GRAHAME TAYLOR

Landfill journeys

Here at Rail Engineer, we've made occasional mention of alternative track support materials. But, time and again, the industry reverts back to traditional materials such as timber and concrete. They do the job. There is an established supply chain. They are a safe option and there's plenty of plant and equipment designed to cope with them. They have problems too - timber quality and availability is declining and price is increasing, creosote will be banned in 2018, mid-life extensions are time consuming and expensive, and concrete is heavy and too stiff to be mixed with timber.

But time and technology moves on, and this often produces alternative ways of doing things - without causing a quantum shift in equipment, infrastructure or work practices. Ideally, delivering better value too.

Recycled bottles

At the recent Rail Live event at Long Marston, there was a recycled plastic composite sleeper being displayed by Sicut Enterprises. Proven in the US over the past 20 years, this material now stands a real chance of changing the way that track is assembled in Europe.

What does it look like? Well, like a sleeper, except that it is black. The initial impression is that it is very hard and durable, nothing like as heavy as concrete, and even without treatment will not rot or be gradually eaten by all the creatures that have timber in their sights. It can be handled and installed in exactly the same way as timber. Looking good so far.

Sicut's composite sleeper is manufactured from a blend of recycled plastics. Within that enigmatic black shape there are countless plastic bottles, as well as waste materials from the automotive and other industrial sectors - in fact, materials which stood a very good chance of ending up in landfill.

So, one could argue that track made using Sicut's sleepers is in effect a most acceptable and very long landfill site. The fill - the sleepers - are doing something really useful, instead of just becoming an environmental menace.

At the end of life - however, if ever, that occurs - old Sicut composite sleepers can simply be returned and put back into the 'cooking pot' to make more sleepers, or one of Sicut's other structural composite products.

Also, in addition to the obvious environmental benefits, detailed cost modelling and track experience has shown that the durability and long life of Sicut's composite sleepers should deliver very significant whole life cost savings for customers.

Development

So, has this new product come out of the blue - or black? Of course not. And has it just been developed for main line railways? Again, of course not. While sleepers made using Sicut's technology have been proven in passenger lines at 200 km/h, as well as Class 1 freight lines at up to 39 tonne axle loads, they have also been successfully used on many other types of railway - including in the rather un-glamorous world of mining.

For most products, the rail industry is one that takes very few prisoners. The conditions are harsh, or even extreme, and the commercial pressures are intense.

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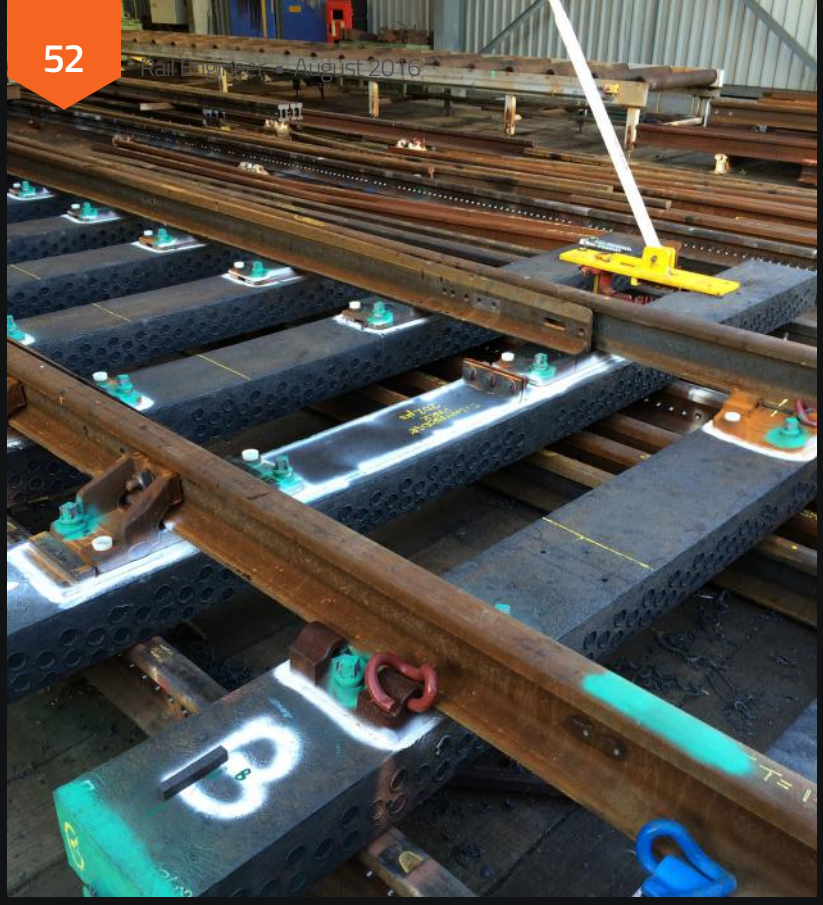

Railway components have to perform. And Sicut's plastic sleepers do perform. After over 20 years and billions of gross tonnes of traffic, they have not split, rotted or degraded - performance remaining unchanged since the day of installation.

Sicut's composites and manufacturing processes have been developed over the past 30 years, derived originally from research carried out and led by Professor Thomas Nosker and his AMIPP department at Rutgers, the State University of New Jersey, USA. This globally renowned centre is dedicated to exploring immiscible polymers and the novel structures and materials that can be obtained by processing them. This is a technical way of saying that they design structural materials from mixed plastic rubbish. Or, as Sicut likes to describe it, they "Turn Today's Waste into Tomorrows Infrastructure". Alongside Sicut, Rutgers remains very much involved in the technology today.

The range of Sicut's structural components is wide, from railway sleepers to bridge structures, marine pilings, I-beams, heavy-duty boards and ground mats. Indeed, complete road and rail bridges have been made from this composite technology.

So the sleeper on show at Rail Live wasn't just a single product line, but part of a wide portfolio of proven products, all derived from low quality plastic waste.

Worldwide

Having seen very few composite sleepers in the UK, the question had to be asked: "Who uses them?" And the answer is quite a few countries - sixteen to date. There's the USA for a start, Canada, Russia, Mexico, Australia, New Zealand, Brazil, Chile and Wales. Yes, Wales - on the Ffestiniog Railway. France, Germany, Belgium, Sweden have all granted Sicut approvals for initial track installations and London Underground, having completed its track trials in 2015, has granted full APR (approved product register) approval for Sicut's plastic sleepers.

They're also being used in subways - normally an environment where fire precautions loom large. In Milan, these sleepers have been embedded in concrete and have been in service since 2006 and Long Island Railroad has had them installed in the New York Subway since 2013. One of their additional benefits in subways, and indeed on bridges, is that of vibration attenuation.

So far, mention has only been made of 'sleepers'. But this generic term covers a multitude of shapes and sizes. Switch and crossing bearers for example, usually sourced from imported tropical hardwoods, are also made from Sicut's composite and have been successfully used around the world. They are made consistently in lengths that would challenge many hardwood suppliers. They are not subject to the vagaries of natural variations. There are no splits, shakes or knotholes. No twists, bends or variations in dimensions - unless, of course, these are specified. An engineered material is, after all, more precise than a natural one. They can also be stored outside before installation without any risk of taking on moisture or degradation.

Lateral stability

There is one intriguing detail that needs an explanation. They may be black, they may be made to the same dimensions as timber, but their sides and base are covered with interesting conical indentations. These, as business development director Anil Aggarwal explained, have been carefully designed and tested to provide the necessary lateral and vertical track stability.

The sleepers are very hard, and the ballast won't dent the sides or base to anchor the sleeper in place. The indentations ensure that the ballast locks into the sleepers and secures the track immediately after installation. Indeed, the measured lateral stability of Sicut's composite sleepers is similar to that of concrete, despite the composite version being less than one third of the weight.

New UK facility

Despite a quiet start, there are developments in the UK - major developments in fact - with the opening of Sicut's first composite sleeper production line in Castleford, near Leeds, to supply the UK and European markets, whether that is for mainline, industrial or underground customers. Ultimately, the facility plans to use up to 25,000 tonnes of locally sourced waste material, much diverted from what was an inevitable path towards landfill.

The UK plastics recycling industry has taken quite a hit recently. Plunging oil prices have meant that the costs of new plastics have also gone down, which leads to a drop in demand for alternatives made out of recycled material. To a very large extent, the opening of the new composite sleeper facility can be seen as a lifeline for this embattled industry. Indeed, the Government's Waste Recycling Action programme (WRAP) seems to think so - it is a stakeholder.

This level of investment in the UK is an indication of the confidence that composite sleepers really are a viable alternative to concrete and timber track support in Europe. Before long, it could be that your train will be traveling over its very own landfill site, a landfill site that everyone will be quite happy to have "in their back yard".