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Working collaboratively to drive innovative materials in the railways

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Transpennine Route Upgrade East's Mark Simpson and Scott Parnell's Sharon Meek discuss the partnerships transforming the biggest rail project in the north of England

The multi-billion-pound Transpennine Route Upgrade (TRU) is set to transform rail travel in the North, improving connectivity and supporting economic growth between York, Leeds, Huddersfield and Manchester.

Its impact will go far beyond the users of the 23 stations along the 76-mile Transpennine railway; the project is also proving to be the platform to trial new ways of working and equipment that are greener and more efficient.

"You won't find anyone in the country driving innovative materials more than us and the progress we are making is really exciting," said Mark Simpson, Contractors' Responsible Engineer (CRE) at J Murphy and Sons on the TRU East Alliance (TRUe).

"The impact we are having is being noticed by the most senior of people and now it is about educating the

rest to ensure ways of working change for the better."

J Murphy & Sons Ltd is the principal contractor and civil engineering partner on the Alliance, working alongside Network Rail, VolkerRail, Siemens and Systra, leading the East of Leeds part of the project between York and Leeds.

Mark, who started his working life as a joiner before working his way up becoming a site agent, project manager and CRE, said: "This is the largest infrastructure project in the North of England and one that is on my doorstep, so I'm incredibly proud to be involved.

"I've been lucky to have been involved with almost everything in construction over the past 38 years but over the last decade one of my passions has been to try to bring in new products and methods to improve the way we construct projects."

That is exactly what he has been driving as part of the TRU project, striking a strong partnership with the one-stop shop for groundworks and civil engineering requirements Scott Parnell.

Its rail director north, Sharon Meek, said: "We reached out to Mark and the TRU team with some products we offer after hearing about the Alliance's commitment to construct the railway in a more sustainable way.

"We are a builders' merchants, but our rail division actually works with product manufacturers, typically start-ups and SMEs, to be their route to market for their fantastic innovations."

Among the products being supplied to the TRU project is Complete Composite Systems' Arcosystem – elevated GRP troughing, Network Rail approved to span 6m between fixings. It is already dramatically reducing the installation cost and time.

"Arcosystem was the first innovation that we brought into the UK across from Europe," said Sharon, who explained the installation efficiencies it brings.

"Traditional elevated troughs install at 1.5, two or three metre centres, compared to our six so the efficiencies are obvious, as are the savings on raw materials and site transportation. It also futureproofs the route because you can come along at any point and attach additional troughing routes to the one-post structure that is already installed."

Scott Parnell also introduced a new alternative to cementitious post-mix foundations – Techno-Crete™ – to the TRU team, which is used for securing fence posts, gates, elevated troughing, signposts, handrails and ballast boards.

It is a two-part, high density hydrophobic polyurethane foam alternative to cementitious post foundations, derived from sustainably grown and recycled vegetable oils, formulated so it can be mixed without the need for mechanical plant and equipment.

Sharon said: "This is so different to traditional post mix, which is heavy, dirty, dusty and requires water. One pack of Techno-Crete, which weighs 1.8kg, commonly replaces 80kg of traditional materials.

“That’s a massive efficiency in the installation again, and vastly reduces the risk of injury to the workforce. It’s made from recycled vegetable oil too, so it is a sustainable product which doesn’t need water.”

Mark said: “In all these years that I’ve been bringing innovation in I’ve never been able to do as much as I have recently and that’s because of the involvement of Scott Parnell and the changing attitude of our client Network Rail. It is also aided by the TRU innovations panel who actively seek out new and innovative practices and materials before they are then discussed and taken forward.

“In the case of Techno-Crete™ we carried out a trial, installed by the manufacturer – Complete Composite Systems – which was attended by our designer Systra. Network Rail gave us the requirements and we carried out a test which exceeded normal foundation requirements by three times, making Network Rail acceptance on TRU a formality. Thanks to Systra it is now specified within our drawings to be used for all lineside foundations such as handrail and Arcosystem elevated trough.

“Its impact goes beyond the TRU East project. It’s been passed on to J Murphy nationally who are now looking to use it and also to Amey, the principal contractor of the West part of the TRU project.”

Simon James, TRU environment and sustainability manager, said: “On TRU, we have the opportunity to do things differently. Too often on projects we are in and out, with a ‘business as usual approach’, resulting in similar replacements and upgrades.

“To meet both project and government targets relating to carbon and biodiversity net gain we need to change this mindset, we need to innovate and move away from traditional designs, materials and delivery methods.

“Scott Parnell offers alternative products that we can challenge designers and engineers to adopt as we strive to build more resilient infrastructure while reducing carbon and improving biodiversity.”

Mark continued: “Three years ago I’d never heard of Scott Parnell, but now its products aren’t just transforming the TRU project but are changing the industry nationally, which is backed up by various experts who think what we’re doing is special and needs to be communicated wider. It really is a pleasure to work together as a team.”

Jason Chadwick, TRU Alliance procurement lead echoes these thoughts, and said: “Over the past two years Scott Parnell has become an integral part of the TRUe Alliance supply chain and an integral part of that innovative delivery.

“Its forward-thinking approach to innovation and sustainability, and the proactive interaction with leading UK and European manufacturers is a breath of fresh air. The Alliance will continue to collaborate with Scott Parnell supporting trials of new products as they enter the marketplace.”

Mark, who in the past 18 years has successfully delivered numerous rail projects across the country, ranging from station and signal box refurbishment, to embankment stabilisation and bridge reconstructions, said it is becoming easier to get new materials approved. He hopes other organisations can take inspiration from this and what has been achieved by Scott Parnell.

“In another example we’ve been looking for alternatives to traditional back-of-wall drainage where standard practice utilises tonnes of aggregates and geotextiles,” he said.

“Once again Scott Parnell had an innovative solution that supports our sustainability goals. TDS400 modular drainage panels can be used as a back-of-wall drainage system, as well as an aide to track drainage across the rail landscape. Made from recycled, UK-sourced plastics it not only replaces virgin aggregates but also removes harmful plastics from the environment and turns them into a benign product with added value.

“This is a solution I have proposed and is now with the Systra design team, who are fully embracing my proposals. Having a network of people across our Alliance who are open to new ideas is making such a difference and it is so refreshing and really improving how we are working.”

Sharon added: “Everything that we look to introduce into the sector over and above what are considered standard materials, we aim to be sustainable, cost effective and efficient, or ideally all three.

“More than 14 years in rail has taught me this industry, as fantastic as it is, can be a little old fashioned in how it operates and relies on practices that are decades old. We want to challenge those thought processes, methods and those materials, but we have to do so with products that are sustainable and offer other advantages.”

The efforts come as the industry looks to achieve net zero carbon by 2050 (and 2045 in Scotland). Around 97 per cent of Network Rail’s emissions come from third parties, including suppliers.

Last month Network Rail praised the progress made in reaching the target with 67 per cent of suppliers now signed up to the science-based targets initiatives to reduce their carbon footprint.

Sharon, whose organisation is on target to achieve net zero by 2023, said: “A vital part in hitting the industry targets is to have the supply chain fully endorse it and to back that up by bringing in these new concepts.

“Another product TRU has trialled and is set to use going forward is FlexMSE, which is the vegetated retaining wall system, manufactured by Gravitas International. They trialled it on one small culvert at Brumber Hill and it was very successful.

“The IDB, EA, landowner, Alliance and client are happy with it, and now the product is being designed into some major culverts and gravity wall systems. This is leading to tonnes of concrete and steel being removed from the construction phase and being swapped out for a system that is EDP certified, so it’s fully sustainable, a true green alternative.

“Not only does the product offer a means to remove concrete and steel, but can be planted with any vegetation that is wanted and that can recover all of the carbon consumed in the manufacturing and build of the culvert and gives back to wildlife that otherwise might have been moved on.”

Flex MSE vegetated culvert headwall

Over the past few months, the Alliance has also restarted an innovation panel looking at potential new products that are then reviewed at the highest possible level.

Mark said: “It’s unbelievable what is going on at the moment. It’s like a snowball going down a mountain, it is picking up more and more momentum with more people being brought in.

“The potential is massive and I’m particularly excited because I’ve been told by some of the most senior people in the country that we really are making a difference.”

Sharon added: “We need to build to improve our infrastructure, but if we can do it in a way that isn’t so damaging to the environment, ultimately we all win.

“If these products bring efficiencies through construction, it becomes cheaper and therefore it is in the taxpayers’ interest as well. There are so many innovative products out there and we’re excited about what we’ll be offering to industry in the future.”

Andy Stocks, East of Leeds Alliance director, has celebrated the collaboration. He said: “The railway industry has to innovate to ensure it has a future. At TRU this is a core requirement to ensure we achieve the efficiencies set by government.

“This includes trialling and testing new products that give a cost benefit in material price or ease of installation. The partners on the East of Leeds Alliance want to work with suppliers who adopt this ethos too.

“There’s an opportunity on TRU to change the way the railway industry operates, and all parties involved with its delivery have this challenge. I’m pleased that Scott Parnell is one of those suppliers that have stepped up to address the challenge.”

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