

The Feasibility of the Vortok Pandrol e clip Stressing Rollers on a Network Rail High Output Ballast Cleaning Site

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Vortok stressing rollers have been developed for both Pandrol FASTCLIP and 'e' Clip fastenings, and are now in widespread use around the world. The following report details Network Rail's experience with the 'e' Clip version.



Trial site at Corby Glen

Network Rail has recently approved the new Vortok Stressing Roller (eVSR) designed for use with the Pandrol e Clip fastening system. A feasibility study was carried out for use on the High Output Ballast Cleaning project to assess the possible benefits the rollers could offer in key areas of the HOBC process and in particular, based around four points.

- Technical improvement
- Safety
- Speed
- Cost (when compared to manpower saved against initial outlay of funds)

Two methods were used to conduct the study.

- Desktop study (using the Vortok paperwork and data provided by Network Rail)
- On site trial

DESKTOP STUDY

As a technical improvement the rollers are designed to reduce the friction between sleeper and rail by a high factor (the Vortok eVSR has a friction factor of 0.0012 reduced from a factor of 0.12 with the traditional methods). This reduced friction allows for a far better distribution of stress throughout the rail that has been pulled. This improved distribution of stress allows for up to 1200m of track to be stressed, as against the current UK limit of 900m.

As a safety issue, the eVSR holds the rail up without the use of jacks, with the rollers supporting the rail under the head of the rail, and holds the track in a way that the rail will not fall while it is raised (the rollers go past the centre point of the lift with the downward force of the rail locking the rollers in place – the actual roller therefore would have to

completely fail for the rail to drop). This means that the possibility of operators getting their fingers trapped under the rail is virtually eliminated.

Due to the reduction in processes such as no jacking of rail, no use of side rollers and reduced manpower requirements coupled with faster operation compared to the traditional methods, there are potentially large cost savings to be envisaged.

TRIAL DETAILS

The trial was carried out as part of an 800m stress on both legs of the Up main at Corby Glen on the East Coast Main Line (ECML) near Grantham in Lincolnshire. The forty four Vortok eVSR rollers were used over 190m of the six foot rail/leg.

The site consisted of a curved area of track

which favours the speed of the Vortok eVSR as the traditional method requires extra work than on straight track (traditional side rollers would normally have to be used on the inside radius of curved track). The trial also focused on the speed of use of the eVSR rollers and the staffing savings with the method compared with the traditional rollers used elsewhere on the same site.

TRIAL METHOD

The Vortok eVSR's were supplied in plastic crates holding eight rollers (each crate is laid out on track every 44 sleepers). The quantity in each crate is to allow a maximum weight of 25kg per box – this allows each crate to be carried safely by one man.

The rollers were then laid out every 11 sleepers which was the suggested distance between the sleepers on the radius curve at the trial site. On this site, 11 sleepers equates to approximately 7 metres. Vortok does not state in any documentation the correct spacings of the rollers, as this should be determined by the local technician working to the agreed specification for the network.

After the rail was cut, it was unclipped away from the pull point. Installation of the eVSR's was delayed until unclipping had reached at least thirty metres from the pull point. This was important because raising the rail with the eVSR closer than this to a secured clip makes it more difficult to operate the stressing rollers. The Vortok rollers were then installed and spaced at intervals of every eleven sleepers and then raised. This operation process was timed and compared to the times taken on the other rail which was being stressed using the traditional methods and equipment. As soon as all rollers of both types had been installed, the rail was stressed. As soon as the stressing was completed the rollers were lowered and removed and clipping up of the rail commenced. Again, times were taken of both methods of operation.

TRIAL SPEED RESULTS

Vortok eVSR.

- i. Installation by two men using Vortok eVSR's took 10mins and 4 seconds to put up 190m of rail on one leg. This time included

the time waiting for the rail to be unclipped after the roller team caught up with the unclipping team. This means that 800m of rail could be up on Vortok rollers in 42mins and 23 seconds.

- ii. Removal using two men the Vortok eVSR's took 6mins and 41 seconds to lower and remove 190m of rail on one leg. This means that 800m of rail could be taken down using Vortok rollers in 28mins and 9 seconds.

Traditional Side/Under Rollers

- iii. Installation by four men using the traditional rollers (with side rollers) took 24mins and 15 seconds to put up 190m of rail on one leg. This means that 800m of rail could be raised up on traditional rollers in 102mins and 6 seconds.
- iv. Removal by four men using the traditional rollers (with side rollers) took 17mins and 21 seconds to lower and remove 190m of rail on one leg. This means that 800m of rail could be taken down using traditional rollers in 73mins and 3 seconds.



eVSR at Croby Glen in raised position

| Method | Time Taken To Set Up 190m | Time Taken To Remove 190m | Time Taken To Set Up 800m | Time Taken To Remove 800m |
|----------------------------------|----------------------------------|----------------------------------|------------------------------|---------------------------------|
| Vortok eVSR | 10mins and 4 seconds (2 Men) | 6mins and 41 seconds (2 Men) | 42mins 23 seconds (2 Men) | 28mins and 9 seconds (2 Men) |
| Traditional | 24mins and 15 seconds (4 Men) | 17mins and 21 seconds (4 Men) | 102mins 6 seconds (4 Men) | 73mins and 3 seconds (4 Men) |
| Time Saved Using Vortok eVSR | 14mins and 11 seconds | 10mins 40 seconds | 59mins 43 seconds | 44mins 54 seconds |
| Manpower Saved Using Vortok eVSR | 2 Men | 2 Men | 2 Men | 2 Men |

EFFECT ON COST

When considering all of the gathered data the calculated effect on cost is based on the savings in man power that can be achieved by using the Vortok eVSR's. The team to set up the rollers on one leg/rail would consist of two men therefore the two teams that would be needed to simultaneously set up two legs would consist of a total of four men. With traditional methods we would use a team of four men on one leg/rail and therefore we would use eight men for two legs/rails and therefore save four men on site using the Vortok eVSR.

As with all new technology or equipment, methods of use and management must be considered. The management of these rollers needs extra control due to the higher level of investment but this is mitigated by the handling and storage system provided by Vortok in the form of stackable lightweight plastic crates. The business benefits already identified from the experience on the Western Territory with the Fastclip version (fVSR) gives us confidence that the eVSR will give similar benefits in other locations.

CONCLUSIONS OF THE FEASIBILITY STUDY

There is strong evidence of a technical improvement by using the Vortok eVSR in the form of the potential increase in the length of rail that can be stressed in one length and the fact that the desired stress is more evenly distributed along the full length of the rail.

Use of the eVSR (and fVSR) rollers provides a much safer operation method with a huge reduction in the risk of operators trapping their fingers between the rail and

sleeper. The data in this study also highlights the significant time saving that the eVSR introduces into the stressing process. Installation is 41% faster than the traditional methods and 38% quicker in the removal process. Less ancillary equipment is required as well.

The cost benefits over a period of time are very high and will obviously vary from job to job, track to track and country to country, always depending on local conditions. It must also be remembered that the VSRs do need to be managed more carefully as more rollers are required on each site when compared to the traditional methods but the overall improvement in productivity and safety substantially outweighs this small extra aspect. ■



Blue tote box



fVSR's on 450m curve showing at blue storage crates