Major events such as football matches or concerts quickly push trains to the limits of their capacity. This is where the Multiseat shows off its true talent – it becomes largely invisible, serving only as a hand support. In this way, the Universal Train achieves maximum capacity for football fans and concert-goers. In this mode, there are 265 standing spaces, and no seats.

seating and a table for two. In this way, the trains can be adjusted to fluctuating demands at the push of a button – whether the requirement is for lots of standing space for bikes, prams and skis; the greatest possible amount of standing room during peak times; or lots of luggage storage space for trips to the airport.

When passenger numbers are particularly high, capacities can be increased considerably. For example, if, in a short train of three carriages, the Multiseat is set to simple seating throughout, 132 seats and 525 standing spaces are available. However, if the Multiseats are folded up, then there are only standing spaces, providing room for a maximum of 795 people. This represents a capacity increase of 20%. The individual Multiseat variants can be combined in any desired configuration. The train operator can also decide how frequently any alteration is to be carried out, and refine the configuration over time.

Fischer says a positive side effect of his invention is the minimal effort required by train operators: “The Universal Train offers an alternative model to the constantly increasing variety of train types, which are causing train operators ever greater headaches,” he says. “Thanks to its flexible furnishing, the Universal Train is suitable for virtually all local public transport routes. This would make it possible for operators to replace lots of different train types with the Universal Train. This, in turn, would considerably reduce the amount of maintenance, training and authorisation required.”

Modular system

The second important characteristic of the Universal Train is its modularity. All vending machines are designed as self-contained units that can be removed at any time or put back in place as a whole. This applies to the toilets, but also – and especially – to the vending machines for hot and cold drinks and snacks.

The starting point for Neomind with regard to this modular vending machine system was the identification of several trends. One of these was the growing acceptance of vending machines – in particular those designed for hot drinks – thanks to the increasingly common presence of espresso machines. Another trend is towards simpler payment methods, the key concept here being mobile payment. “Yet there is an obstacle in the path towards more vending machines on trains: the stocking of the vending machines is time-consuming and complex to organise, especially in the course of normal train operation,” says Fischer.

The modular concept was designed as a solution to this very problem. Once the train has arrived at its destination and all passengers have disembarked, one or two employees work their way along the length of the train with a special service wagon, removing the individual vending machine modules from the train and replacing them with a module that is fully stocked, cleaned and, if necessary, serviced. The Universal Train is constructed in such a way that the vending machines can be removed directly

ABOVE: In weekend mode, a balance is struck between seating and storage space

through the train's outer casing. The special service wagon is simply docked on to the appropriate, colour-coded parts of the train. "The vending machine can then be removed from the train with almost no effort, and replaced with a new module," says Fischer. The entire swap-over process for one vending machine should take no longer than a few seconds. "This procedure saves time and money," says Fischer. "Employees do not have to laboriously pull a fully stocked goods trolley through the train, check each vending machine and individually replace any missing items. Instead, the vending machine modules are restocked outside the train. This can be carried out almost wholly automatically, or even be entirely subcontracted to the producers or vendors of the food and drink."

Liquid assets

As well as the benefits to passengers, Neomind believes that the full-scale use of such vending machines could bring new sources of revenue to train operators. "Instead of letting the station shops take all the business, they could translate the coffee-to-go trend into direct profits," says Fischer. "To increase sales, the drinks and snacks offered could be adjusted to the respective transport situation: the 'Nespresso Train' with lots of vending machines for hot drinks would operate in the morning, and at night the 'Coca-Cola Train' with more cold drinks and the appropriate accompanying snacks."

Fischer says the immediate spatial proximity of seat and vending machine also makes the Universal Train a promising advertising space. "There is hardly any other situation in which people are as receptive to advertising messages as they are when travelling by train," he says. "The fact that the impulse to purchase can be acted on in situ should convince any food manufacturer and retail advertisers."

From design to reality

Currently, the Universal Train exists as a completed design study. The concept was first introduced to the public at the beginning of 2012, in an exhibition for the design industry at the Munich Creative Business Week. "There was huge interest, both from the general public and from representatives of the rail industry," reflects Mirko Kiesel, also a managing director of Neomind. "That's precisely what pleased us the most – that both potential passengers and train operators immediately recognised the added value of this idea. That was, after all, our initial goal – to design a train that offers both passengers and train operators added value."

Because of the relatively long innovation cycles within the rail industry, the designers at Neomind are not counting on a rapid implementation of the entire project. "But we are certain that individual elements of our Universal Train concept will gradually find their way into the industry," says Fischer. "The advantages are obvious. And the technical implementation can be carried out without any problems."

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COMMUTER MODE: SEATS AND TABLES

In Commuter mode, the Multiseat is set up to provide the maximum number of seats. Depending on passenger numbers, working modules with tables can be added. Such areas could, for example, be designated as quiet zones to allow passengers to concentrate on work. Electronic displays above the windows would serve to signpost these areas. The displays allow the functions of different areas to be as flexible as the furnishings. In this mode, there would be 44 seats and 175 standing spaces.

Cover stories

Operators from the UK, New Zealand and the Netherlands explain why they chose floor coverings from Forbo

From rapid transit to luxury tourism, all operators need assurance that their floor coverings will stand the test of time, retaining appearance and functionality for years, no matter how heavy the passenger traffic, and however rigorous the cleaning regimes. A global supplier of high-quality commercial floor coverings with well-established environmental credentials, Forbo Flooring Systems manufactures functional, design-oriented and sustainable flooring solutions for challenging interior spaces. The company has served the international passenger rail market for many years and offers a comprehensive range of textile and other flooring products, suitable for use throughout the railway carriage.

One of Forbo's most widely specified floor coverings, found in vestibules around the world, is Coral Brush Activ FR entrance flooring. Designed for durability in areas bearing heavy traffic, and to absorb moisture and remove soil from shoes (and wheeltreads), it boasts a unique construction of moisture-absorbing capillary, active scraping and extra-heavy-duty yarns.

Midway through one of its largest-ever procurement projects, Translink N I Railways is installing Coral Brush Activ FR in 20 new Class 4000 trains. New Trains Two programme manager James Erwin says the matting proved very effective in the past and also helped them to comply with the latest European standards for persons with reduced mobility. "We installed Coral back in 2005 on trains that are still in service. Seven years later, it still looks great," he says. "We can draw upon Forbo's extensive colour palette to provide the necessary visual contrasts with fixtures and fittings. There's plenty of choice so it's easy to find matting to integrate well."

BELOW LEFT: Tessera Alignment FR on KiwiRail's tourist train

BELOW RIGHT: Translink N I Railways has installed Forbo's electrostatically flocked Flotex floor covering

Paul Rutter, senior associate at DCA Design, also involved in the specification, comments, "Coral Brush Active FR performs really well, yet it looks more like carpet than entrance matting. Before this project, we specified it for Virgin Voyager vestibules. We've also installed it on M6 double-deck trains in Belgium as the main floor covering because of its performance and carpet-like appearance. In all cases it has been a success and we'll undoubtedly use it again."

Effectiveness, compliance and colour availability were important considerations for Chris Elliott, who looked after the HST refurbishment when he worked for East Midlands Trains. The vestibules in 93 HST saloon carriages were fitted with Coral Brush Activ FR. "We use Coral on all

LEFT: De Nederlandse Spoorwegen's newest carriages are finished with linoleum floor coverings from Forbo

BELOW: East Midland Trains recently installed Coral Brush Activ FR and Tessera Alignment FR as part of a major refurbishment involving 93 HST saloon carriages

of our train refurbishments," he said at the time. "It does a superb job, stopping soil entering the carriage and causing unnecessary soiling and premature wear and tear. It's by far the best product we've found."

Beyond the vestibule, wool-based carpeting has long been a traditional choice for saloon interiors. Forbo offers a number of options, including Tessera Alignment FR, a tufted multi-height loop pile carpet with a bold directional theme, available in a wide range of standard and bespoke colours. Manufactured from 100% solution-dyed nylon, Forbo says the carpet is designed for long-lasting colour retention, higher resistance to soiling than wool, and quicker drying times after intensive cleaning; while the flame retardant backing also meets the requirements of NFF16-101, NFP91-501 and BS6853. A year after East Midlands Trains started to install Tessera Alignment FR carpets in the saloons of its HST fleet, Elliott said he was very satisfied: "The carpets are living up to expectations and look great. The tufted construction is very hardwearing and standing up well to daily vacuuming. We see no reason why they shouldn't last throughout the current franchise."

This bodes well for New Zealand operator KiwiRail, which is installing Tessera Alignment FR in 16 'panorama' carriages joining its fleet of premium tourist trains. "For tourism-focused rail travel like this, the look and feel of the carriage interior is very important," says Keith Strode-Penny of KiwiRail's design consultant, Barnacle Design. "Alignment provides a contemporary yet upmarket flooring solution that really works within our overall design scheme." With its densely tufted pile, the carpet also has a coefficient of friction that meets New Zealand's requirements for wheelchair accessibility.

Moral and hardy

Forbo is supplying a completely different type of flooring for a carriage refurbishment project in the Netherlands, managed by NedTrain for De Nederlandse Spoorwegen. The manufacturer has developed a special fire-retardant version of Artoleum Striato, a linoleum floor covering, for the project. This is proving to be a popular alternative to the rubber flooring used by the operator for many years. Sustainability, durability and ease of cleaning were key specification criteria, and the 'retro yet modern' design of Striato has given the carriages a more upmarket look.

Meanwhile, operators including Translink N I Railways and KiwiRail have chosen Forbo's electrostatically flocked Flotex floor coverings for railway carriages. "Flotex provides a very practical surface that can be easily cleaned and stays looking good regardless of the wear and daily use in wet and wintery conditions," says Paul Rutter of DCA Design on the Translink N I Railways installation. "Flotex seems to thrive on this sort of punishment and it still offers a level of underfoot comfort for the passenger that is missing with any of the alternative hard floor products available."

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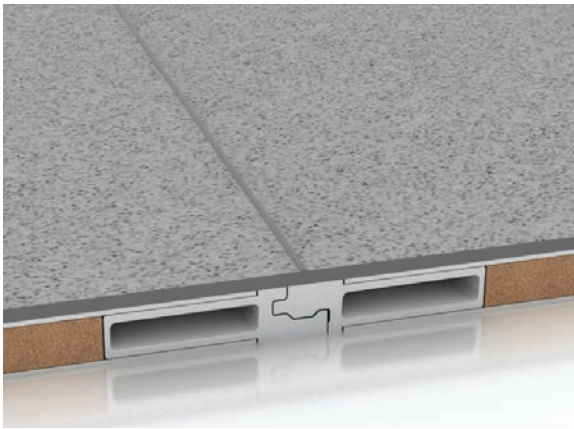

Green team

Cork sandwich panels promise lighter, more eco-efficient trains with improved acoustic and thermal insulation

Several years ago, Amorim Cork Composites (ACC) introduced cork and rubber core materials for plywood panels, to reduce noise and vibrations in trains. The result is a light, sound-absorbing plywood floor panel that has been used in railcars for many years. More recently, a new solution for train interiors has come onto the market, developed by the company from R&D to production. ACC has joined with others in a consortium (EcoTrain) to develop the Alucork floor system. Replacing traditional plywood panels, Alucork is a panel with a Corecork core in a sandwich system with aluminium skin. ACC says the final result is approximately 40% lighter than a plywood panel and offers much improved noise and vibration insulation performance.

Bearing in mind the production processes for railway components, and according to the Eco-Indicator 99, ACC estimates that Alucork's environmental impact is 50-80% less than other panels. "Alucork uses fewer raw materials and less energy for its fabrication, thus decreasing the overall CO_2 emissions in its manufacturing phase and in turn related production costs," says Antonio Coelho, R&D director and Ecotrain project manager at ACC. "It also uses a high percentage of renewable materials and is 100% recyclable, resulting in less environmental impact at the end of the train's lifetime."

The key to the product's acoustic insulation, vibration damping and thermal insulation properties, says the company, is its core. Corecork is a natural cork composite material that reduces noise transmission by 5-12dB in most cases – across the frequency range (up to 5kHz). ACC says that Alucork also provides a low thermal conductivity (λ=0,040 W/m^{2}C) and long-term durability, which ensures efficient thermal insulation throughout the train car's life.

Rolling stock flooring systems must be able to compensate for vehicle movement, withstand heavy human traffic and be resistant to relevant thermal changes. To address this, finite element analysis models were developed and Alucork's structural resistance was extensively tested. The product feasibility studies included fatigue tests of three million cycles, which simulated the floor's deflection after 40 years of passenger use. ACC says that the impact and point load resistance tests demonstrated that Alucork complies with the maximum deformation acceptance criteria.

LEFT AND RIGHT: The Eco-Train project led to floor and sidewall panels with cork cores

ABOVE: A railcar concept using various Corecork solutions

Alucork was also subjected to extensive tests to check its durability throughout the train's service life. "After being exposed to heat and humidity, Alucork shows good retention of its original bending strength without signs of delamination or other problems (such as mould growth)," says Coelho. "In contrast with typical railway plywood, the result is no water absorption. This feature contributes to the floor's long-term durability and maintenance-free service life."

Meanwhile, ACC reports that FST tests on Alucork panels show compliance with some of the most demanding requirements for flame spread, smoke density and toxicity: the floor panel is compliant with NF F-16-101(M1 F1), CEN/TS 45545 (HL3) and ASTM E-162/ASTM E-648.

The panel's standard dimensions are 4.6 x 2.4m and it can be applied in both new and refurbishment projects. Alucork is easily bonded to different top sheets, using a permanent bonding or a quick-release adhesive system. The panels can be customised to achieve the necessary mechanical stability.

Interior profiles are built in to the panel depending on which components will be installed in the floor (e.g. seats and hand poles). Pre-assembled fixing points and connecting profiles for sidewalls are defined according to customer requirements and can be pre-installed. Larger floor panels can also be pre-assembled using built-in profiles.

The EcoTrain consortium has also focused on developing sidewall and ceiling elements in fibreglass sandwich panels with Corecork cores. A lightweight and flexible core material is also available for thin sandwich panels. The outcome is a fully tested window panel, 2.2 x 1.8m in size, that is 30% lighter than existing monolithic parts. This new composite part was made by vacuum bagging but can also be made by vacuum-assisted resin transfer moulding using flame-retardant resin systems. ACC says the manufacturing process uses fewer fossil resources, reducing the environmental impact by at least 20% (for the panel manufacturing phase only; Eco-Indicator 99 (E)V2.03).

"The EcoTrain sidewall panel shows an improvement in thermal and noise insulation as well as good damping behaviour," reveals Coelho. "It is resistant to temperature variations with no mechanical degradation, and low dimensional change, while retaining its dimensional stability during the entire lifecycle. The sidewall panel complies with fire, smoke and toxicity railway standards NF F16-101 (M1F2) and CEN/TS 45545-2 (HL3/HL2)."

EcoTrain was funded by the Portuguese National Strategic Framework Programme (QREN) under the Operational Programme for Competitiveness Factors (COMPETE) and European Regional Development Fund (ERDF). As well as ACC – which has been supplying core materials and vibration decoupling strips for train and bus floors for many years – the consortium also includes: Alstom, a world leader in transport infrastructure, power generation and transmission; ISQ, a Portuguese technical inspection and test organisation; and PIEP, a private R&D institute. Others joined the project during the development phase – Metawell working on the Alucork floor concept; and Mäder Composites and Famopol on the sidewall panel solution.

The project explores the use of cork as a core material in technical structures for interior components. "Designed to be lightweight, durable, sustainable and high-performing, EcoTrain solutions harness cork's natural lightness and acoustic and thermal insulation properties to create innovative interior systems – floor, sidewalls and ceiling panels," says Coelho. "The main advantages of the EcoTrain solutions over existing products are the reduced carbon footprint and environmental impacts, weight reduction and remarkable improvements in acoustic and thermal insulation."

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LEFT: Caxxx

Light fantastic

Metros in Warsaw and Munich are the latest to use LED technologies to enable striking interior design features

LED lighting is now well established in rail interior design. "The power savings, ability to be dimmed, cool beam and low maintenance costs LEDs offer are decreasing typical lighting systems' lifecycle costs considerably," says Martin Ramsden, engineering manager at LPA Excil Electronics, an early adopter of the technology. One advantage of LEDs is that the dimming interface can be pulsewidth modulation (PWM) or vehicle-supply logic-level binary code, permitting various illumination levels, including emergency mode. "Today, the only newly designed rolling stock using fluorescent lamps tend to be in lower GDP countries with low labour and energy costs, therefore not justifying the use of LEDs," Ramsden says. "The day is fast approaching when fluorescent lamps in trains will be a thing of the past."

Low-power chip LED technology is the latest technology to catch LPA Excil Electronics' eye. The company has embraced the technology and is using it in its LumiMatrix concept, part of the LumiSeries LED-based product range. This design utilises many LEDs operated at low power, as opposed to a lower number of high-power LEDs. A matrix of low-power chip LEDs are arranged on a back plane with a glass or polycarbonate diffuser placed in front. "This matrix can be configured to match the luminous intensity of any fluorescent lamp and achieve specific service life," says Ramsden. "The high quantity of LEDs operated at low power avoids the spotting effect that can occur when you use a lower number of high-power LEDs. Extremely high-performance LEDs from a leading manufacturer are used, which ensures a high colour rendering index (CRI) and close control of colour temperature."

ABOVE: The Siemens Inspiro platform

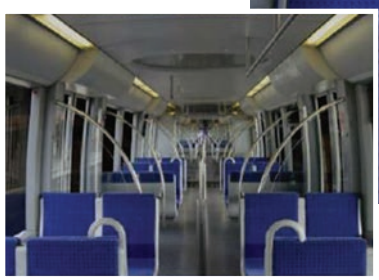
The LumiMatrix is not simply an LED luminaire; it can be supplied in any shape and dimension – as a printed circuit board (PCB) only, or as a full luminaire. This 'light engine' can be a rectangular or circular board, or just an LED strip. "Most importantly, this concept allows interior designers to push the boundaries of traditional interior lighting schemes," says Ramsden.

The company believes its two most recent applications illustrate the design benefits of the LumiMatrix technology – and LED lighting in general. LumiMatrix has been selected for metros in Warsaw,

Poland, and Munich, Germany – both of which are based on Siemens' new Inspiro Metro platform.

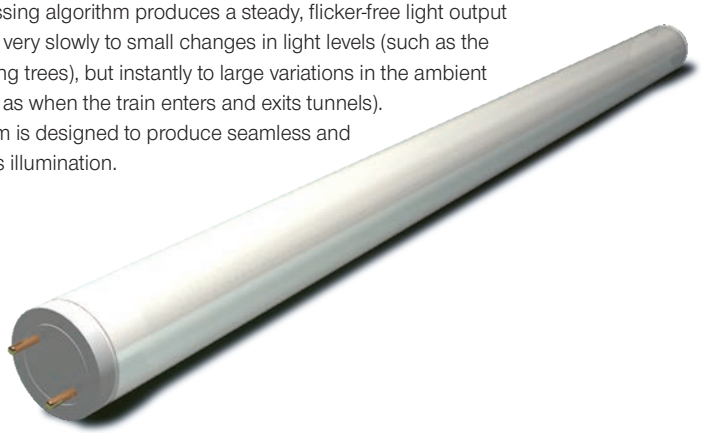
For Warsaw, Siemens has started the production of 35 train sets using LumiMatrix technology. The design has a traditional scheme of two longitudinal lighting strips on each side of the train. "One of the striking features of this interior is the uniformity and continuity of the light strip throughout the whole length of each car, therefore avoiding the typical visible gap between each luminaire with fluorescent lamps," says Ramsden. This is achieved by mounting LED PCBs end to end and keeping the same pitch between each LED from one unit to another. Multiple dimming levels are preset to achieve a particular lighting level and atmosphere. "The dimming level for emergency lighting also allows minimum power consumption, thus enabling downsizing of batteries (and cost)," adds Ramsden. Each longitudinal lighting row is powered by two connection modules, one at each end of each car. The system also offers additional safety features in case one supply line fails.

For Munich, Siemens will build 21 train sets. "The designer on this project came up with an ambitious, unconventional and refreshing lighting scheme comprising 'rotundas' (a full circular strip in each vestibule), arches and longitudinal strips highlighting each section of the car – vestibule and saloon," says Ramsden. The technology used on the Warsaw Metro will also be applied on the Munich Metro, with some variations. To achieve the uniform illuminated circular and arched strip, Ramsden says the obvious and probably only solution was to use a high number of chip LEDs on a circular PCB with modules connected end to end.



ABOVE: Munich's new metro uses LumiMatrix to create linear and circular LED strips

"These projects are the most recent ones demonstrating how LEDs can help shape a new rail interior deign," says Ramsden. "Other additional features can easily be added – such as colour temperature variation according to the time of the day or a specific event, to create different moods." He adds that PWM-controlled lighting systems also have the flexibility to interface with any dimming control system, including real-time ambient control. An ambient light-level control system averages the output from a number of ambient light sensors and applies a processing algorithm to attain the correct response characteristics. The lumen output of each luminaire is controlled using a PWM signal. Ramsden says that this processing algorithm produces a steady, flicker-free light output that reacts very slowly to small changes in light levels (such as the train passing trees), but instantly to large variations in the ambient light (such as when the train enters and exits tunnels). This system is designed to produce seamless and continuous illumination.



BELOW: LPA's new drop-in LED tube for retrofit projects

While complex lighting systems with new mechanical interfaces may be routinely integrated in new rolling stock, retrofit project teams may be put off by the price. For this reason, LPA Excil Electronics is offering a new LED tube designed to fully comply with railway standards such as shock and vibration (EN61373:1999), environment (EN50155:2007), electromagnetic compatibility (EN50121-3-2:2006) and the harsher surge and transient requirements of BRB/LUL/RIA 12, while still being a cost-effective solution for retrofit projects.

The unit is a drop-in replacement unit for a T8 fluorescent lamp. It emits light from LEDs at an angle of 120°. But one of the key features of this unit is that it has built-in drive electronics, meaning the existing fluorescent inverter can be bypassed to power the LED tube directly from the vehicle supply (110VDC, 72VDC, 24VDC or 230VAC), the aim being to reduce installation time. The end caps can be factory-set at a specific angle to optimise the luminous spread of the LED tube.

The company says the product is IP65 sealed and has a lumen maintenance of 65,000 hours to 70% of the initial output, with a 50% power saving at an equivalent light output of a fluorescent lamp. Trials are under way across Europe and Asia for retrofit projects.

"LED lighting has now reached a critical stage where one would struggle to justify the use of fluorescent lamps for new projects," says Ramsden. "Availability, reliability, affordability, power saving, dimming control and the return of 10 years' experience are among the long list of benefits of this exciting technology."

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Long or short

With practical seats for regional routes and others for long-distance comfort, Borcad has something for everyone

In 2008, Borcad was faced with the important decision of which direction to take in the development of new seats. The options were to focus on either the regional or the long-distance market. As the Czech company boasts a strong and innovative R&D team, its management decided to bring new solutions to both segments.

The company had already gained rich experience in regional transport (with seats for ŽSSK, ČD and MÁV), and it drew on this for the development of completely new seats. The objective was to offer a product that met all the needs of railcar manufacturers, operators and the travelling public.

Regional solutions

The first prototype of the new regional seat was the result of a research project that concluded with testing in 2010. The project was the culmination of extensive market research that included an in-depth needs analysis of the clients, resulting in goals that seemed, at first glance, rather contradictory. The goals were: to achieve lightweight seats without compromising robustness; to meet the demanding crash test norm GM/RT2100 by increasing robustness; to achieve high adaptability while retaining serial duplicity of the components; and to maximise passenger comfort.

The company managed to meet these goals with a new construction design for the seat frame and technologies incorporated into the production process. The final outcome was a seat that is particularly suitable for double-deck and electric units, where weight represents a key factor. “The most important features of the Regio and Regio+ seats are their low weight and high robustness. They have high crash resistance that greatly contributes to increased passive passenger safety,” says Michal Ševula, marketing manager at the company.

TOP AND ABOVE: Regio seats installed on a double-deck train

The armrests meet the solidity norm UIC 566 and resist compression under 2,000N. “A considerable increase in the seat part’s load capacity – reaching 2,000N, which is twice the norm – was achieved,” says Ševula. But by far the greatest breakthrough in arriving at

ABOVE: The Excellent seat

BELOW: The Comfort seat

reddot design award
honourable mention 2012

enhanced solidity was duly accomplished with the armrest construction, with 750N compression sustainability at the top or the sides.

Borcad says Regio and Regio+ armrests are able to sustain 1,500N compression in both directions. "The enhanced durability of the components produces high resistance to inadvertent handling by the maintenance personnel or against vandalism," says Števula.

During the development, considerable attention was paid to safety. The company reports that the seat successfully passed demanding crash tests according to the GM/RT2100 norm at MIRA, a certified test facility in the UK. The new construction is designed to ensure a high level of passive passenger safety in collisions.

The Regio and Regio+ seats were delivered to units operated by Aeroexpress, ČD (City Elefant) and ŽSSK (Bdteer), among others.

High-speed seats

The first notable success for Borcad in the high-speed arena was the development of seats for ČD's series 680 Pendolinos. Borcad is proud to have been awarded the order for seats for all seven of these train sets. In total, 2,331 seats were delivered to ČD. The model went on to receive the prestigious National Design Award in 2003.

Rather than resting on its laurels, following this success Borcad continued to research and develop new seating solutions. One of these, Comfort, was designed for the new generation of medium- and long-distance trains. A modular concept forms the basis for first- and second-class variants, and enables the company to respond flexibly to specific customer requirements. Seat options include an integrated 10in backrest monitor, two options for stowaway tables with magazine pockets, and a footrest. The side cover of the head part can be complemented with a handrail and a reading lamp.

"The seat's innovative positioning feature enables passengers to adjust the sitting position comfortably – which is particularly useful during long journeys – and also affords more space than any of its competitors," says Števula. The design of the Comfort seat aims to give an upmarket feel to the interior while creating ideal conditions for comfortable travel.

In March 2012, the Comfort seating solution, which has been installed in Stadler's Leo Express units, was awarded a Red Dot prize in the product design category. "This is clear evidence of the determined product philosophy of Borcad; a philosophy that is based mainly on innovation, high-end technology and originality, combined with modern trends and functionality," says Števula. The creator of the Comfort seat design is the sculptor Jiří Španihel, with whom Borcad has a long-term cooperation.

Top of the line

Borcad not only reacts; it also endeavours to forecast new trends in its field. Thus, the company has embarked on a new project for luxury-class seats, entitled Excellent. This seat is designed to be the first power seat of the highest class, offering the best conditions for working and relaxing on long journeys.

A control panel integrated into the right armrest enables passengers to make adjustments according to their preferences. "Seat comfort is ensured due to pleasant upholstery, the seat cushion's depth and angle, the optimal shape of the backrest and ergonomic headrests," says Števula. Lumbar support is adjustable in four directions, enabling passengers of all heights and sizes to find their preferred ergonomic position.

Meanwhile, a tilting footrest and the ergonomic slanting of the back are designed to ensure excellent conditions for working and relaxing on long journeys. "The pragmatic design takes all kinematic functions into account and ensures easy integration into various types of passenger train interiors," says Števula. "With the selected materials and workmanship of the highest quality, the Excellent seat provides passengers with maximum comfort and security."

Accessories include a lamp, pillow, stowaway table, footrest, lumbar support and power socket. As with the Comfort model, the Excellent seat debuted in Stadler's Leo Express.

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Screen stars

Operators such as Leipzig MTA expect today's onboard infotainment systems to offer crystal-clear HD displays and real-time functionality

RIGHT: Vianova's infotainment system is installed across Leipzig MTA's varied fleet of trams, trailer cars and buses

Onboard information and entertainment (infotainment) systems on mass transit authority (MTA) subways, trams and buses really began to grow in popularity around the turn of the century. "These early systems used 12in displays in 4:3 format and were limited in terms of interesting and up-to-date content," says Josef Kreidl, chairman at Vianova. "Since then, MTAs have created demanding standards for dynamic passenger information, pushing for innovations in display quality, functionality and reading distances."

Today, real-time dynamic passenger info – including connection information – has become a must, according to Kreidl. "Systems also typically include content such as news, weather information and sport updates – produced in high-definition (HD) resolution (720p minimum) and in 16:9 format," he says. "And to help balance the cost of these sophisticated systems, media companies have helped operators to develop parallel channels for advertisement income."

Vianova's own modular infotainment solutions are designed to achieve all these needs, as well as to be flexible and expandable for additional functions in the future.

Hard-working hardware

Vianova's display family was designed specifically for use in MTA vehicles. Both intelligent (standalone) and passive (with a remote server) display units are available. The design is based on robust electronic components (that Vianova says can last for 10 years or more) with modular extensions for WLAN, 3G/GPS, Bluetooth, video surveillance and passenger-counting systems. The displays have been designed for easy maintenance and service over a period of around 10 years. Vianova offers 18.5in, 17in and 15in screens, in dual- or single-display versions, and various mounting solutions (such as roof- or side-mounting assemblies).

Each display has its own scaler, enabling it to adapt different formats. "This means that the operator can run the same content in its new infotainment installations as it already uses in its existing equipment, as long as it is a compatible format," says Kreidl.

GigaSTaR II video signal transfer technology enables operators to connect up to 20 displays in a daisy chain to a single server.


16 Messegelände
16:22
Triftweg
Zwickauer Straße
Tierkliniken
fahrgast-tv
Entwerter
5. Integrationsmesse
Zukunft statt Herkunft - Arbeitsmarktstärkung durch Migrant/-innen

"The GigaSTaR technology also supports long distances between the displays and ensures a robust signal transfer between the cars," says Kreidl. "In addition, all parameters like temperature and display functions are monitored, and this information is automatically transferred so operators can see when a unit needs to be serviced."

Vianova's servers were also developed especially for onboard use. The modular platform can run video surveillance and passenger counting on top of its infotainment programme. GigaSTaR II and DVI video outputs are available. The servers' basic interfaces are IBIS, IBISplus, USB, Ethernet and galvanic isolation. Extensions like RS232, RS485, WLAN, UMTS (3G), GPRS and DAB interfaces are also available. Compact flash cards and 1.8in SATA solid-state or hard drives are used as mass storage devices.

RIGHT: HD displays enable operators to offset costs through advertising revenue

INFOTAINMENT IN ACTION

Holger Müller, technical manager of infotainment at Leipzig MTA in Germany, reveals the lessons gleaned from 12 years of providing onboard passenger infotainment systems

Why do you offer infotainment?
Leipzig MTA has offered a combination of passenger information and entertainment by using a dual-display concept across our fleet of trams and buses since 2000. This gave us the opportunity to provide good passenger information, and by cooperating with a media company for the entertainment we kept the investment and maintenance costs down. By utilising the infotainment system for next-stop signalling, we were also able to reduce the investment needed for newly purchased trams and buses, because traditional LED displays were no longer necessary.

How many systems do you operate?
We have infotainment installed in 137 trams from various suppliers (Bombardier, Siemens and Heiterblick), 38 trailer cars and 84 buses (from Evobus, Solaris, Hess and Man). The system reaches more than 345,000 passengers a day.

How do you maintain your diverse fleet?
By changing suppliers. The media partner who was responsible for our infotainment from 2004 until 2009 integrated eight different hardware systems into our fleet. Our challenge now is to keep this variety of systems up and running at a reasonable cost. Recently, with our new supplier Vianova and its software partner BitCtrl, we were able to transfer the different hardware platforms to a unified concept for easy maintenance. The powerful software platform LISA, which is integrated in all the systems, helped us to achieve this goal.

How have the technological changes of the past 12 years impacted you?
The first systems we integrated in 2000 had 12in displays in 4:3 format. Today's content is created only in the 16:9 format with a minimum resolution of 720p in HD. By the end of 2012, we will have 115 trams and buses running infotainment with full HDTV in 16:9 format. Our suppliers (Vianova and BitCtrl) have the technology to run all compatible older installations simultaneously to the new systems. Because of the high number of pixels, the new HD systems are able to display information even for visually impaired passengers, and also support very impressive adverts from premium brands. These can be shown perfectly in full brightness, supporting substantial ancillary revenues.

What's next for this technology?
Infotainment systems will be connected to our automatic vehicle monitoring system to show dynamic passenger information, including connections in real time. Interesting HD content adds to passengers' comfort, supporting the move from individual transport by car to mass transport. This will make infotainment increasingly important to MTAs.

Function-rich software

Vianova's hardware uses BitCtrl's software package LISA (Live Infotainment System & Advertisement). "LISA works as a platform providing a seamless workflow from content generation to distribution and display," says Kreidl. The content management system enables the creation of various campaigns incorporating videos, pictures, text and other dynamic objects such as clocks, stops and line graphics, tickers and more. The system supports different sets of information for various groups of vehicles. On every display, the multimedia player provides passenger information and entertainment content controlled by different playlists. The player controls the integration of real-time information through IBIS or the digital I/O interfaces. System diagnostics are always active as well.

"All common graphic elements and picture formats are supported," adds Kreidl. "The automatic download of content – by wireless communication such as WLAN, GPRS, UMTS (G3) or DAB – is organised by the player. Updates can also be performed via Ethernet or USB. Meanwhile, in terms of security, operators can rest assured that the software elements are write-protected, and all communications are protected against hackers." Also adding to operators' peace of mind, Vianova provides full maintenance contracts with its systems, and guarantees the full availability of the system for 10 years.

Crucially, Kreidl believes the system can deliver a tangible improvement to passengers' journeys. "Excellent visible dynamic passenger information, supplemented by an interesting entertainment programme, provides a controlled and subjectively shortened ride for the passengers – an excellent argument for using mass transport instead of individual car rides," he says.

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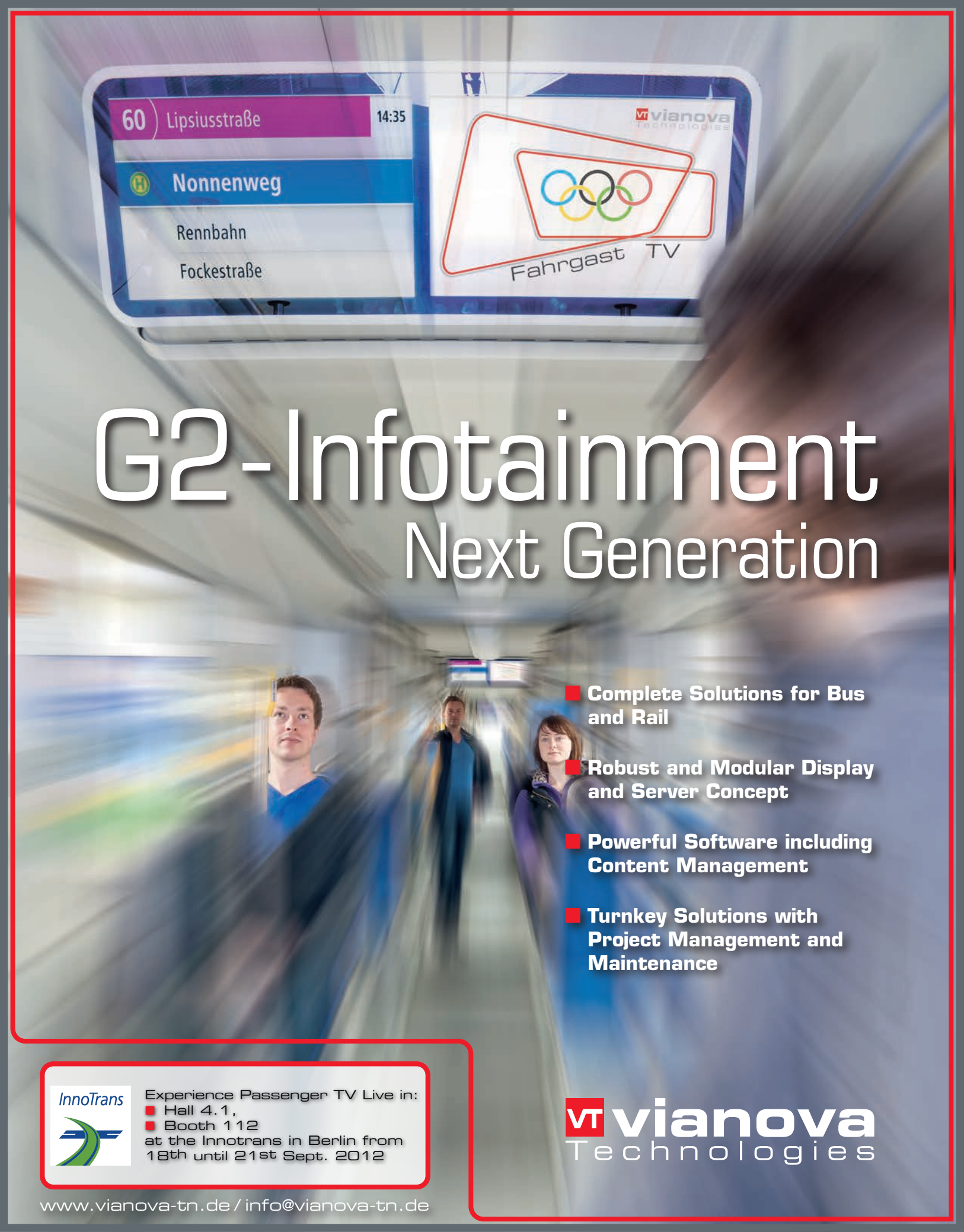

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Smooth operator

Floating floors can maximise travelling comfort and reduce lifecycle costs

There are many transport choices available these days. "The challenge for network operators is to offer appropriate added value for users and to convince people that the choice to take public transport should not focus solely on the cost," says Thomas Gamsjaeger, product manager at vibration isolation company Getzner Werkstoffe. "Reasons such as reliability, comfort, time savings and safety are crucial here – a massive challenge for rolling stock manufacturers, because profitability sets boundaries."

Getzner Werkstoffe believes its products can help operators to up their game, especially in terms of comfort and profitability. Its materials, Sylomer and Sylodyn, can be used for floating floors, which are designed to reduce vibrations. This increases travelling comfort for passengers and staff and also increases the service life of the carriage and its components.

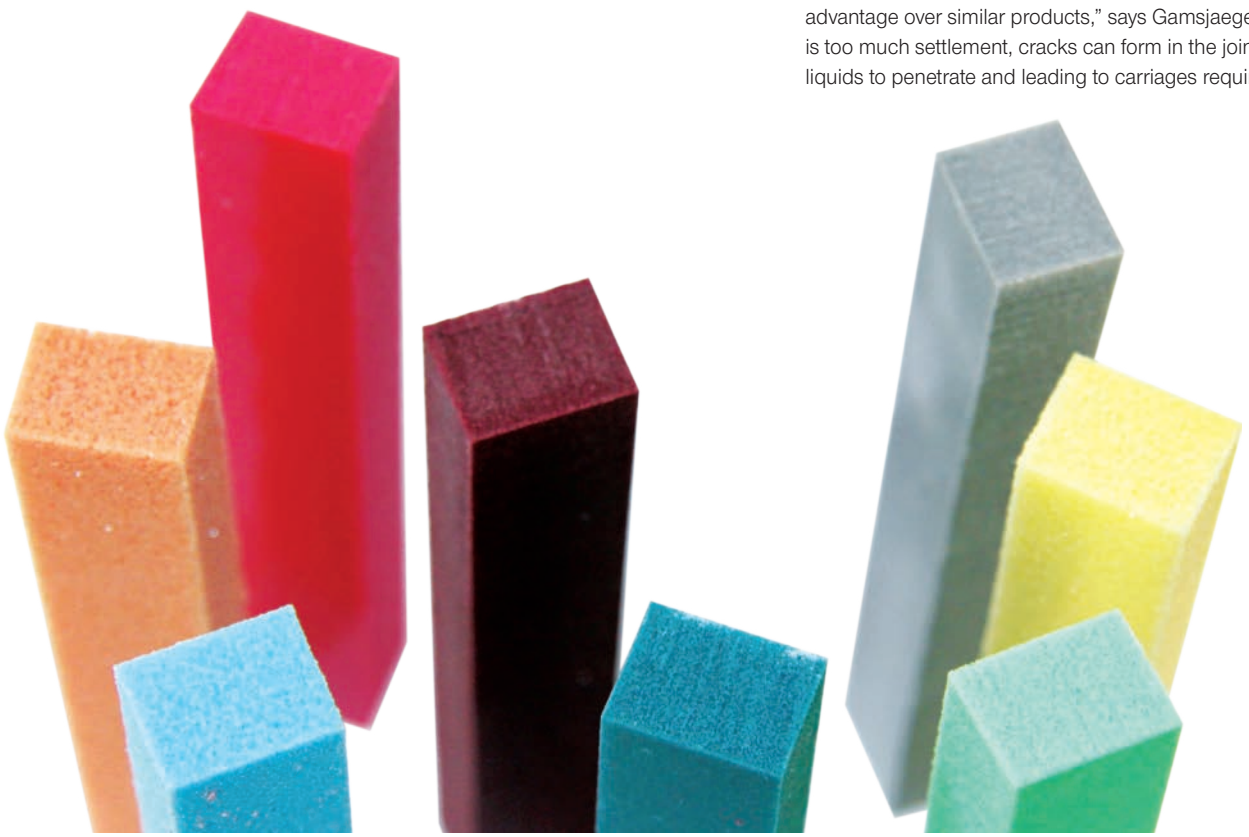
"Elastic-mounted carriage floors give rise to a new travelling experience," says Gamsjaeger. "Passengers relish in this 'floating comfort', feeling as if they are travelling over clouds. Shudders that occur because of the wheel/rail contact are less noticeable to passengers and crew and the elastic-mounted floor constructions reduce vibrations to a minimum. Everything is altogether smoother, as less secondary airborne noise is emitted."

Ultimately, Gamsjaeger believes floating floors can persuade more people to take the train. "Design enhancements such as these make public transport systems more attractive," he says. "A higher degree of travelling comfort is something that customers who drive top-of-the-range cars find appealing, so this may encourage them to switch to public transport."

Profitability and costs

Getzner says carriages with elastic-mounted floors have the edge over others in the long-term, too. "A lower level of structural vibrations will extend the service life of a carriage and its components," says Gamsjaeger. "The minimal creep properties of the materials and the guaranteed minimal deflections over a long lifespan will increase the amount of time between maintenance, which is of considerable financial benefit for operators."

The materials are designed to offer excellent damping and reduced creep. "The long-term creep behaviour is a great advantage over similar products," says Gamsjaeger. "Where there is too much settlement, cracks can form in the joints, allowing liquids to penetrate and leading to carriages requiring premature



LEFT: Getzner's polyurethane foam, which can be used for floating floors

PAST PROJECTS BY GETZNER WERKSTOFFE

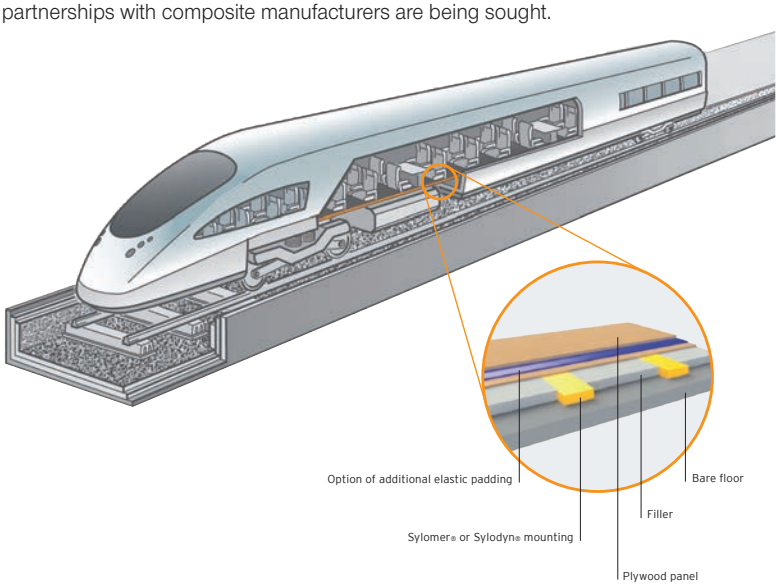
Manufacturer	Train type	Region	Application
Alstom	Coradia	Germany	Light rail
Alstom	Coradia X61	Scandinavia	Light rail
BEML/Rotem	Stainless steel metro coaches	India	Metro
Bombardier/Alstom	ET 422	Germany	Light rail
Bombardier	Itino	Germany	Light rail
Bombardier	Zefiro 380	China	Intercity/high speed
Siemens	Desiro	Europe	Light rail
Siemens	Desiro RA Be 514	Sweden	Light rail
Siemens	Inspiro	Russia/Poland	Metro
Siemens	Railjet	Austria	Intercity/high speed
Siemens	ULF	Austria	Trams

maintenance. Getzner polyurethane foams perform better than silicone foams in terms of creep behaviour and noise emission (caused by secondary airborne noise)."

If it proves impossible to isolate an entire carriage floor from vibrations, individual components or areas such as the driver's cab, first-class section or the toilets can be mounted elastically. "A tangible reduction in lifecycle costs especially applies when fitting the floor of the interior," says Gamsjaeger. "Plus, similar isolation prevents self-induced vibrations being carried from the toilets, air-conditioning or control boxes to other areas."

Fire protection

Getzner has designed its polyurethane material to meet flammability rating HL3 according to CEN/TS 45545-2 in its uninstalled state. "Increases in fire protection requirements worldwide meant that the regulatory standards also became more stringent, and this led to a reduction in the amount of plastics used," says Gamsjaeger. "This, and the increasing preference for lightweight construction and more favourable material properties, are the reasons for the growing use of fibre composites." The material's properties also make it suitable for floor constructions with underfloor heating. Classifications and fire testing for relevant ASTM standards are already envisaged, and partnerships with composite manufacturers are being sought.



BELOW: A cross-section of a typical floating floor construction

Getzner says other advantages of its materials include: simple processing; low construction height; light weight; resistance against water, chemicals and oils; long service life; ability to cut to different sizes; ease of cutting, laying and bonding; and the wide range available for various load ranges.

Collaborative work

Getzner Werkstoffe is one of the leading specialists in vibration isolation and has more than 40 years' experience in the rail, construction and industrial sectors. Its solutions are based on Sylomer and Sylodyn materials, both of which are developed and manufactured in Bürs, Austria. As well as its offices in Bürs and in Germany, Getzner has subsidiaries in Japan, China, India and Jordan, and distribution partners in 35 countries. The head office in Bürs is also home to the company's research and development operation. Every day, more than 300 specialists in the fields of physics, acoustics, construction, engineering, plastics engineering, chemistry and production and process engineering work to develop ways of meeting special requirements for vibration isolation.

Getzner advises carriage floor manufacturers on the selection of their materials, which also includes calculating deflection, natural frequency and insulation rates. In addition, Getzner prepares ready-made Sylomer and Sylodyn products on request, and can create, test and produce large quantities of customised substances.

The company is also a major distributor to other suppliers; numerous manufacturers of interior fittings, such as carriage floors, use Sylomer and Sylodyn in their products or floor constructions as vibration-damping components or elastic inserts. "Getzner is therefore able to deliver a finished product with guaranteed properties, making a decisive contribution to the development of an optimal overall solution using tried-and-tested materials," says Gamsjaeger. Indeed, Getzner has fitted out numerous trains to date.

Possible applications include the mounting of carriage floors, cabs, electronic equipment and raw materials such as steel wheels on freight trains. Customers include Alstom, Bombardier, CAF, China Northern and China Southern Rolling Stock and Siemens.

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Gaining ground

Composition leather is making tracks into the rail interiors sector

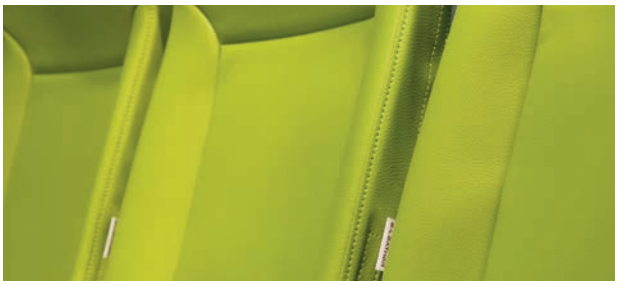
Airlines from all over the world have chosen to upholster their seats with composition leather from E-Leather over the almost five years the company has served this market. Now the UK-based manufacturer is expanding into the rail sector, too. “Irrespective of the mode of transport, interior designers, manufacturers and operators are all grappling with the same long list of often conflicting requirements,” says Nico Den Ouden, sales and marketing director at E-Leather. At the top of this list, he says, is the goal to reduce weight, to cut fuel and energy costs.

Certification, cost, comfort, visual appeal, durability, longevity, ease of maintenance and hygiene are some of the other factors that Den Ouden believes any new material has to address. “It’s not just the initial acquisition cost – the challenge is to find innovative design solutions, new materials and new ways of working to significantly reduce long-term costs and ongoing maintenance,” he says. “Alongside all these challenges, the needs of the passenger must be met in terms of an attractive, comfortable and hygienic environment. To win and retain passengers, any new interior must retain its good looks for many years. Increasing numbers of passengers are now experiencing and comparing trains, boats, buses and aircraft, and expect the same high standards across all modes of transport.”

E-Leather’s composition leather is designed to tick all these boxes, and has been tested and trialled. It is now used by some of the largest airlines in the world, and has found its way into most other forms of transport – including buses and coaches, cars and trams.

Recent projects have seen E-Leather used on the new fast-charge electric buses now operating in Coventry, UK (two bespoke shades of green with contrasting headrests and piping); and on Mercedes Vito taxis in London (black E-Leather

LEFT AND RIGHT:
E-Leather's eponymous composite leather



FLYING HIGH

One recent airline customer of E-Leather is Southwest Airlines. The airline previously flew traditional leather, but decided this was not the right product for its large-scale operation. "Traditional hides are individually unique, requiring them to be hand cut and hand sewn," says Geoffrey Buschur, systems engineer at Southwest. "This all-by-hand process leads to inconsistent yields, performance and final product, making it impossible to properly manage and control a fleet of 75,000 passenger seats."

After exhaustive laboratory testing and a two-year flight trial, Southwest switched to E-Leather. "By selecting E-Leather's rolled stock we get a consistent raw material with predictable performance," says Buschur. "Our manufacturing vendors can use mass production techniques that not only help them operate more efficiently, but also help us get a uniform final product at a lower price. When you add in the weight savings, durability and environmental sustainability qualities, E-Leather really stands above the competition. All these efficiencies help us keep our cost down, while maintaining an industry-leading interior for our customers."

with yellow high-visibility contrast panels to assist the partially sighted).

Rail operators are increasingly getting in on the act. It's still early days for E-Leather in the rail sector and projects often span several years, but early adopters include Via Rail in Canada; KiwiRail in New Zealand; Irish Rail in Ireland; Heathrow Express, East Midlands Trains and Eurostar in the UK; with many more active projects on the way.

The material is made from recycled leather that has been discarded by the industry. It is then upgraded in a patented process that physically interlinks the fibres without the use of adhesives. The end result is a man-made material comprising the leather fibre and a high-performance core.

The fact that different core materials and compositions can be engineered to particular application and certification standards means that colour, grain and performance can be fine-tuned. Den Ouden believes it is this flexibility that has resulted in the rapid adoption of E-Leather across so many sectors. In particular, he says, designers are exploring the branding opportunities the material affords, such as colour and grain combinations, contrast stitch details, debossing, embroidery, perforation and semi-perforation.

"Manufacturers see higher yield than with traditional leather, with reduction in waste and the benefits of a consistent 'on the roll' material, which makes for ease of use and faster cut and sew operations," concludes Den Ouden. "Operators also see benefits in overall lifecycle costs. For a material that weighs about the same as fabrics, E-Leather has the enhanced appearance of leather and surprising durability."

ABOVE LEFT: E-Leather is installed in Mercedes Vito taxis in London, UK

ABOVE RIGHT: New electric buses in Coventry, UK, also feature the product

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Modern conveniences

Operators racing to meet the 2020 deadline for PRM compliance are flocking to a new toilet module designed to meet these needs and more

The clock is ticking. This might be 2012 and the summer of the Olympic Games, but for rail operators another race is on, and the finish line is closer than many might realise. By 2020 all UK mainline trains must have been upgraded to meet EU legislation for persons with reduced mobility (PRM). "At the moment there is no fixed date for rail companies in the rest of Europe to comply, but consumer demand will create pressure to match standards throughout the continent at the start of the new decade," says Mark Isaac, managing director at PCC.eu.

The legislation is designed to ensure accessibility for all passengers, with perhaps the greatest challenge being the upgrade of the toilet cubicle. PCC.eu unveiled its solution to this potential headache at Railway Interiors Expo 2011 in Cologne, Germany. The Comfort Zone – a fully PRM/TSI-compliant universal toilet module – brought record numbers of visitors (more than 700) to the company's stand during the three days of the event.

"Not only have we identified the PRM-TSI as our design input, but we have considered all ergonomic factors affecting all levels of reduced mobility," says Isaac. "The design takes into consideration visually impaired people (aided by consultation with the UK's Royal National Institute for the Blind – RNIB), the elderly and even people with heavy or bulky luggage. The turning circle within the cubicle and the small space envelope even fits in to a class 156 vehicle – which is actually its first installation."

The Comfort Zone is flat-packed for easy installation into the prepared area for refurbishment of most UK rolling stock. Other project drivers were energy efficiency and operator maintenance. The module has bi-parting doors with no floor track for speedy and smooth operation. Isaac says the unit has been tested over a 10- to 20-year cycle simulation, and can be replaced in 15 minutes; the door motor takes just 10 minutes to replace. In addition, the facilities have been engineered so that consumable replenishment can be carried out in one operation; using just one cabinet for air freshener, soap and toilet tissue to avoid ongoing maintenance costs.

These features created great interest in Cologne, but Railways Interiors Expo 2011 proved to be just the start of a busy year for the company based in South Wales. Since then it has been gearing

up to deal with not only initial orders but also an enormous level of interest that the company believes will lead to further major contracts. “We had no doubt that we were producing the right product, and this view was confirmed by the level of interest shown by visitors when we unveiled Comfort Zone at the Expo,” says Isaac. “But we were always determined that those three days in Cologne had to be just the start of the story, and our staff have worked diligently since then to be in a position to deliver.”

First flush of success

Railcare was the first company to commit to installing Comfort Zone in rolling stock, and its first unit was fitted out earlier this summer. Since then, Porterbrook has also identified Comfort Zone as its unit of choice. The large number of visitors to the PCC.eu stand also generated a lot of feedback about the product, and the management team who met delegates were delighted to take comments on board and act on them. After the show they commissioned a top design team – Creactive Design of Leamington Spa, UK – to enhance the interior feel of the unit.

ABOVE AND LEFT: Bigger on the inside – despite Comfort Zone’s small footprint, it offers room for wheelchairs to turn

ABOVE: The fittings are designed for use by visually impaired and elderly passengers

LEFT: The door control unit

The revised Comfort Zone solution has found great favour with initial customers. Creactive’s changes included bringing in more pleasing colours, softening the lighting and incorporating a full-length mirror. The agency worked in cooperation with PCC.eu’s in-house design team and the result was a remarkable improvement in aesthetic design, without compromising the unit’s PRM-TSI compliance.

Additional improvements include a low-power heat-store hand dryer designed to give the dual benefits of energy savings and zero risk of fire. All-LED lighting has been incorporated, with the aim of saving on energy and maintenance. A dispenser with capacity for 2-3 days’ worth of tissue is designed to further reduce running costs and prevent fire spread in the event of arson.

With water savings being high on the priority list of most potential customers, PCC.eu worked together with Evac and EAO to develop a unique solution to the problem of double-flushing. The company says that train operators have found that water is being used twice as quickly as expected in some cases, and it was identified that customers tend to flush before and after using the toilet. PCC.eu’s solution is a second pushbutton next to the toilet that releases a short jet of fluid to the pan. The button prompts the user by blinking after the door has been locked. The company says using this not only saves substantial volumes of water for the operator, but it also releases a pleasant fragrance, making the user experience more pleasurable.

Building capacity

Major orders are now being negotiated, and to deal with the volumes involved, the company has had support from the Welsh government, which recognises the employment potential being created. This backing has enabled the signing of agreements on a new manufacturing facility, which is due to be fully operational by late 2012. The plant will initially be capable of producing three Comfort Zone modules a week, alongside the company's normal workload of composite products, with plans to produce six units a week to reflect industry needs.

"Welsh government representatives had no hesitation in investing as they saw the opportunity to encourage a market leader to grow in South Wales," says Isaac. "By the end of 2013, it is anticipated that PCC.eu will have tripled its workforce. This in turn will cement its ability to innovate, design and manufacture, ship and install a fully compliant PRM solution to the rail industry."

RIGHT: Updates include new colours and lighting

BELOW: Signs and audio indicate if the door is locked

BOTTOM: The basin is accessible from the toilet seat

One more key development will help give customers confidence in the new product: PCC.eu's chairman David Crisp has put strong financial backing in place to ensure there can be no cashflow problems as the company grows, enabling it to meet the challenge of fulfilling a significant order book.

PCC.eu has a long history of commitment to customer service, and those values will be incorporated into the Comfort Zone project. As more installations take place over the next 12 months, the company will be setting up a dedicated customer phoneline to handle orders for spares and consumables promptly and efficiently.

"Our company has a history that goes back to 1988 and we have always prided ourselves on building and maintaining a reputation within the rail industry for both the quality of our products and our willingness to go the extra mile to meet our customers' requirements," says Isaac. "We have always firmly believed that Comfort Zone was the right product to meet an urgent industry need. We are the only company in the UK with the in-house ability to see through the whole process of phenolic products from design to manufacture to delivery. We believe this makes us uniquely qualified to foresee the demand to be ready for the 2020 deadline and to engineer a solution that ticks every box for rail operators."

Isaac predicts great demand for the product. "When you say '2020' it sounds a long way off, but the sheer number of train units that will need to be completely refurbished within eight years means it is imperative for rail operators to be planning ahead now for the PRM TSI legislation," he says. "I think everybody we met in Cologne was aware that the clock was ticking; we are just glad to be offering an economical answer."

MEET THE TEAM

The Comfort Zone project has been a triumph for the people involved in PCC.eu's highly innovative team:

- Systems manager Gareth Lumsdaine designed all the electronic systems, ensuring functionality, compliance and safety;
- Customer support manager Alistair Isaac, together with Sam Murcutt, were responsible for the physical product design, engineering functionality, safety and compliance;
- Consultant Goff Parish, a designer with a wealth of industry experience, helped engineer the door mechanism;
- Finally, Chris Roberts-Lloyd, the company's diligent quality manager, ensured the design maintained PRM TSI approval throughout the project, working together with Rail Approvals and in close liaison with the UK's Department for Transport.

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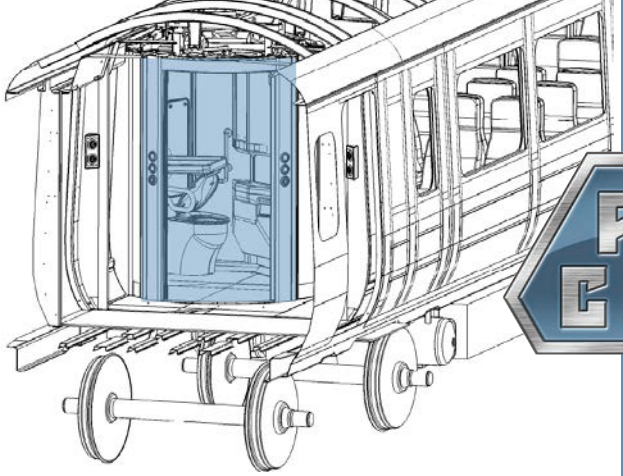

Caring for the 21st century customer

A fully certified PRM-TSI compliant toilet module

- Designed to allow an extensive range of vehicle upgrades to PRM-TSI standard from vehicles of 'Class 15x' proportions upward. Proven installation and interfacing into Class 156 vehicles.
- Full PRM-TSI size internal wheelchair turning circle together with ergonomically designed controls means more available external space for seating
- Rail Electrical Compliance to EN 50155, EN 61373, EN 50121-3-2, RIA 12
- Rail Structural Compliance to GM/RT2100, EN 12663-1
- Low maintenance door mechanism with designed-in features for ease of maintenance
- Strong, light-weight bi-parting doors - minimises friction to avoid dragging, easily replaced in the event of vandalism
- Water saving short flush feature and adjustable tap water supply providing potential savings of up to three times lower water consumption compared to alternatives – fewer header tank refills and CET emptying operations (where installed)
- Low power electric hand dryer and LED lighting making the complete module up to 40% more energy efficient than alternatives
- Proven, reliable, Evac vacuum toilet
- Low cost, low maintenance system ensures the toilet and its pipe work remain free of lime scale and other residues protecting against costly breakdowns
- No door floor guide required – improves access for wheel chair users, and avoids dirt traps causing door jams
- All service items inside one unit for easy maintenance including a high capacity tissue dispenser – up to seven times that of standard capacity dispensers
- Unique audible voice announcer advises the user of the toilet status reminding them to lock the doors after entering the toilet cubicle avoiding those embarrassing moments and provides excellent feedback for visually impaired users
- Touch free, sensor controlled soap, water and dryer for improved hygiene
- All services accessible while seated on the toilet – allows wheelchair users to use all facilities prior to returning to their wheelchair
- Full floor to ceiling height three-part wall mirror – allows mirror use at all heights and can be replaced in segments
- High strength baby change table capable of withstanding high levels of vandalism and misuse

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Pastures new

Having conquered the demanding aviation industry, Scottish leather supplier Andrew Muirhead is focusing more than ever on the rail market

Part of the Scottish Leather Group, Andrew Muirhead & Son has been producing leather since 1840. The company exports to more than 60 countries and is one of the largest suppliers to the aviation industry, catering for more than 130 airlines and aircraft manufacturers. Its test facilities have even been approved by the UK's Civil Aviation Authority.

This experience honed within the heavily regulated world of aircraft interiors – as well as the automotive, marine, architecture and interior design markets – is now being used to further Andrew Muirhead's reach in the rail market.

"Andrew Muirhead has used its state-of-the-art facilities to develop a range of products that meet the exacting criteria of rail regulators," says Archie Browning, sales director at the company. "Our distinctive fine Scottish leather has been approved to the highest standards demanded of railway interiors across the world."

The proof? The company's leather can now be found in trains across the globe. UK customers include First Great Western and East Midlands Rail, the latter of which specified dark blue hides for the refurbishment of 27 trains.

ABOVE AND RIGHT: East Midlands Rail chose Voyager leather for its latest first-class cabins

The company's focus on railway interiors intensified after Railway Interiors Expo 2011, held in Cologne, Germany. At this expo, five premium Scottish railway interior manufacturers joined together to create Rail Interiors Solutions. This consortium consists of Andrew Muirhead (leather), Replin Fabrics (fabrics), Transcal (seat cover manufacturing), Novograf (bulkhead and table panel materials) and Forbo – Nairn (flooring). The idea is to offer a new approach to rail interior fit-outs, a one-stop shop.

Andrew Muirhead believes the watchwords for the rail market are comfort, safety and economy, and has tailored its approach accordingly. "Our products offer a proven high level of safety and hygiene performance," says Browning. "The success of our recent expansion into railway interiors is exemplified by the fact that our leather can be found in trains as far apart as Europe and China."

The primary leather used by the company for train interiors is Voyager. "This leather is designed to be lighter than other standard leathers in the market, making it more efficient for rail companies such as East Midlands Rail," says Browning. "Because of this, and the fact that the feel of the leather can reinforce brand values to the

same extent as advertising and promotion, marketers value Andrew Muirhead highly." Sateen and Arisaig are the two other principal leathers used by Andrew Muirhead for railway interiors. "Both of these leathers are fire-retardant and are 1mm thick, premium leather, conditioned to ensure safety, comfort and hygiene," says Browning.

Leather, with its unique tactile and aesthetic qualities, is often used in premium cabins, to lend a feeling of luxury. In line with this, Andrew Muirhead is dedicated to the highest standards of production, to ensure quality. "For example, fire-retardants are impregnated into leathers and not just sprayed on," says Browning. "Our modern production facility in the east end of Glasgow, Scotland, ensures that the highest standards of durability and consistency are met."

Adjacent to this factory, the company maintains a warehouse and distribution facility stocked with five ranges of finished leathers. Its huge array of products – designed for specific applications and customers – reflects the company's emphasis on diversity.

ABOVE: Tay, a recent addition to Muirhead's range of print finish options

RIGHT: The company prides itself on its environmental credentials

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GREEN MANUFACTURING

Through the wider Scottish Leather Group, Andrew Muirhead has spearheaded the design of a thermal energy plant and waste water treatment plant to reduce the amount of waste produced by manufacturing leather.

The process starts with hides weighing approximately 40kg and finishes with a leather product that weighs just 10% of the original hide. From the excess 90%, both oil and solid waste are extracted. The oil is used as a biofuel, and the solid waste is converted into steam, supplying the factory with the heat for 200 million litres of water a year (from the plant's very own loch) – the idea being to reduce the company's dependency on fossil fuels and create low-carbon leather that does not cost the earth.

The liquid waste is processed through the water waste treatment plant, which, through an ultra-filtration process, ensures that clean water is discharged from the facility.

Bundle of fun

High-tech multimedia entertainment has descended from the clouds into coaches and trains

Many train routes are today in direct competition with airline connections, prompting some operators to try to offer comparable or better comfort. One aspect of the airline experience that coach and train operators can now make replicate is to offer individual multimedia entertainment and information systems, such as the Funtoro Media On Demand (MOD) solution.

In fact Funtoro MOD boasts more than 150 coach installations across Europe. It now also has railway projects ongoing – including kits for monitors to be installed in Saira, Kiel, Grammer and Borcad seats for operators in Belarus, the Czech Republic, Estonia, Russia and Slovakia. The system is available as original equipment in Van Hool, Irizar, VDL and Beulas coaches, or as a retrofit kit for a number of different brands and types of seats for coaches and trains.

The system comprises a computer server and 7in or 10in digital touchscreen LCD monitors integrated into seatbacks or arms.

Passengers can take their pick of a wide list of movies, music and pictures. The server has capacity for hundreds of movies, thousands of music titles and a practically unlimited number of photographs. It is also possible to watch live TV (either DVB-T or satellite TV) and watch pictures from onboard or front-facing cameras, standard navigation information or other AV sources. Operators can integrate an internet connection, giving passengers access to social network sites such as Facebook and Twitter; tour operator or other websites for ticket, hotel, car hire and taxi reservations; and individual online shopping. Linking to a GPS provides information about the time and distance to the next stop or final

LEFT: Funtoro MOD installed in seatbacks on a train

RIGHT: 7in and 10in monitors are available

destination, and can also enable position-related advertisements. Operators can also implement commercial breaks into media content to generate additional profit. A further advantage to passengers is that each monitor is equiped with a USB port, which can be used for charging their own devices.

System architecture

The system has a client-server architecture whereby each monitor receives streamed data from the server. "This architecture enables easy management of media content, further implementations and the development of applications and products on the same hardware platform, as well as the possibility of system customisation to suit individual requirements," says Jozef Hostin, general manager at Molpir. "Another advantage of a fully digital MOD system is simple installation, as every seatback LCD monitor is connected to the server via a hub using only one cable to provide the data and power. The whole system is designed for mobile application usage and is manufactured in compliance with automotive and railway standards. The system is robust enough to withstand rough handling by passengers and is highly reliable. Media content management is also made easy, with dedicated software tools."

Molpir is the European representative for MSI Corporation's Funtoro brand. Molpir designs and develops installation kits and accessories for different coach and train seats for Funtoro monitors and collaborates with vehicle and seat manufacturers to enable the implementation of Funtoro systems onto their vehicles. The company is also responsible for the Funtoro service network throughout Europe and offers warranty and post-warranty service back-up for all Funtoro products in Europe.

RIGHT: Monitors can be installed on seat arms

Happy customers

Customer satisfaction studies have highlighted many benefits to installing onboard entertainment. "For example, in the Czech Republic, one study found that providing entertainment content to children tends to keep them in their seats – a more relaxing experience for adult passengers and safer for the children," says Hostin. "Meanwhile, a survey of 1,600 passengers in the USA showed strong demand for Live TV broadcasting with a good variety of channel options, and also demand for good food and refreshments on board. Funtoro MOD can respond to both these demands – providing Live TV with plenty of channels, and enabling passengers to order refreshments directly from their seats."

Past installations of the Funtoro MOD system in particular have led to positive reactions from customers. "For example, Turancar of Slovakia reported that when customers know there is MOD-equipped coach available on a specific route they will try to get a reservation for that coach," says Hostin. "Likewise, Xline of Slovakia found that it received many repeat orders from customers for MOD-equipped coaches."

The Funtoro MOD system is regularly shown at major bus, coach and railway exhibitions worldwide and has won several awards. These include the Czech Autotec Prix 2010 and the Taiwanese 2011 Outstanding IT Application/Product Award, which Funtoro MOD won in the automotive electronics category.

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Meet your match

A new seating system designed for the ultimate in comfort and style

ABOVE: A first-class carriage fitted with Match seats

LEFT: The standard-class Match model

The latest railcar seat range from Franz Kiel combines maximum versatility with a contemporary and ergonomic design. “The ergonomic and stylish design presents a new dimension in passenger comfort,” says Josef Vega, director of sales and marketing at Franz Kiel. “The Match seat ensures that those travelling in standard- or first-class accommodation will arrive at their destinations feeling relaxed.”

The Match seating solution can be adapted to suit every installation, with various styles of headrests, seat cushions and backrests, and first- and standard-class models available. “This modular seating system is a very cost-effective solution with user-friendly features that add to passengers’ comfort and experience,” says Vega. For example, reclining the backrest automatically changes the seat cushion and back angle orientation. The backrest reclines within its own space to ensure it does not compromise the comfort of passengers sitting behind. In addition, the seat cushion

spring case is designed to add extra comfort for longer journeys, and the ergonomics incorporate the latest scientific findings.

The headrest is of a modular design and is therefore easily adaptable to meet an operator's requirements. The same principle applies for the seat cushion height and widths, which can be adjusted to suit the many different vehicle installations.

Franz Kiel – which is based in Nordlingen, Germany – offers a complete range of accessories, such as seatback tables, footrests, armrests, magazine nets, audio modules, reading lamps, underseat luggage restraints, subtle underseat lighting, emergency lighting and a rotary feature to ensure that passengers face the direction of travel. The company says its complete seating solution meets the requirements for strength, safety, fire and crashworthiness.

ABOVE: A mix of flip-down and standard-class Match seats installed on a regional train

"In addition to meeting the highest functionality and comfort standards, the Match seating system also features an innovative, modern and eye-catching design that makes it stand out from the rest – the perfect ingredients for passenger comfort," says Vega.

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Business partner

A new club car concept aims to reconcile the conflicting needs of today's business traveller

Targeting a potential premium for operators, Elskop Scholz's latest concept is for a business-class club car. In designing for these passengers, the major challenge was meeting needs that the company identified as both complex and contradictory. "Privacy and a good work environment compete with the occasional need for sociability and relaxation," explains Christopher Scholz, architect at Elskop Scholz. "These contradictory requirements can be resolved in the configuration of the club car space and in the function of the individual seat."

The seat is the foundation of the experience; Scholz believes it must act as a home base, offering privacy and comfort, while being effective as an environment for productive work. "Like a house, its exterior forms a protective shell and its interior is made comfortable and protected," says Scholz. "Depending on the desired activity, the passenger can adjust swivel and lean. Private thought, work, or quiet conversation with one's neighbour are each possible with a slight rotation. Thus each person controls the degree of interaction with their fellow passengers, with the surrounding car and with the landscape outside."

Contradictory requirements also affect the material selections for the seat and cabin. "To appeal to the passenger they must embody a degree of fineness in surface and detail, and at the same time be durable enough to maintain their freshness and sense of quality throughout their useful life," Scholz adds. "To accomplish this, the seat is composed of two parts – lightweight composites covered in real wood veneers and protected by a high-lustre hard coating form the high-design shell. The soft seat interior is covered with high-quality, high-wear fabric and constructed with various densities of upholstery to support the body and conform to its contours, while reducing pressure points on longer trips." To accommodate a variety of body types and postures, an adjustable head pillow can be placed in an optimal position.

The car interior supports the various seat functions, and the interior wall is shaped to provide discreet lighting and ventilation. A small panel pulls away from the window column to become a table for a meal or a laptop. An integral light is designed to give a sense of place around the table and a rack holds magazines or newspapers. "The individual environment can be further controlled with a curtain that softens the daylight and modulates the passing landscape, diffusing it for a more contemplative mood, or exposing it for a more dynamic vista," continues Scholz.

A balance also had to be struck between solidity and lightness. "In the drive to reduce vehicle weight, the quality of the passenger experience must also be maintained," explains Scholz. "As mass is removed, a sense of solidity can be lost. With lightweight products the problem lies in the passengers' perception of quality, not in the product's performance. The solution lies in clever design details and choice of materials."

Overall, this concept car has been conceived not only with specific functions governing its design, but to create a complete environment for the business traveller and an experience of luxury and exclusivity that supports the operator's brand and corresponds to a higher price point in the market.

ABOVE:
The club car concept has cocoon-like seats

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Sweet success

Honeycomb sandwich in general and aluminium honeycomb in particular are fascinating materials that have been used in aircraft construction for quite some time. Rica Seats believes component technology and manufacturing techniques have now sufficiently developed to enable the materials' more widespread use in train interior applications. The company has used honeycomb materials in various projects, including the seat pictured, created for a train's restaurant car.

"The primary advantage of honeycomb is its low weight compared to traditional structures of similar strength," says Georgy Sveshnikov, project manager at Rica Seats. "Depending on the product, overall weight can be cut by more than half." Honeycomb sandwich can also be moulded into a variety of shapes. "In addition, properly made aluminium honeycomb is inherently fire safe, meeting the strictest safety regulations," Sveshnikov adds. "Finally, at the end of its considerable service life, the honeycomb can simply be melted down and used again. So no matter if it is a seat, an expandable table, an interior panel or even toy furniture in the children's area, honeycomb is a material to go with."

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Clean start

Over time, traditional wool-covered mass-transit seating can accumulate stains and odours, causing complaints and dissatisfaction from riders.

Addressing the issue as part of its effort to update its railcars, San Francisco's Bay Area Rapid Transit (BART) surveyed riders on seating preferences, using seating 'laboratories' where riders provided feedback on material alternatives. The majority of riders loved the vinyl. BART listened, and further evaluated it along with textile options. Materials were compared for their initial cost, expected life, annual cleaning costs and germ resistance.

In all categories, BART decided the vinyl upholstery was the clear winner. BART's research led to Omnova's PreVaill Transit upholstery (pictured right), engineered by Omnova specifically for mass-transit applications. In addition to meeting flame, smoke and toxicity standards, Omnova says the product benefits from featuring the company's PreFixx protective finish, which is designed to offer durability, stain resistance and easy cleaning. Thus Omnova and BART designers collaborated on region-centric custom-designed upholstery.

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Why **wait?**

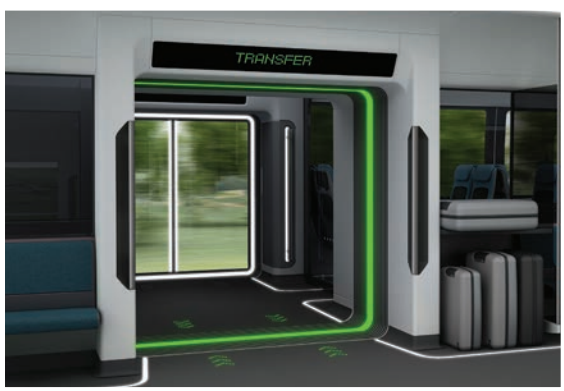
Watching the clock while waiting for a connection is a frustrating experience that most passengers have had to face, and for which they've had to factor in extra journey time. Several designers have tried to tackle this inefficiency head on, with systems that bypass stations altogether.

The Seamless Interchangeability concept by Glenn Le Faou (a student at the UK's Coventry University), for example, envisages individual rail carriages breaking away and joining other trains while moving, allowing passengers to transfer without the whole train having to stop at a main interchange station. With a patent-pending coupling device, trains would join/separate end to end. "The improved logistics possible with this system would reduce infrastructure congestion and allow more regular services to run, enabling the capacity to adapt to growing demand and provide greater service flexibility," he says.

Inside the carriage, numbered and colour-coded zones correspond to journey types or routes, guiding the user through the interchange process. A digital information ribbon wraps around the carriage, making interchange information viewable wherever the passenger is. Adaptable message displays are also used to help disperse passengers more evenly.

Another futuristic concept that explores the idea of cutting out stations is Priestmangoode's Moving Platforms. This infrastructure would enable passengers to travel from their local stop to a local address at their destination (even in another country) without getting off a train.

A network of non-stop high-speed trains would run outside towns and cities, while trams carry passengers from local stops out to meet them. As they near each other, the train slows down slightly and the tram speeds up alongside it, at which point they physically connect via a docking system, allowing passengers to transfer across. The vehicles then separate, with the tram going back into the town or city centre with the newly disembarked passengers.



ABOVE AND BELOW: Glenn Le Faou's Seamless Interchangeability train concept

RIGHT: The Moving Platforms design by Priestmangoode

The tram, in effect, acts as a moving station. The same system could also be used by passengers transferring from one high-speed train to another.

"If we really want high-speed rail to be successful and change the way we travel, it is imperative that the infrastructure works with, not against, this new technology to enable a seamless passenger journey," says Paul Priestman. "The days of the super-hub train station are over –connectivity is the way forward."

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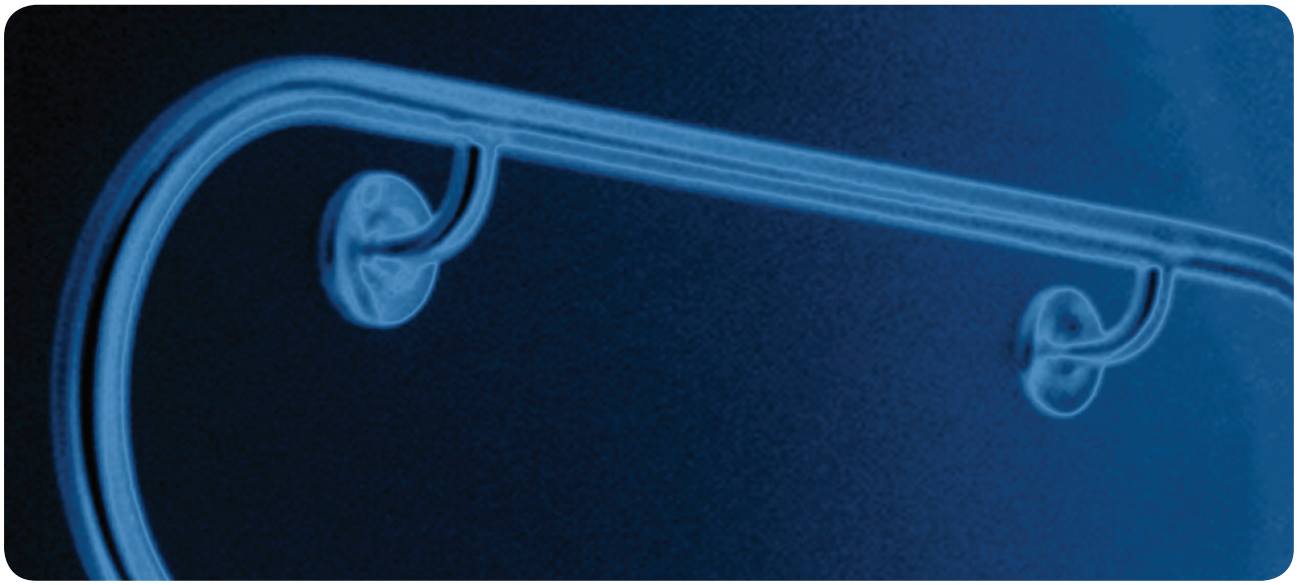

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(kom´pri hen´siv) — *adj*. **1**. including all or nearly all; inclusive **2**. having the quality of comprehending well; understanding much **3**. having an extensive mental range or grasp.

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