

Alstom Metro Northern Line



HAV (Hand Arm Vibration) reduction and the removal of the requirement for sand bags for new floors. Carried out at Morden depot on the Northern Line Midlife refurbishment

As requested by The Office of Rail Regulation the following Case study will explain how we came to use a specific tool to reduce HAV by using our effective Industrialization opportunities. This case study also includes how Alstom mitigated the risk of injury and tiring activities to staff by sourcing an adhesive for floor Linoleum that does not require sand bags for weighting during the curing process.

The businesses involved were:-



The changes to our processes were justified in both cases by the fact that both products paid for themselves by either removing the labour requirement or by removing the requirement for expensive PPE.

It will also explain how this subsequent change of process helped to reduce our Health and Safety critical areas of exposure.

This process of current availability and subsequent choices involved working closely with Alstom Metro Health and Safety department.

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Interested rail observer: ORR Request for information and case study analysis

Company information

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Solution group	Engineering / Health and Safety
2 x Solution offering	Reduction in hand, arm vibration levels for refurbishment of flooring (Northern Line trains for Midlife refurbishment project.).Remove the use of sand bags for laying flooring
Project name or title	Midlife Refurbishment

Case Study

Alstom Company profile

Alstom are an international renowned manufacturer and supplier of rolling stock to many different world customer transportation systems.

LONDON UNDERGROUND EXAMPLES:-

Northern Line 636 carriages 1995 stock

Jubilee Line 441 carriages 1996 stock

Business situation

Alstom strive to not only reach the required levels for health and safety within all areas of their business but also to go much further than required wherever possible.

The requirement to reduce Hand and arm vibration levels for all our end users is a continuous critical requirement. White finger health risks on the Midlife project needed to be mitigated.

There was also concern with the amount of time and energy that was being spent carrying sand bags around to weigh down freshly laid floor linoleum. It was also noted that it caused major tiredness issues to staff and the increased risk of lower back injury. The sand bags regularly spilt onto floors which in turn became a high risk slip area.

The Alstom Metro Quality Engineer scoured the market to find the best solutions available. This included looking outside of the rail industry. The solutions for both issues were found within the construction industry where floor lifting and laying is an almost identical process and is a daily requirement.

Technical situation 1

The Alstom Metro Engineering department was challenged by their interior health and safety department to find a solution to high daily HAV readings.

The tools being used at this stage were standard Makita 110v Electric hand held chisels. Using these tools to remove all the old linoleum flooring was causing the daily HAV readings for staff to be pushed to the limits. The readings were in excess of 9.0 m/s² which limited daily usage to 3 hours per day. This had a direct impact on project flow due to having to consistently switch staff around on tasks to ensure limits for individuals were controlled.

After looking at numerous readily available electric chisels and solutions it was deemed that all these variations could not offer the desired result. None of the current tools on the market could offer a reduction in vibration exposure that would assist the project and improve staff health risks.

Staff were beginning to complain of tiredness and numbness in joints even though we were ensuring they were working within the guidelines for HAV controls.

We therefore decided to hunt further outside of the rail industry.

Solution

Through making personal contact with persons outside the rail industry the Alstom project quality engineer finally identified the ScrapAir 36 model as designed by MABI in France for the Commercial and Foundry market as a potential solution. It looked very interesting so we investigated further.

The MABI Managing Director agreed to travel to London in March 2014 and carry out trials with Alstom (in-house) to prove the tooling capabilities.

This also involved the full analysis of the MABI results for the reduction of HAV.

The highest HAV test results using the ScrapAir 36 model were only 6.07 m/s²

These results subsequently enabled the staff to work for longer periods whilst dramatically reducing the HAV level for our staff.

It was also apparent that lifting a floor coating in the carriage could be done in a time period that meant there was no need to switch staff around in a single shift.

This solution also offered a more cost effective use of staff hours on the project.

The ScrapAir 36 lifted the linoleum far more quickly than any other tool we had tried and also reduced the HAV exposure of our workforce so this was deemed a very successful find for Alstom.

It also enabled Alstom to remove the requirement for HAV gloves (reducing to standard safety gloves).

The Alstom business case demonstrated that removing the HAV gloves alone would actually cover the cost of all the ScrapAir 36 tools for the whole project.

Staff no longer complained of tiredness or numbness in joints.



ScrapAir36 Short



ScrapAir36 Long

Alstom Benefits

1. The HAV levels were greatly reduced and there was a distinct improvement in productivity.
 2. The time to lift the old flooring was reduced by 50% by incorporating the new MABI tools.
 3. The business case proved HAV glove removal paid for the tools required
 4. Alstom staff have benefitted from working in a much safer environment
 5. Other visiting potential clients see how Alstom strive to give best practice at all times
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Technical situation 2

The Alstom Metro Engineering department was challenged by their interior health and safety department to find a solution to the excessive everyday risk of injury and fatigue for its staff. This arose from the use of sand bags for laying floors (weighting to hold down glued floor covering). This is current rail industry standard.

Previous lessons learned from rail projects within rail refurbishment showed this has always been a normal expectation/acceptable risk within our industry.

Once again Alstom searched outside of the rail industry within an area where the renewal of floor coatings was a daily occurrence, notably the construction industry.

Solution

We thought “Why are there not huge piles of sand bags standing around on street corners when major retailers are having a flooring refurbishment carried out on their building?”

A flooring adhesive was found called BS400 which is manufactured by a UK based company called BSDL (Building Systems Distribution Ltd).

Alstom and BSDL carried out trials on this product in the Morden depot in October of 2013.

These trials proved the adhesive was a perfect solution to allow the **total removal** of sand bags from the project.

A simple hand corking method was implemented which provided a substitute for the sand bags needed to lay the floor coating on top of the mixed adhesive.

BSDL set up a full training course for all staff to ensure warranty and installation quality of the flooring was upheld.

It was also found that the adhesive cured within 4 hours for foot traffic enabling other tasks to be completed within the carriages at an earlier stage.

The BS400 adhesive was tested by EXOVA in the UK and subsequently passed all rail fire and toxicity requirements.

Alstom Benefits

1. The risk of injury from slips and falls has been removed from the project.
2. The risk of lower back injuries from sand bags has been removed from the project.
3. The labour time used to manually handle sand bags was 22 hours per train. Removing this requirement actually paid for the adhesive in terms of hours saved on the task.
4. Alstom staff have benefitted from working in a much safer environment
5. Productivity was actually increased which should have a positive effect on gross margins.

Alstom Improvements still to come

The use of HAV monitoring systems that fit the tools has been successfully trialed.

The monitoring devices can be allocated to a member of staff for the project duration.

These monitoring tools results are downloaded to the individual user account at the end of each working day by simply plugging into a docking station.

We are currently testing ways of fitting them to various vibration tools we use on the Midlife project.