



RailEngineer

by rail engineers for rail engineers

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WHO NEEDS RAILS?

Rhomberg Sersa's exercise in lateral – and longitudinal – thinking

SIGNALLING BARES ITS SOUL

At the IRSE's ASPECT 2019 conference in Delft, resilience and the capacity challenge were the major topics.

NEW TRAIN INTRODUCTION

With 8,000 new coaches ordered in eight years, commissioning new train fleets is a challenge for operators, owners and manufacturers.

INVOLVING END USERS IN DESIGN

Early involvement in the design process can improve both functionality and buildability, though changes are always likely.

PERMANENT
WAY

Who needs rails?

Rhomberg Sersa's exercise in lateral – and longitudinal – thinking.





GRAHAME
TAYLOR

For the last twenty years at least – and maybe more – the railway industry has been receptive to ideas from other industries. Railway engineering is undoubtedly specialist, but far less specialist than many traditionalists may think.

In this article, Rail Engineer looks at how ideas, seemingly outrageous in the rail context, can solve the management of difficult engineering sites, many of which have been forever wearily shunted into the 'rather difficult' pile.

For example, driving a tunnel in a mine poses a few basic and obvious problems. One problem is "How do you excavate the material ahead of you?" and this leads to the next which is "What on earth do you do with the spoil once it's been dug?"

The reason why the latter is of interest in this article is because a tunnel is linear and it's confined.

There's a similar scenario in our industry and it, too, has the same basic problems. This time, think of a single line railway. It's linear and it also is confined. Digging out the formation ahead is fairly straightforward. Managing the transportation of the material through the linear site and disposing of the spoil is not.

The dustpan and brush

The tunnel industry came up with a simple solution. It developed a compact machine that ran on caterpillar tracks and which had an excavator at the spoil end, a chute between its crawlers and a conveyor belt that raised the spoil up to the level of other conveyor belts in the rear.

So, job done! Keep feeding the conveyor belts and the spoil problem is sorted – a bit like a large dustpan and brush.

The seeds of the idea were taken up by the railway industry in Europe, which looked for a solution for relaying single lines, but, because this is the railway and because there are rails involved, matters were a little more complicated.



The "dustpan and brush", or ITC-BL4 (and below left).

Happily, two items of kit have now been introduced to the UK by Rhomberg Sersa to allow a very elegant solution. Both items make use of caterpillar-type tracks to free them from the strictures of the rails. The tunnel-derived machine – the dustpan and brush unit – is known as the ITC-BL4. A companion machine is the MFS+ (a type of On-Track-Machine) and both of them, along with a UMH (Universal Materials Handling wagon), form the basis of Rhomberg Sersa's 'Machine Group'.

The MFS+ machine is an audacious bit of engineering that allows what is basically a standard MFS (*Materialförder- und Siloeinheit*, or 'mineral conveyor and storage unit') high output conveyor/hopper wagon to lift itself clear of the running line and then to wander off into an excavation. It then snuggles up to the ITC-BL4, which is busy scooping up spoil, assisted by conventional dozers, dispatching it into its chute and then off onto its conveyor belt. This spoil is taken back by the MFS+ conveyor and into its 60-tonne hopper.

The MFS+ then travels back to feed a rake of conventional rail-mounted MFS wagons which can either store the spoil for later discharge or, in conjunction with the third member of the Rhomberg Sersa machine group – the UMH – discharge it to other wagons for removal from site. »



Rhomberg Sersa's Machine Group in action at Furze Platt station, Maidenhead, Berkshire.

The 'difficult' sites are always with us

Before further detail, it may be useful to understand the background to this 'Machine Group' and how it came to be in the UK. About five years ago, Rhomberg Sersa entered into a joint venture as part of the S&C North Alliance with a view to using some specialist equipment from Europe in UK work sites in CP5.

It had been recognised that there are some sites on the network that pose a real problem when it comes to relaying and reballasting. The obvious sites are single lines, although single lines don't just exist between centres of population. They also exist in multitrack sections of a railway.

Consider, for example, an island platform. There are two lines of way, but where they diverge around the platform, they are single lines. Where lines lead up to a flyover, these again are single lines. Locations with very wide wide-ways – again, these are effectively single lines, even though the parallel line is within sight and then, of course, there are single line tunnels. All these locations have been difficult to reballast/relay. They are not impossible, but efficient relaying has always been a challenge.

Even more challenging

Less obvious, but maybe even more challenging, are large switch and crossing layouts. In the past, it has been necessary to relay half a layout at a time in order for the spoil to be loaded to an adjacent track. This causes problems with ensuring a precision fit of the two weekends' work, both for the main running lines and for the crossover road as well.

The Rhomberg Sersa group of machines allows an element of unfettered lateral thinking – quite literally. No longer are engineers confined by where the rails used to be. There is a clear playing field over which both the ITC-BL4 and the MFS+ machines may wander. They don't have to be in line. They don't have to be parallel with the railway.

The MFS+ machines can be manoeuvred in various ways throughout the site to allow for the efficient loading by the ITC-BL4. These wagons, even loaded with 60 tonnes of spoil,

are surprisingly nimble, with skilled operators performing a slow-motion ballet between the ITC-BL4 and the main line of rail-mounted MFS wagons. Taking under five minutes to discharge their loads, the MFS+ machines can be back in position to receive subsequent loads without interrupting the ITC-BL4's output.

The operation uses minimal operators – each machine has a dedicated operator, supported by additional multiskilled staff that can undertake operator or assistant-operator duties as needed, and all operations are supported by qualified fitters.

All the machinery is self-sufficient with on-board lighting and are fitted with the latest dust suppression developments. There are no onerous cant or gradient restrictions that would preclude the equipment from anywhere on the national network and it can negotiate curves as tight as 150-metre radius.



The Rhomberg Sersa squadron

Rhomberg Sersa was allowed the use of Kingmoor Yard in Carlisle by Network Rail to import, assemble and trial the machinery on siding roads before going live on the national network. The site had pits for maintenance and was well suited to the extensive experimentation needed to check the performance of the machines.

From around February 2018, testing had been completed and the machines could be planned to work throughout the network.

There are six machines that can travel throughout the UK. There is the 'OTP' (on-track plant) ITC-BL4 which is transported by haulage contractors by road. It does not need movement orders as it is not over-length nor over-width.

The rail mounted 'OTMs' (on-track machines) are made up of two MFS+ units. These are recognisable as conventional standard MFS vehicles but with the addition of retractable caterpillar track assemblies. Finally, there are the three UMH wagons, all of which are transported by rail throughout the network.

Detailed planning

David Hardy is the project manager for the system. He has seen the transition from fledgling experimental plant to trial certification. He heads up a team of 16 staff in the UK which undertakes all of the planning, compliance, operation and maintenance and includes machine operators, supervisory staff and skilled mechanical engineers, who know all the intricacies of the hydraulic, mechanical and electrical components. »

The Machine Group
laying ballast outside
Barrow-in-Furness.



The MFS+ unit running on its crawler tracks, not the railway.

It is his job to ensure that everything – machines and staff – arrives on site in full working order, having been transported to, and stabled at, one of the major railheads in the UK. These include Sandiacre, Whitemoor, Basford Hall in Crewe and Miller Hill in Scotland, as well as several others. Not the least of his tasks is to ensure that the kit arrives in the correct formation and the right way around!

Having been lodged originally at Carlisle, the equipment now travels throughout the UK to locations as varied as Inverness, Llandavenny in the Newport area of South Wales and the Cumbrian Coast – all in the space of a few weeks. This is coordinated from project offices in Doncaster and Wigan.

When the S&C North Alliance contract ceased at the end of CP5, Rhomberg Sersa took the machine group in house and has become a main contractor and a stand-alone sub-contractor to the larger clients – such as Balfour Beatty, Babcock and Colas. In fact, Rhomberg Sersa has a plant hire contract with Network Rail's Supply Chain Operations (SCO), so a relaying contractor - the client - books Rhomberg Sersa's machines and then David's team liaises directly with the client to work through the fine detail and planning.

Audacious innovations

If there's one thing to be taken from this review of Rhomberg Sersa's project, it is that, just when you thought that all the new ideas from unrelated industries had been exhausted, someone comes up with an audacious new way of working.

Taking rail wagons off the track and allowing them to roam freely in an excavation

is one such innovation. All the confines of a railway line vanish. Network Rail's Brian Paynter, programme director track, has called it a 'game changer'. This idea, backed up with some simple, but chunky, bolt-on engineering, will lead to yet more ideas, because something has been shown to be possible.

So, what next? ●



// The Rhomberg Sersa Machine Group – a unique and specialist in-line excavation and re-ballasting system

Our comprehensive fleet consists of:



MFS+

Material Conveying
and Hopper Vehicle
(rail and crawler modes)



MFS 2000 Multi-Speed Conveyor System



ITC BL4 High capacity in-line Road Rail Excavator



UMH Universal Material Handling Vehicle

// The Rhomberg Sersa Machine Group is a unique and specialist in-line excavation and re-ballasting system that represents a step-change in track renewals in the UK.

Using this system Rhomberg Sersa Machine Group has the capability to deliver in-line excavation, parallel working, single line and single bore tunnel working and a production line approach all supported by a dedicated, experienced and multi-skilled team comprising:

- Multi-skilled On-Track Machine and On-Track Plant operators
- Safety critical staff (SWL1/2)
- S&C and plain line renewal
- On-Track Machine and On-Track Plant maintenance staff
- Full technical support
- Planning capability cradle to grave

Bringing innovation and engineering excellence to the rail sector

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