

A Review of the Activities Of the Adhesion Working Group

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Executive Summary

Background and Remit

This report was commissioned by the Adhesion Working Group (AWG) in August 2009 following industry discussions about the future of AWG.

The review group was asked to:

1. Review and report on the achievements of AWG since 1995
2. Review and report on AWG's current work programme
3. Canvas the requirements of AWG's current (and past) Members to identify their wishes, perceptions, needs and requirements for short, medium and long term work to address adhesion related issues.
4. Identify the current role that AWG fulfils within the industry in the UK and abroad, and recommend how the requirements of Members can best be met whether by AWG or otherwise.

Incorporation of AWG Management Group Views

Issue 1 of this report was presented to the AWG management group on 2nd February 2010. The management group made a number of comments about the report. The report is presented here in substantially the same form as the original issue 1, but the additional management group comments are clearly indicated throughout the report by use of smaller, italic text.

The main comments made by the management group were:

- The view was expressed that funding AWG activities indirectly would result in no savings to industry bodies since funding would still be required from other sources. However it was recognized that the current system means that organisations can receive benefit from AWG activities without providing funding. See comment in section 5.1
- It was felt that a source of funding would need to be provided for AWG activities above the administrative support described in recommendation 6.3. It was felt that this should be considered by NTFOG and ATOC.
- A dual reporting line to NTFOG and VTSIC would be confusing. The management group felt that a single reporting line to NTFOG would be more appropriate. However, it may be necessary to apply for funding for longer term research activities through VT-SIC or direct to RSSB.
- A third option should be presented to the industry based on the current governance arrangements but with a revised remit. This option is described in 5.4.
- The management group considered that AWG's ability to respond quickly to emerging issues was a strength (an amended SWOT is shown in 5.1)

- The management group felt that AWG must have a remit to consider short and medium term issues as well as longer term research.

The AWG management group response to the original recommendations is shown in section 6.

Achievements Since 1995

AWG has played a crucial role in maintaining a high profile for adhesion issues across the industry. Early work included some very significant developments in adhesion management which have had a profound impact on the way in which the industry manages the adhesion problem. These include:

- Development, testing and introduction of sanders
- Enhancement of WSP systems
- Sponsorship of the development of LAWS™
- Benchmarking of control measures

More recent and ongoing work includes:

- Co coordinating the industry response to the difficult autumn season of 2005
- Analysis of wrong side track circuit failures
- Development of the Adhesion Management System

AWG has continued to raise industry awareness of adhesion problems through publication of the AWG Manual, regular publication of Gripping Stuff and the annual AWG conferences.

In many cases the outputs from AWG's work is now taken for granted by the industry. AWG has not been solely responsible for the significant initiatives that it has been involved with, but it was always intended that AWG would act as a focal point for industry action. In this respect AWG has been a considerable success over the past 15 years.

Consultation With Stakeholders

Questionnaires were sent to organisations on current and previous AWG contact lists. Organisations were asked their views on a number of issues relating to management of adhesion. They were also asked for their views on the role of AWG. A number of one on one interviews and presentations to industry groups were carried out to understand stakeholder opinion of the role of AWG.

Key issues identified were:

- Adhesion remains a significant issue for the industry
- Individual duty holders have a responsibility to manage adhesion
- However, there must be co operation between duty holders to manage adhesion effectively
- 74% of respondents said that there should be a single co coordinating body for adhesion management. Only 15% said that there was no need for a single co coordinating body.
- The current funding arrangements were seen as unsuitable.
- The governance of AWG needed to be changed.
- AWG is seen as non-partisan both between Industry partners and professional disciplines.
- AWG's work needed to be owned more by the industry.
- The current funding arrangements were seen as unsuitable.
- The governance of AWG needed to be changed.

Recommendations

The review group recommends that a single co coordinating body for adhesion management should remain. The constitution of the group should follow the model for the existing System Interface Committees. Members of the adhesion management group should represent defined constituencies.

The new adhesion management group should have links with the Vehicle Track System Interface Committee (VT-SIC) and National Task Force Operators Group (NTF-OG). Links with VT-SIC will provide a mechanism to obtain research funding from RSSB. Links with NTF-OG will provide operational guidance and will enable the adhesion management group to obtain support from key stakeholders such as Network Rail and TOCs.

The adhesion management group should be largely free at the point of use. This will require commitment from the industry in terms of management time and support for the activities of the adhesion management group.

An alternative model without a central co coordinating body is also outlined. This option is not recommended by the group. Effective co operation in areas of wheel rail interface is seen as difficult without a single co coordinating body.

1. Background and Remit

1.1 *Background*

During the summer of 2009 a number of members of AWG made it clear that they did not intend to renew their subscription for 2010. Although AWG subscriptions had remained unchanged for many years (and were being held at the same level for 2010) the prevailing economic conditions had led TOCs to consider their spending carefully.

Possible changes to industry management of adhesion were discussed at National Task Force Operators' Group (NTF-OG) on 29 May 2009. On 26 June NTF-OG considered whether it was possible to cover the activities of AWG through existing industry structures and particularly through greater use of Network Rail resources. Following this meeting the Chair of NTF-OG wrote to the Chair of AWG to outline the concerns within NTF-OG.

In the meantime several TOCs had actually declined to continue their subscription to AWG. This would result in a significant shortfall on the draft 2010 budget. The Chair of NTF-OG attended the AWG meeting on 04 August 2009 to explain the concerns of some NTF-OG members. The following extract from the minutes outlines the discussion:

'AS introduced Gary Cooper, Chair of National Task Force Operators Group (NTFOG), who attended the meeting to brief AWG on discussions that had taken place in NTFOG regarding AWG's future role. He explained that the issue of subscribing to AWG was raised by a TOC at NTFOG in response to receiving the 2009/2010 AWG invoice. NTFOG facilitated a members' discussion on the role of AWG, particularly considering the enhanced autumn management processes now in place within Network Rail. PA and BR provided input for AWG. He advised that NTFOG had determined that it was up to individual duty holders to decide whether to continue sponsoring AWG as part of their autumn management arrangements.

The AWG meeting then discussed the matter and noted that the industry is now in a different position than when AWG was first set up in 1995, and the management of adhesion is now more effective. The discussion noted the impartiality of AWG, the valuable work that AWG had undertaken and outputs such as trainborne sanders, WSP testing improvements etc. GR also noted that AWG is a forum that includes other than main line rail operators (e.g. LUL) and companies from other countries. NH noted the role that AWG plays as client and stakeholder for RSSB adhesion research projects. PA noted the range of involvement and expertise around the table, but added that the circumstances have changed in the industry and the management of adhesion needed to be part of a wider remit.'

As a result of this discussion a decision was taken to carry out a review of the activities of AWG.

1.2 *Remit*

The remit for the review is as follows:

1. *Review and report on the achievements of AWG since inception in 1995*
2. *Review and report on AWG's current work programme*
3. *Canvas the requirements of AWG's current (and immediate past) Members to identify their wishes, perceptions, needs and requirements for short, medium and long term work to address adhesion related issues.*
4. *Identify the current role that AWG fulfils within the industry in the UK and abroad, and recommend how the requirements of Members can best be met whether by AWG or otherwise.*

The review will be led by Ben Rule of National Express East Anglia. Ben will be supported by:

- *Paul Arnold of Network Rail*
- *Cliff Cork of RSSB*
- *Richard McClean, Chairman of ATOC Engineering Council*

The review is to be completed by the end of January 2010 and reported back to AWG at its February 2010 meeting when the result will be published. An update will be provided to AWG at their October and December meetings.

2. Review of AWG Achievements Since 1995

2.1 *Management Structure*

AWG was formed by British Rail in 1995 to act as a focal point for work to resolve adhesion problems.

The management structure of AWG has remained largely unchanged since its formation. A Managing Group (currently Chaired by Adrian Shooter) meets two-monthly to discuss current workload and initiatives. Over the years there has been regular turnover in the membership of the management group, although the nature of the group has remained fairly constant. In particular, there has always been a balance between engineering and operations expertise, infrastructure management and train operations. In addition there have been a variety of managing group representatives from non UK mainline railways e.g. LUL and overseas railways.

In 1997 the relationship between AWG and the industry changed as a result of the privatisation of the industry. From 1997 membership was via a subscription. In the early years following privatization AWG achieved more consensus than many of the other cross industry groups at the time. Until very recently this has not prevented the group from representing the interests of the whole industry, nor has it prevented the group from attracting overseas members. In 2003 there were 44 members paying subscriptions. In 2006 members included Deutsche Bahn, Irish Rail, Translink (Northern Ireland), Pro Rail (Netherlands), NS (Netherlands) and Long Island Railroad (USA).

2.2 *Early Work*

The 1996/97 programme of work for AWG is listed below and is representative of the early workload for AWG. In the first few years as well as improving general awareness of adhesion issues and improving general competence in management of adhesion there were a number of key projects to be tackled. These are listed and explained below. A full list of AWG sponsored work is included on the AWG website and in the AWG Manual.

2.2.1 *Development Testing and Introduction of Sanders*

AWG was central to early testing of two types of trainborne sander systems. Trials of the Emergency Sanding Device (ESD) and the Automatic Sanding Device were partly funded by AWG and partly by the British Railways Board.

The ESD was initially tested on South West Trains class 159s and subsequently on class 158s in South Wales and West. Early results showed that the ESD could prevent operation incidents. In the 1995 season 16 SPADs were prevented by use of the ESD and a further 4 could have been prevented by correct use of the ESD.

1996/97 Programme of Work

1. Improve communication on low adhesion problems and initiatives
2. Improve management's understanding of low adhesion control and mitigation measures
3. Improve data on low adhesion events
4. Improve understanding of basic causes of low adhesion incidents
5. Improve methods of, and competency of staff, examining contaminated rails
6. Progress the trials of trainborne sander systems
7. Review performance of older generation Wheelslide Protection Systems (WSP)
8. Determine relative stopping performance of tread and disc braked vehicles
9. Review use of driving simulators for low adhesion training
10. Develop low adhesion prediction model
11. Improve our understanding of the processes involved in the formation of low adhesion conditions
12. Encourage a co-coordinated approach to lineside vegetation management
13. Produce a specification for procuring and testing Sandite
14. Develop a process to measure the performance of low adhesion initiatives
15. Review efficacy of 3 step brake instructions and EP/Auto brake instructions relative to braking under low adhesion conditions

Automatic Sanding Devices (ASD) were fitted to Thames Trains class 165 and 166 units for the 1996 autumn season. This followed the 1995 season where a Turbo unit had hit the buffer stops at Slough due to adhesion problems. This was the first time that automatic sanding equipment had been fitted to units in the UK. The 1996 season was the first opportunity to assess the effectiveness of the equipment.

During the 1996 season there was a reduction in adhesion related SPADs and station overruns on Thames Trains. It was concluded that the introduction of the automatic sanders had contributed to this reduction.

Following a review workshop in 1997 AWG published a report entitled 'Sanding Equipment For Traction and Braking – A Review'¹. The report concluded that:

- Both ESD and ASD systems had been shown to be effective in terms of safety, performance and driver confidence.
- ASD was favoured over ESD due to increased availability and possibility of use in traction.
- A safety case for use of ASD in traction would be required.
- Further development work should take place on variable rate of sanding according to speed and adhesion conditions.

AWG were then involved in the drafting of a Group Standard setting out the requirements for design, installation and operation of sanding equipment on multiple units. The Group Standard (GM/RT2461) was issued in 2001.²

The standard requires that when sand is deployed under braking conditions the train should come to a stand with no more than 7.5g/m of sand under the rear axle of the train. It is recommended in the standard that a flow rate of 2kg/minute is chosen to achieve this requirement. However there is no mandated flow rate in the Group Standard and this wording has allowed subsequent development of variable rate sanders. AWG representations were central to the drafting of the standard in this way.³

From the first fitments of automatic sanders in 1996 fitment of automatic sanders has become widespread across the multiple unit fleet. By 2006 92% of EMU cabs were fitted and 67% of DMU cabs were fitted.⁴ By 2008 these figures had increased further to 94% and 67%.⁵ It should be noted that the DMU figure includes class 153 and 14x units for which the current design of ASD is unsuitable.

2.2.2 Enhancement of WSP Systems

In Europe WSP systems have traditionally been on-track tested using a detergent solution to reduce adhesion. The WSP system is tested on a number of braking runs to evaluate extension of stopping distances and the possibility of wheel tread damage. This is the traditional UIC methodology for WSP testing.

¹ Sanding Equipment For Traction and Braking – A Review: A Report For the Adhesion Working Group, John Tunley, AEA Technology 1998 RR-TRS-98-075

² Sanding Equipment Fitted to Multiple Units and On Track Machines. Railway Group Standard GM/RT2461 2001

³ 'Railway Group Standard For Train Sanders' Gripping Stuff Issue 11 p14 April 2001.

⁴ TOC Sander Fitment Progress Report, David Weir, ATOC 2006

⁵ Conversation with Steve Bence, ATOC 16/12/08

However, this methodology tests only a small part of the WSP system algorithms. Limited testing on track leaves open the possibility of tread damage in varying extreme low adhesion conditions. It is prohibitively expensive to carry out track trials using a range of different vehicles, loading conditions, adhesion profiles and wheel profiles. Group Standards also require that WSP systems make the best use of available adhesion and minimize the extension to stopping distances.

For these reasons WSP testing and acceptance in the UK (including LUL and also Irish Rail) has generally been through enhanced testing using simulation rigs. AWG played a significant role in making simulation rig testing the default methodology for testing and acceptance of WSP systems.

AWG commissioned several reports by AEA Technology into WSP testing. The best practice document 'WSP Acceptance and Performance: A Guide to Best Practice'⁶ includes a generic test specification, proposes a test approach and fulfils the requirements of both the CEN specification and Group Standards. AWG has also produced a spreadsheet that compares the performance of new and older WSP systems. This assists in development of a business case for the fitment of more capable WSP systems. This has been used by Transys and Westinghouse Brakes to justify the upgrading of WSP systems to a number of fleets.

The level of detail to which AWG has investigated particular aspects of the adhesion problem is demonstrated by the fact that AWG has also published a report into the effect of enhanced braking systems on air consumption by WSP systems in very low adhesion conditions.⁷

2.2.3 Development of LAWs

LAWSTM stands for Low Adhesion Warning System. It is a system developed by AEA Technology, (now Delta Rail Group) to monitor wheel slip activity and combine this with positioning data on the train to map low adhesion conditions. In addition the system can send warnings to the control centre that low adhesion has been experienced.

The development and analysis of LAWSTM during the 1999 season was sponsored by AWG.

2.2.4 Mitigation Benchmarking Tool

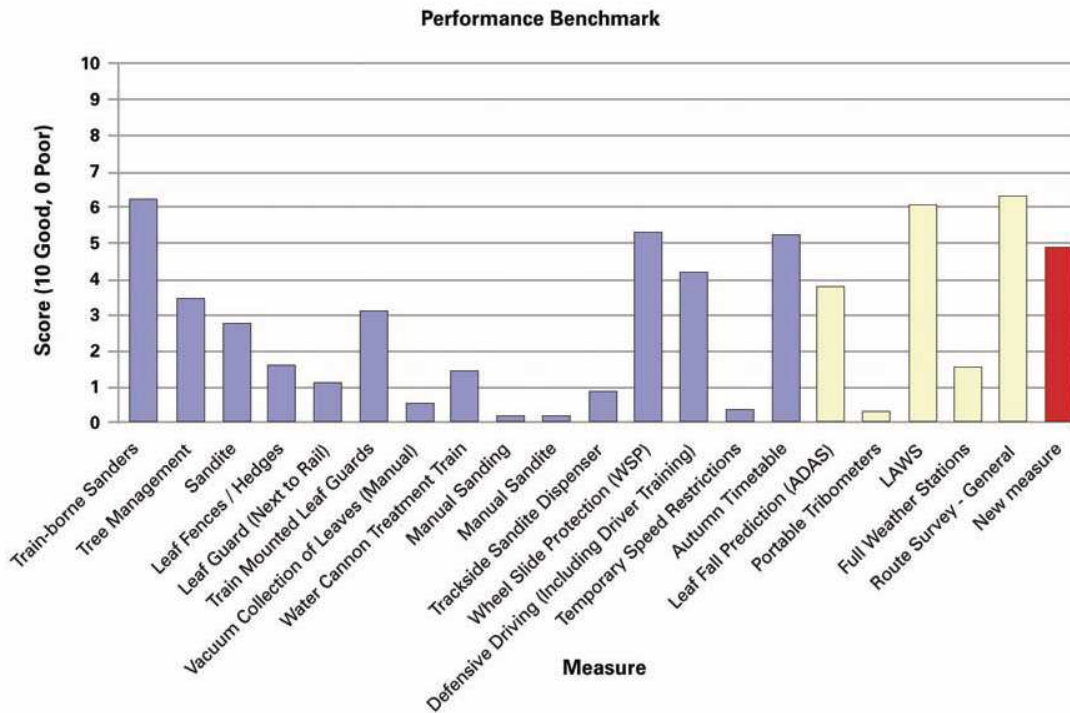
⁶ WSP Acceptance and Performance: A Guide to Best Practice, SD Brown, AEA Technology AEATR-VTI-2004-043 2004

⁷ Effect of 12%g Braking on Air Consumption in Low Adhesion Conditions, RR-TRS-97-064, 1997

AWG has been involved in the development of a range of control measures for low adhesion problems. Clearly the effectiveness and cost of different initiatives varies, and AWG has undertaken work to benchmark the different initiatives. The 'New Control Measure Assessment Model' is designed to assist the industry in decision making about which control measures to apply and whether a new control measure is justified.

Control measures are assessed against performance, cost, safety, practicality and environmental. The model provides a first order estimate of the effectiveness of a control measure and can assist in the decision whether to consider the initiative further. The model is used by AWG to assess new initiatives that are proposed to the management group. Further details can be found in the AWG Manual.

The chart below shows a number of existing physical control measures (blue), information systems that are used to assist with mitigations (white) and a new control measure which is being evaluated (red). The size of the bar represents the relative effectiveness of the control measures.



2.3 Ongoing Work

2.3.1 WSTCF Analysis

AWG has considered wrong side track circuit failures since AWG was formed. More detailed analysis of the problem commenced in 2000 and a review report was commissioned in 2002.⁸ Findings of this report were:

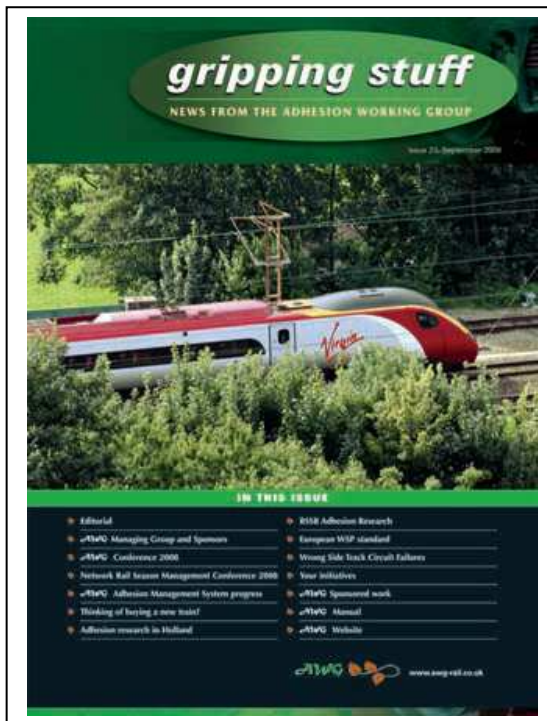
- That data had been recorded inconsistently and this had prevented clear analysis. The report generated a single Access database of incidents and this has been used since 2001 to record incidents.
- October to December were the worst months for WSTCFs.
- Class 158 units were the highest risk vehicles.
- Tread conditioning units were recommended to be fitted to DMUs in conjunction with TCAs.

AWG has continued to collate and analyse WSTCF data since the 2002 report. This database now provides an important resource, especially given the increase in WSTCFs that was experienced in 2008 and which has increased industry concern about the issue. 2009 has seen work by Network Rail to identify the causes of this increase, and this is likely to lead to reintroduction of scrubber blocks to various class 158 fleets.

It should be noted that AWG were also involved in trials of train mounted railhead scrubber blocks on First Great Eastern class 315 units in 1999.

⁸ Analysis of Wrong Side Track Circuit Failure (WSTCF) Incidents, Interfleet Technology ITLR/T11235/001 2002

2.3.2 *Gripping Stuff*



AWG has always had an objective to ensure that low adhesion remains high profile within the industry. The key way in which AWG makes the industry aware of its activities is through the Gripping Stuff newsletter. Gripping Stuff has been published twice a year since July 1995. Traditionally the April edition has reviewed the results from the previous season and outlined the programme of activities. The September edition has reported on the AWG conference and has acted as a reminder of the forthcoming season.

Gripping Stuff is provided to AWG members. Sufficient copies are provided so that front line staff, as well as managers, are able to obtain a copy. Feedback received during this review

suggests that TOCs value the effect that Gripping Stuff has on Driver awareness and confidence during the autumn season. More recently, Gripping Stuff has been made available via the AWG website.

2.3.3 *Conferences*

Annual conferences have been the other main method that AWG has used to maintain a high profile for adhesion issues. The first of these was in 1997. Content of conferences has varied over the years, although the core content has always been:

- A review of the results from the previous season.
- Updates on the progress of AWG activities.
- Presentations on good practice and research.
- Generating ideas for future AWG work.

The 1999 and 2003 conferences took on a different style and were outdoor events. Both took place at the Buckinghamshire Railway Centre at Quainton Road. The outdoor conferences had a stronger emphasis on practical methods to mitigate the adhesion problem.

In more recent years the conference has received a number of presentations from overseas rail operations including from the Netherlands and USA.

Particularly since 2003 there has been overlap between the AWG conferences and seasonal conferences run by Network Rail. The more international focus of the AWG conferences and the occasional outdoor conference has helped to maintain a differentiation between the two conferences, although the core subject matter remains similar. The Network Rail seasonal conferences have addressed similar issues but have also included a wider transport through studies of other national transport systems including for example, highways.

2.3.4 AWG Manual

Since 1995 AWG has undertaken a wide range of research into adhesion problems. Through the activities of its members and through the conferences it has been able to collect a wide range of good practice advice for mitigation low adhesion. This collected knowledge was first published as a manual in 1997. Updates were published in 2001 and 2004. The latest version was issued in 2009.

The manual aims to be a definitive summary of knowledge on the subject of adhesion management. It is a comprehensive document of over 170 pages. The sections of the manual are:

- What is Low Adhesion?
- Low Adhesion Analyses
- Operational Measures
- Infrastructure Measures
- Rolling Stock
- Train Detection
- ERTMS
- Various appendices providing resources

The manual is available to AWG members on the website.

2.3.5 AWG Website

The AWG website is accessible to all at www.awg-rail.co.uk. A dedicated members' area provides additional material which is only available to subscribing members.

2.4 Post 2005 and the Goff Report

The 2005 autumn season was significantly different to the preceding seasons. The 2002 season had seen a significant number of safety related incidents due to a single storm event on 27th and 28th October 2002. However, the 2005 season

saw a significant increase in station overruns (from 132 in 2004 to 332 in 2005) and in particular 2 serious SPAD incidents at Esher on 25 November and Lewes on 30 November.

At Esher a South West Trains class 450/0 4 car unit passed WK338 signal and WK336 signal at danger due to low rail adhesion. A collision with a train signalled from the slow line to the fast line at Hampton Court Junction was narrowly avoided.

At Lewes a Southern Railway class 377 4 car unit passed LW9 signal at danger due to low rail adhesion. A collision with a departing train was only avoided by the Driver of that train applying the brakes on becoming aware of the runaway train.

The industry had become concerned about the safety performance during the early part of the season. As a result the National Task Force asked AWG to arrange a review which commenced during the autumn season. A remit was produced by AWG and Network Rail. The review was carried out by Tony Goff with assistance from John Tunley and commenced with a review meeting on 15 December 2005. Due to the severity of the incidents at Esher and Lewes RAIB also investigated the 2005 adhesion season. Separate reports were published for the Esher⁹ and Lewes¹⁰ SPADs as well as a summary report for the whole season¹¹.

The Goff report¹² made a number of recommendations to improve safety and performance during autumn. There was some overlap between the Goff report recommendations and those made by RAIB, although the Goff report was completed much quicker and enabled the industry to react in time for the autumn 2006 season. The recommendations from the report were delivered jointly by the industry, although Network Rail appointed a project manager to co ordinate delivery.

Recommendations from the Goff report covered many of the issues that AWG had been working on over the previous years. This included improvements to on train sanders, railhead treatment, reporting of incidents and training of drivers. However, this was not a reflection on the effectiveness of work by AWG. In fact the Goff report acted to re-energise the industry. The fact that the industry turned to AWG to facilitate the report shows the central role that AWG has had in dealing with adhesion issues. It also demonstrates that the industry felt AWG was the right body to co ordinate industry response after a difficult autumn season.

⁹ Autumn Adhesion Investigation Part 1: Signals WK338 and WK336 Passed at Danger at Esher, RAIB, 2007

¹⁰ Autumn Adhesion Investigation Part 2: Signal LW9 Passed at Danger at Lewes, RAIB, 2007

¹¹ Autumn Adhesion Investigation Part 3: Review of Adhesion-Related Incidents Autumn 2005, RAIB, 2007

¹² Report of an Independent Review of Low Adhesion incident Performance During Autumn 2005, Tony Goff, John Tunley, 2006

2.5 Outcomes

The Adhesion Working Group has been closely involved in many of the significant developments in adhesion management since 1995. These include:

- The development and roll out of automatic sanders on multiple units
- Systematic analysis of whole industry performance
- The establishment of co-coordinated and targeted communication channels
- Delivery of a co-coordinated and cost effective cross industry response to significant incidents or adverse trends in performance in the area of adhesion
- Delivery of a co-coordinated and cost effective cross industry response to externally produced reports and recommendations.

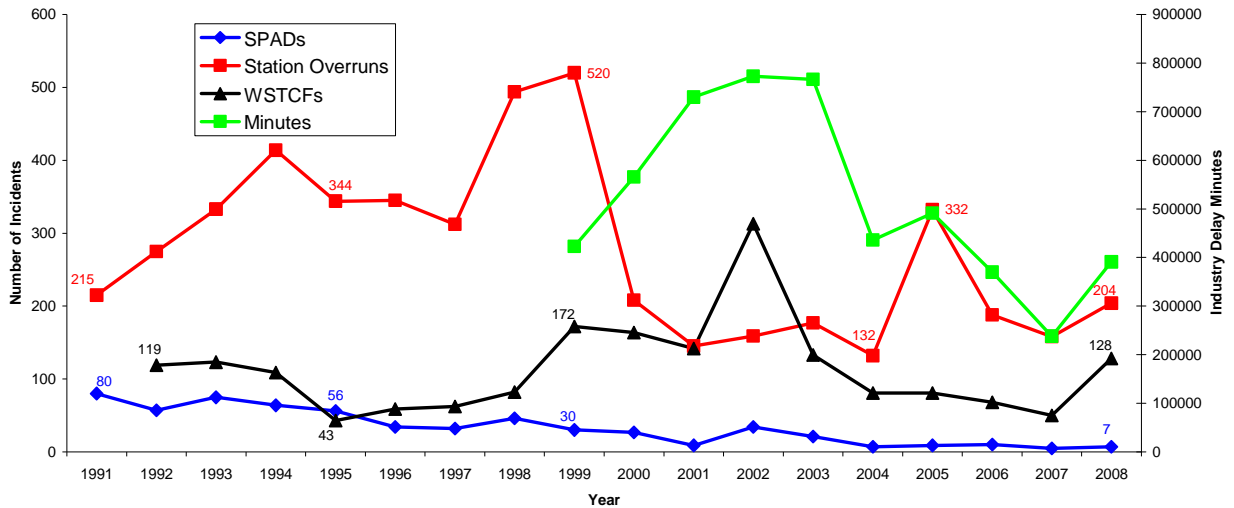
Many of the outputs of these workstreams are now taken for granted across the industry. Clearly, AWG has not been solely responsible for the significant initiatives that have taken place and most work has been in conjunction with other industry bodies as it was never intended that AWG be solely responsible for developments in adhesion management. However, it has acted as a focal point for developments while individual duty holders have continued to be responsible for managing the adhesion risk.

2.5.1 *Safety and Performance Results*

Nevertheless to allow some assessment of the impact of AWG's activities it is illustrative to look at the safety and performance statistics since the formation of AWG. The results since 1991 are shown below.

Since the formation of AWG there has been a steady decline in the number of adhesion related SPADs. In 1995 there were 56 and by 2008 there were only 7. Trends in station overruns are less clear. There was a significant drop in the number of overruns between 1999 and 2000, although there is some doubt about whether the date prior to 1999 is directly comparable. The increased overruns in 2005 are evident although there has been a reduction since 2005. Over the period there has been virtually no reduction in wrong side track circuit failures. The spike in 2002 was caused by the serious storm of 27th and 28th October 2002. Reliable delay minute data is only available from 1999. The data that is available shows an increase from 1999 to 2002 and a steep decline after 2002.

Safety KPIs During Autumn 1991-2008



The picture is therefore mixed. However the improvement in adhesion related SPADs is significant both in numbers and the effect of overall safety improvement of the railway. The development of sanding equipment, improvements in WSP and improved railhead treatment methods that AWG has influenced will certainly have played a key role in this improvement.

2.5.2 Quantification of Safety Risk

Following the RAIB report into the adhesion incidents of the 2005 season¹¹ RSSB carried out an assessment of the safety risk posed by low adhesion problems.

Two methods were used to obtain an estimate of the overall risk from low adhesion causes, namely:

- Summing the risk for precursors based on data in the Safety Risk Model (SRM).
- Establishing the proportion that low adhesion causes make to the overall Category A SPAD risk number based on the SPAD Risk Ranking Methodology.

The overall risk from low adhesion causes based solely on the SRM (i.e. method (a) above) is estimated as 7.58E-02 fatalities and weighted injuries per year (FWI/yr).

Based on the SRM, the percentage risk contribution that low adhesion SPADs make to the overall annual Category A SPAD risk is estimated as 5.14%.

Between 2002 and 2006 the overall risk from low adhesion causes based on use of data from the SPAD Risk Ranking model is estimated to be factor of 2-3 times higher (1.72 to 1.86E-01 FWI/yr) than the risk estimate from method (a)

It is considered that method (b) provides the best estimate of the low adhesion risk from category A SPADs than using the Safety Risk Model alone. There are uncertainties in both methods, but the risk from low adhesion should be considered as a range from 7.58E-02 FWI/yr to 1.86E-01 FWI/yr. However, this result is very sensitive to individual high risk SPAD events in each year and this demonstrates how important it is to continue to work to prevent high risk incidents such as those seen at Esher and Lewes in 2005.

By comparison version 5.5 of the Safety Risk Model states that the total risk of all movement accidents and train accidents equates to 34.5FWI/yr¹³.

2.5.3 Financial Impact of Adhesion

One of the measures of financial cost to the industry is the deemed cost of train delays caused by poor adhesion. The table below shows deemed costs of adhesion delays between 2003 and 2009.

Year	Cost of Delay Minutes/£m
2003	27.068
2004	15.621
2005	15.756
2006	11.592
2007	7.429
2008	8.482
2009	5.661

Cost of Delay Minutes Caused by Adhesion

There is a significant ongoing cost of delays to the industry. The values have reduced significantly over the past few years, although the poorer autumn seasons of 2005 and 2008 can be seen in the data.

Clearly, actions to reduce the costs of adhesion issues have been effective, although a significant opportunity remains.

¹³ http://www.rssb.co.uk/pdf/reports/Risk_Profile_Bulletin_-_Overview_of_Issue_5_5.pdf

3. AWG's Current Work Programme

AWG publishes a programme of work each year. The programme for 2009/10 is shown below:

Programme of Work 2009/2010	
The following is the scope of AWG's work programme for the 2009/010 financial year and progress to date (more detail can be found elsewhere in the current issue of GRIPPING STUFF).	
Ensure that low adhesion remains high profile within the industry	<p>This is achieved partly through the issues of GRIPPING STUFF maintaining awareness of what is happening with adhesion initiatives in the industry. AWG intends to issue 2 newsletters this year.</p> <p>The AWG Web Site (www.awg-rail.co.uk) will also be maintained to ensure world-wide visibility of AWG's existence and work. AWG publications and reports, including the AWG Manual – Managing Low Adhesion – will be available for download by members.</p> <p>AWG will hold an annual Adhesion Conference in 2010 to allow sharing of good practice and provide a networking opportunity.</p>
Adhesion Management System	<p>AWG will continue with the development of the Adhesion Management System (AMS). Further testing of the main line Adhesion Controller's Condition Assessment Tool (MLACCAT) will take place over the autumn of 2009 on the Chiltern lines.</p> <p>AWG will work with RSSB to develop the system into prototype form to support a shadow and live trial in 2011/12.</p>
Human Factors	<p>AWG will continue to consider human factors issues in all areas of its work. Review local, national and international practice on addressing adhesion.</p> <p>AWG will keep a vigil on developments and initiatives aimed at addressing adhesion problems at home and abroad. Various international operators and suppliers attended the last conference and some have now joined AWG.</p>
Support new initiatives	<p>AWG maintains its 'open-door' policy on the review of new ideas from outside and within the industry.</p> <p>AWG will continue to assist RSSB in developing adhesion research specifications and evaluate the outputs as an industry Stakeholder.</p>

2010 budget for AWG also gives an indication of the planned work for the next 12 months.

Adhesion Working Group – Budget 2009/10



<u>Item No</u>	<u>Description</u>	<u>Budget Provision (£k)</u>	<u>Forecast Outturn (£k)</u>	<u>Contracted Value to date (£k)</u>	<u>Expenditure to date (£k)</u>	<u>Remarks</u>	<u>Lead AWG Manager</u>
1	2010 Adhesion Conference	12.00	10.00	0.962	4.112	Event arrangement, exhibits costs, delegate rates etc.	C Fulford
2	Gripping Stuff	20.00	16.00	7.891	7.891	2 editions: May 2009 & Sept 2009	C Fulford
3	Web site management	2.00	1.00	1.00	0.09	Web site subscriptions + update + members area	C Fulford
4	Adhesion Management System	0.00	0.00	0.00	0.00	See 4.1 to 4.6 below	
4.1	Project management	5.00	3.50	2.395	2.395	Project management	C Fulford
4.2	Develop MLACCAT High Resolution base model	16.90	42.00	40.09	13.56	Development of MLACCAT for ADAS High Risk model	C Fulford
4.3	Run MLACCAT 2009	55.00	0.00	0.00	0.00	Run MLACCAT in Banbury ICC (ADAS/Met Office/DeltaRail Group/SAnDS)	C Fulford
4.4	RH Moisture sensors	25.00	9.12	9.12	9.12	Service and install 6 units	C Fulford
4.5	RHMS characterisation	7.32	7.32	7.32	7.32	Characterise output of RHMS vs moisture	C Fulford
4.6	Compare IR vs ACIC	20.00	1.906	1.906	0.00	Compare output of IR sensor with ACIC units	C Fulford
5	WSTCF analysis	1.00	0.00	1.025	0.00	Update WSCF database and analysis 2009 data	C Fulford
6	New initiatives	0.00	0.00	0.00	0.00	As required	
7	AWG overheads	15.00	12.0	10.894	5.969	Meetings mgt, budget, invoices, contracts, general management, Accounts, Corporation Tax	C Fulford
	Total (k)	174.22	102.846	82.603	50.457		

A comparison with the 1996/1997 programme of work (see section 2.2) shows that in recent years AWG has begun to focus its efforts on a smaller range of activities. Gripping Stuff and the conferences have continued, and account for approximately 25% of the AWG budget. However, the largest item of work is development of the Adhesion Management System which now accounts for just under 60% of the AWG budget. Overheads and website management account for the remaining 15% of the budget. There is no allocation in 2010 for human factor research or other new initiatives, although it should be noted that the budget had to be adjusted due to the reduction in income as some companies decided not to subscribe to AWG for 2010.

3.1 *Adhesion Management System*

The Adhesion Working Group is leading the co-ordination of the development of an Adhesion Management System (AMS) for predicting, monitoring and warning of low adhesion on a conventionally signalled railway. Over the past few years a significant proportion of the AWG budget has been spent on the development of this system. This has been a departure from the historical focus of AWG which has been to sponsor a range of projects across the different objectives for the group.

The AMS has been conceived as a tool to provide a greater level of granularity than existing main line low adhesion risk prediction methods, by warning of low adhesion conditions on a more localised basis and in real time, direct to the train as it approaches an affected area. In this way it is anticipated that drivers will be able to use defensive driving techniques more selectively with greater confidence and be aware of localised risk areas, thus reducing train delays and safety of the line incidents associated with low adhesion¹⁴.

Ideally information on the state of the line would be provided direct to the driver though systems such a GSM-R. However, work by RSSB has shown that there may be only limited locations where a suitable cost benefit exists to justify development of the system to this level. An alternative is to provide the information to controllers and to drivers at known problem locations using lineside signs.

The system being developed by AWG is based on an application of London Underground's Adhesion Controllers Condition Assessment Tool (ACCAT) system used on the Central Line. Trials of ACCAT have been taking place on the Chiltern line to assess the accuracy of the system in predicting low adhesion events. More recently outputs from the system have been provided to Controllers as a next step to a full shadow trial.

¹⁴ Adhesion Management System: Concept of Operation, AWG-AMS-PP2, Adhesion Working Group

Further details can be found at:

http://www.rssb.co.uk/research/rail_industry_research_programme.asp

searching under project T540

3.2 *Sponsorship of Industry Experts*

The AWG from time to time sponsors key industry experts to represent the group on key projects. One such example is the sponsorship of Stuart Brown from DeltaRail who is a leading expert on the optimisation of Wheel Slide Protection systems (WSP). He is representing the AWG on the revisions underway on the European standard for WSP systems (EN15595:2009 Railway applications — Braking — Wheel Slide Protection) with the objective of ensuring that GB best practice on WSP system optimisation for extreme low adhesion conditions is included within the document. This document is called up in the Technical specifications for Interoperability as applied to Rolling Stock.

4. Consultation with Stakeholders

In order to canvas the opinions of existing and former AWG members the following consultation methods were used:

4.1 *Consultation Questionnaire*

A questionnaire was sent to all the contacts listed in the 2008/09 AWG contact list as provided by the AWG Secretary plus some other selected individuals. Questionnaires were sent on two occasions and Managing Directors of TOCs were made aware of the review. The questionnaire is shown in Appendix 1.

27 replies were received from the following organizations:

ADAS
 Angel Trains
 Arriva Cross Country
 Arriva Trains Wales
 Arup
 C2C
 Chiltern Railways
 Chris Fulford (AWG Secretary)
 Department For Transport
 First Scotrail
 Irish Rail
 London Midland
 London Underground
 LOROL
 National Express East Anglia
 National Express East Coast
 Network Rail London North Eastern
 Network Rail London North West
 Network Rail Scotland
 Network Rail Wessex
 Northern
 Porterbrook Maintenance Limited
 Rail Accident Investigation Branch
 South West Trains
 Steve Scott (former Network Rail Seasons Specialist)
 Transys Projects Limited
 Virgin Trains

Feedback received falls into the following categories:

- Adhesion is generally still seen as a significant issue for the railway. Most organisations see it more significant than other weather problems such as heat or flooding, although this is not completely consistent. Flooding was clearly the major issue for some TOCs.
- The specific problem of TPWS being unable to mitigate against an adhesion related SPAD was given by some operators as a reason why adhesion is a more serious issue.
- Almost all responses recognise that individual duty holders have a responsibility to manage the risk presented by adhesion.
- However, there is a widespread recognition that the different parts of the industry must co-operate in order to tackle adhesion effectively. Management of vegetation and the condition of the railhead is clearly seen as the responsibility of the infrastructure owner. Railway undertakings are seen as responsible for training of staff and ensuring that vehicles are specified and maintained to cope with low adhesion conditions.
- Other parties such as manufacturers, ROSCOs and consultancies are also mentioned by respondents as having a role to play. Some respondents emphasised a 'whole system' view of adhesion.
- Some respondents saw research into adhesion problems as an RSSB responsibility.
- Almost all respondents recognise that AWG has played a key role in improving the way in which the industry tackles the adhesion issue. AWG's role in coordinating the activities of the industry has been valued by stakeholders. AWG is generally highly respected for what it has achieved.
- AWG's links to non mainline railways and foreign railways is particularly valued by stakeholders.
- Opinion is divided on whether AWG continues to have a role in the management of adhesion within the industry.
 - 18 respondents felt that AWG should continue its role, although many responses accepted that there was a need for some change in structure or focus.
 - 2 further responses expressed the view that AWG should continue, but that a structure similar to the System Interface Committees (SICs) would be more suitable.
 - 4 respondents stated clearly that there was no need for a specific organisation to coordinate adhesion management activity. These respondents stated that individual duty holders should work together bi-laterally or multi-laterally. Existing forums such as Seasonal Joint Improvement Teams and OPSRAMs were quoted as examples.
 - 3 respondents made no specific comments.
- The current governance structure for AWG was mentioned by several respondents.

- The current subscription funding arrangements were seen as no longer appropriate by some respondents.
- Although many responses mentioned AWG's role in raising awareness of the adhesion issue there were only a few specific mentions of the AWG conferences, the AWG manual and Gripping Stuff.

4.2 *Interviews*

In addition to the questionnaires which were sent to industry members a number of interviews were conducted with specific individuals. These interviews were used to cover specific issues in more detail with the individuals. They were also used to collect general feedback.

Chris Fulford (the current AWG Secretary) was interviewed particularly to gain information about the history of AWG and the key workstreams from the early years of operation.

Andy Doherty of Network Rail is the current chair of the Vehicle-Track System Interface Committee (VT-SIC). He also plays a key role in managing Network Rail's programme of adhesion mitigations. Andy was interviewed partly as a senior manager within Network Rail, but also to help understand the way in which the System Interface Committees operate and test whether this might be an alternative model for AWG. This issue is discussed in more detail in section 4.4 below.

Joost Noordewier of First Group was interviewed as a way of obtaining the First Group views on AWG. Most First Group TOCs had not renewed their subscription to AWG for 2010. Responses to the questionnaire had not been received from some First Group TOCs and it was felt to be important to collect feedback from the group. Other TOCs who had not subscribed for 2010 had provided feedback through the questionnaire and it was not necessary to organise specific interviews.

4.3 *Consultation with Industry Groups*

Presentations were given to two key industry bodies to assist with the review.

4.3.1 *ATOC Engineering Council*

A presentation was given to ATOC Engineering Council on 01 September 2009. Key comments were:

- AWG has been good at sharing information across the industry.

- AWG has succeeded in keeping adhesion as a live issue through a period of significant change in the industry.
- The fact that there have not been serious accidents due to adhesion could be seen as a significant success.
- AWG is seen as non partisan.
- AWG is seen as an operations led organization rather than an engineering organization
- The structure of AWG is 'curious'.
- Vehicle Track System Interface Committee already deals with wheel/rail interface issues, although VTSIC does not have a high profile.
- The pure cost of the AWG subscription is not high.
- There was no sense that AWG activities were accepted and owned by the industry.

4.3.2 National Task Force Operators Group (NTF-OG)

A formal presentation was given to NTF-OG on 11 December 2009, although AWG had been discussed at previous meetings (see section 1.1). Views from the group were not unanimous. However key views from the group were:

- Adhesion remains a key issue for the industry.
- It is a problem that requires co operation between the parties involved.
- The current structure of AWG is no longer appropriate. In particular the subscription funding arrangement should change. It was not clear why adhesion management required a different funding arrangement to other organizations dealing with issues of concern to the industry.
- The current governance arrangements were seen as a problem and prevented full involvement from all TOCs and full ownership by the industry.
- It was felt that some of AWG's activities should be carried out by Network Rail as part of its day job. Overlap between the AWG conference and the Network Rail seasonal conferences were quoted as an example. As described in section 1.1 a proposal had been presented to a previous NTF-OG meeting suggesting how AWG activities could be almost completely disposed of through Network Rail activity.
- The view at Engineering Council that AWG activities did not carry a sense of ownership from the industry was repeated at NTF-OG.

4.4 Views from Review Group Members

There were a number of issues that were not raised during the industry consultation, but which the review panel felt were relevant to the review.

4.4.1 Tracking of TOC Mitigations

The tracking of TOC responses to investigations remains a problem. There is currently no simple method to check whether a TOC has implemented a recommendation. It becomes even more difficult to track whether mitigations remain in place after a period of time.

Following publication of the Goff report significant effort went into tracking TOC responses. Both ATOC and Network Rail provided resources to do this. However, following the 2008 season it proved to be difficult to establish the status of some of the Goff recommendations within the TOCs. In the 2008 autumn season there was also an increase in the number of wrong side track circuit failures. A large number of these involved class 158 units. Investigations by Network Rail identified that scrubber blocks had previously been fitted to units in some of the high risk areas of the network. This initiative had not been implemented across the whole network. Subsequent fleet cascades had meant that units with scrubber blocks had been transferred to lower risk locations and units without scrubber blocks had been transferred to high risk locations.

The review group considered whether there was a role for AWG in tracking the implementation of mitigations across TOCs. After consideration it was felt that this was an activity that lay with a cross functional group and should discharge this responsibility through the relevant representatives of that group supported by appropriate resource for the task. A recommendation is made to this effect (recommendation 6.10).

4.4.2 The System Interface Committee Model

There was a view from the review group that the core role of AWG should be identifying ways of improving adhesion management in the most effective and efficient way. The review group felt strongly that adhesion is a system issue and there must be co-operation between industry bodies.

The review group identified that there was an existing industry model which achieved these aims for other system wide issues and that the System Interface Committee model had provided solutions to a number of system wide issues faced by the industry. In addition, the model provided the governance structure necessary to obtain funding for research related activities. Research carried out as part of the RSSB core programme must have the support of one of the principal client groups. VTS-IC is the principal client group for wheel rail interface issues (and therefore adhesion matters).

5. Proposed Solutions

5.1 *The Current Role of AWG*

Views from the consultation have been summarized in the Strengths, Weaknesses, Opportunities and Threats table shown below.

AWG has significant strengths. It is a clearly recognised brand and this has allowed it to achieve one of its main aims of maintaining a high profile for adhesion issues. It is also seen as non partisan which has helped it to bring the industry together to solve adhesion issues. A good example of this is the 2005 autumn season where the industry turned to AWG to co-ordinate the initial response to the difficulties that were being experienced. It is notable that despite the existence of a formally independent RAIB the industry still asked AWG to commission to Goff report.

Opportunities also exist. Adhesion remains a key issue for the industry. Although the 2009 season was relatively benign the 2008 season had some problems particularly around wrong side track circuit failures. Feedback from the industry consultation also shows that there is a desire for clearer advice on best practice in adhesion management.

However, the review group is clear that the status quo is not appropriate. Despite the various strengths of the existing model and the opportunities that exist there is the significant threat that industry members will no longer fund AWG through subscription. Not only would this prevent AWG from funding its planned activities, but it would also be a significant barrier to AWG representing the whole industry. To some extent this has already happened as key industry members stopped paying subscriptions during 2009. The review group does not recommend that the existing arrangements for AWG should continue.

It should be noted that some members of the AWG Management Group expressed the view that any alternative group would require a source of funding to support its activities. Further that industry members would still be funding AWG through an alternative mechanism and that this might be less efficient than the current arrangements.

Any alternative model needs to have the following features:

- It needs to have the support of the majority of the industry.
- It must be seen to be broadly representative of the whole industry.
- Its governance needs to be clearly understood.
- It needs to have a balance of interest in all aspects of the adhesion issue: operations, engineering, infrastructure management, human factors.

- It should reflect the fact that adhesion is a significant issue for the industry, but one that should be managed through normal industry mechanisms.
- It needs to be largely free at the point of use.
- It needs to be seen as independent and have the authority to state what best practice is.
- It should not cut across individual duty holder responsibilities and should not duplicate activities which are best carried out by individual duty holders. It should however guide the industry in focusing its efforts.
- It should have a remit to identify and share best practice with overseas railway organisations.
- It must have a way of communicating its activities to all levels of the industry. Communication of developments in adhesion management should be seen as a priority.
- It should provide the industry with a way of responding rapidly to emerging adhesion issues.
- It should consider issues of relevance over short and medium timescales as well as longer term research.

As well as meeting these high level requirements any new model for AWG must adequately dispose of all the activity that is currently taking place.

Appendix 2 lists:

- Activities that are currently carried out by AWG
- Activities that have previously been carried out by AWG
- Activities that form part of AWG's stated aims
- Adhesion management activities which respondents to the stakeholder consultation stated should be undertaken
- Adhesion management activities that the review group consider need to be undertaken

Two possible options for change are described below. Option 1 is model which is recommended by the review group. Option 2 is an alternative in which there is no single co-coordinating body specifically dealing with adhesion issues and all activities are disposed of to existing industry bodies. Option 2 is an illustration of how the industry could manage adhesion issues without an AWG type body. It is provided because such a model has been considered previously, for example as part of the NTF-OG discussions on 26 June 2009. However, it is not recommended by the review group. The reasons for this are described in more detail below.

SWOT Analysis For AWG

<p>Strengths</p> <p>Seen as non partisan</p> <p>Has maintained a high profile for adhesion</p> <p>Links with overseas railways and 'non mainline' railways</p> <p>Gripping Stuff is highly valued by Driver Management community</p> <p>AWG management group includes representatives from wide range of industry activities</p>		<p>Weaknesses</p> <p>Governance structure is confusing</p> <p>More recent failure to deal with adhesion issues of importance to stakeholders</p> <p>Over emphasis on AMS project</p> <p>Limited sense of ownership of AWG activities by the industry (although this is recognised as a weakness for many cross industry groups)</p>	
<p>Opportunities</p> <p>Adhesion remains a key issue for the industry</p> <p>Desire for non core AWG activities to be carried out by other organizations</p> <p>Strong view that adhesion management must be co operative</p>		<p>Threats</p> <p>Potential loss of knowledge in any change to nature of AWG</p> <p>Engineers perceive AWG as an operating organization</p> <p>Current financial constraints in the industry</p> <p>Industry intention not to fund AWG through subscriptions in future</p> <p>Overlap between AWG and activities of other organisations</p>	

5.2 Option 1

Option 1 is the new model for AWG which is recommended by the review group. (Recommendation 6.1).

5.2.1 Governance

A managing group for adhesion issues should be retained. The constitution of this body should follow a similar model to the System Interface Committees. RSSB publish a System Interface Committee protocol which describes these arrangements.¹⁵

As discussed in section 4.4 the remit for the existing Vehicle Track System Interface Committee includes adhesion between the wheel and the rail. This does not exclude adhesion caused by leaf fall. However, the existence of AWG has meant that low adhesion issues have not been a priority for the VT-SIC which has focused on mitigation of rolling contact fatigue. Because the remit for VT-SIC already includes adhesion issues it would not be appropriate to create a further SIC specifically to deal with adhesion matters. In addition the various SICs already have sub groups and working groups that deal with issues of relevance to the remit of each SIC. The new adhesion management group should become a sub group of the VT-SIC and report to it on technical matters. (Recommendation 6.1)

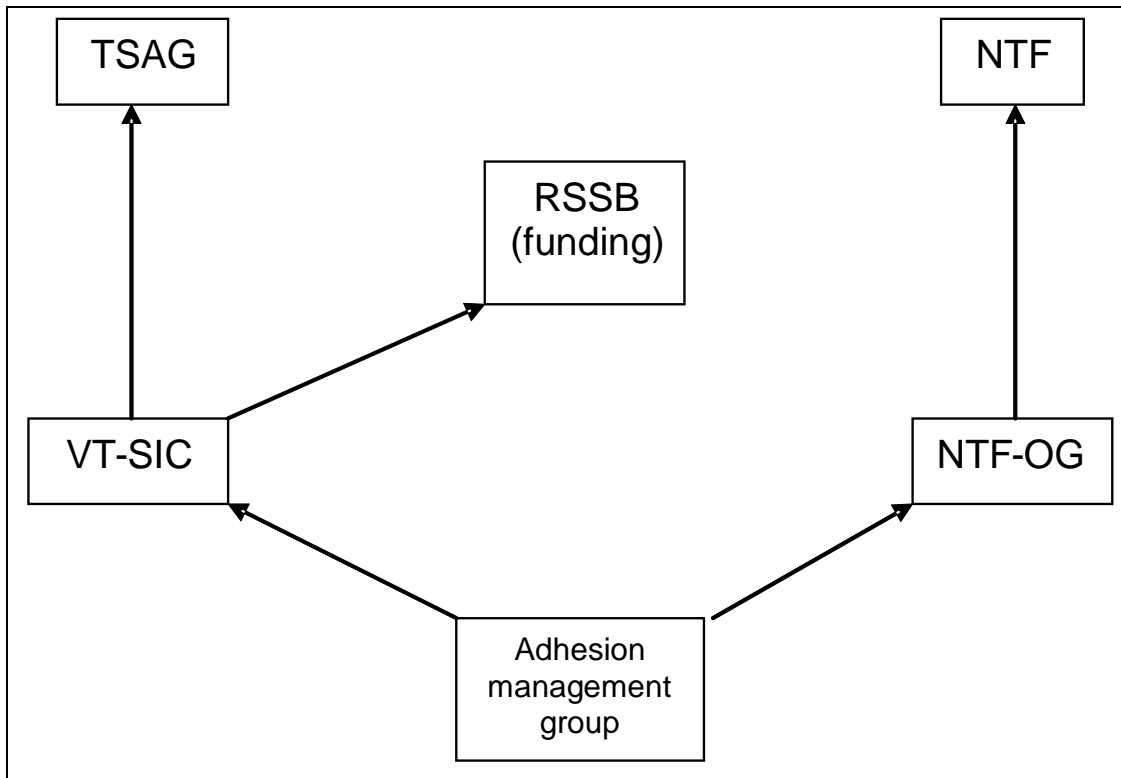
It will be necessary to reconsider the remit of VT-SIC to make a requirement to manage low adhesion issues (and leaf fall related wrong side track circuit failures) more explicit. Membership of VT-SIC would also have to be reconsidered to ensure that it has sufficient expertise to cover all aspects of adhesion management. (Recommendation 6.2). However, VT-SIC has no direct operational expertise, a topic which AWG currently does focus on.

The current lack of operational expertise would need to be addressed. The National Task Force Operators Group (NTF-OG) has specifically addressed a number of adhesion issues and would therefore have an interest in activities of an adhesion management group. Unlike other industry groups with an operational remit NTF-OG considers safety and performance issues. It would therefore be of benefit for an adhesion management group to also report into and take actions from the NTF-OG. (Recommendation 6.1).

The model therefore should encompass both aspects of technical and operational issues associated with adhesion related matters. An adhesion management group should therefore become a sub-group of both VT-SIC and

¹⁵ http://www.rssb.co.uk/pdf/SIC_Protocol_i3_2008.pdf

NTF-OG. Both VT-SIC and NTF OG would be responsible for agreeing their respective objectives with the group. (Recommendation 6.1).



Option 1: Relationships Between Organisations

Representation on an adhesion management group is recommended to be:

Constituency	Selecting Body
Network Rail	Network Rail
Passenger Train Operators	ATOC
Non Passenger Operators	Operator agreement
Rolling Stock Owners	ROSCO agreement
RSSB	RSSB
Suppliers	RIA
Other infrastructure operators	Operator agreement

Membership of the managing group should be by selection, although the group should be able to co-opt further members where appropriate. The number of elected representatives for each constituency should be determined through further discussion amongst the industry. The chair should be selected from within the membership of the managing group.

It should be noted that the governance structure outlined in option 1 was not supported by the AWG management group when issue 1 of this report was presented to them. The management group considered that a dual reporting line to NTFOG and VT-SIC would be potentially confusing. The management group preferred a single reporting line to NTFOG with applications to VT-SIC being made for specific items of research activity. The management group also wished to propose an alternative option which is described in 5.4.

The report authors continue to recommend the original Option 1 proposal. This is on the grounds that without a degree of ownership and governance with the System interface Committee structure, the ability to obtain research funding from the RSSB managed research funds is made more difficult.

5.2.2 Remit

The group should consider key workstreams in both engineering and operations to improve industry management of adhesion.

A proposed remit is:

- The group should facilitate industry wide management of adhesion issues in the most effective and efficient way.
- The group should lead the industry in managing safety and performance KPIs associated with low adhesion issues in the most effective and efficient way.
- The group should also assist the industry in managing leaf fall related wrong side track circuit failure issues.
- The group should identify and publish best practice methods and techniques for managing adhesion issues (including international best practice and opportunities for international co-operation).
- The group should identify requirements for research into adhesion issues (technical and operational) and develop business cases to support such research.
- The group will act as industry stakeholder for adhesion related research proposals to RSSB.
- The group should work with other industry bodies to ensure that adhesion issues remain a high profile within the industry.

Administrative support for the group could be provided by RSSB. The existing SICs are supported by a Stakeholder Support Manager. (Recommendation 6.3). Where the managing group consider that research work is required to deliver its remit then application should be made to RSSB for funding.

Resources do exist within Network Rail, Train Operators and other industry bodies to support small items of project work which may need to be undertaken. The current VT-SIC is supported by a Permanent Project Group (PPG) paid for by Network Rail, ATOC and ROSCOs. Provision of management time, and short

term secondments on AWG issues should be considered by industry bodies in a form similar to the current PPG that supports VT SIC activities. Membership of the AWG PPG could consider as its core, the members of the Network Rail Seasons Team. Without the requirement to pay a subscription to AWG in future, provision of management time would demonstrate a commitment to industry co-operation on adhesion issues. (Recommendation 6.4).

There should be no subscription required to become a member of the managing group. Output from the managing group should be freely available to the industry. An exception to this is publications which are discussed below.

5.2.3 Disposal of Other Activities

Some existing AWG activities should be disposed of to other industry bodies as it is felt by the review group that they can be delivered more effectively elsewhere.

There is considerable overlap between the AWG conference and the Network Rail seasons management conference. The main difference is the larger emphasis on hardware suppliers at the AWG conference. It is recommended that the 2 conferences are combined with Network Rail taking the lead in organising the conference. Consultation with the revised AWG management group should allow the agenda for the conference to cover issues of relevance to the whole industry. (Recommendation 6.8).

Publishing of good practice guidance is felt to be an activity which can be carried out by RSSB through its existing Group Standard Guidance Notes and Rail Industry Standards. The AWG manual is the definitive reference document on adhesion management and the management group should retain control over the content of the document in line with the remit proposed above. However, it should be published by RSSB in a similar way to other good practice guides such as the Human Factors Guide. The current AWG website should be hosted by RSSB in line with the pages that exist for other System Interface Committees. Links to appropriate Network Rail web facilities such as the seasons management site¹⁶ should be included. (Recommendation 6.6).

There will be an ongoing requirement for AWG to publicise its activities as part of its remit to retain a high profile for adhesion issues. Front line operational staff in particular value the information provided by Gripping Stuff. It is recommended that any similar material published by AWG in future should be paid for on a per copy basis. However there is scope for combining Gripping Stuff with other publications such as Red Alert. Over time the need for hard copy publications is likely to decline as use of electronic means becomes more widespread. The new

¹⁶ <http://www.smtleaffall.co.uk/nr/default.aspx> and <http://www.smtweather.co.uk/>

AWG managing group should determine its communication strategy as a priority. (Recommendation 6.5).

For several years AWG has carried out statistical analysis of wrong side track circuit failures (see section 2.3). Since the 2008 autumn season this work has been taken over by Network Rail and no budget has been allocated for this work in 2010. Although the proposed remit for the AWG management group includes consideration of wrong side track circuit failure issues the maintenance of this database should be a Network Rail responsibility. (Recommendation 6.7).

AWG has historically held its own contact list. This has consisted of members of the management group, points of contact within companies who subscribe to AWG and other organisations that receive AWG publications. Network Rail hold a list of industry contacts for weather related issues. It is recommended that in future a combined list of weather and adhesion contacts is held. (Recommendation 6.9).

5.3 *Option 2*

Option 2 is an alternative model for the way in which the industry might manage the adhesion problem. It is not recommended by the review group, but is provided to illustrate the implications of a model without a dedicated co coordinating body for adhesion management.

The basics of option 2 are:

- No dedicated co coordinating body for adhesion management.
- Best practice would need to be identified locally and shared through bodies such as ATOC Operations Council and NTFOG.
- Emerging issues would need to be dealt with at local level and escalated to national groups such as ATOC Operations Council and NTFOG. It is unclear where liaison between operations and engineering would take place
- Network Rail seasons management conference would take over from AWG conference.
- Liaison with overseas railways would need to take place through Network Rail with TOC/ATOC involvement.
- RSSB would fund and archive research where appropriate and justified.
- It is unclear who would act as stakeholder for adhesion related research. This could be VT-SIC, although this would probably require a modified remit.

The main concern with option 2 is that adhesion is an issue at the interface between the wheel and the rail and between different organisations. The nature of the problem therefore justifies a structure for co-operation across the industry.

Consideration of the questionnaire responses in section 4.1 and the SWOT analysis in section 5.1 shows that loss of a single co coordinating body would not receive support from the majority of the current AWG stakeholders.

The review group is also concerned that without single co-coordinating body good practice could be lost. A further concern is that without a dedicated body leading adhesion management the problem may not receive emphasis justified by the residual safety risk or the cost to the industry.

5.4 Option 3

A further option has been suggested by the current AWG Management Group at its meeting on 2nd February 2010. It was proposed that a revised remit could be adopted along the lines of the bullets in 5.2.2. A proposal could then be submitted to the industry that AWG continue its current activities but with the revised remit.

This option did not form part of the original review group report, but has been added at the request of the current AWG Management Group. It is not supported by the review group on the grounds that one of the initiators of the review was the current funding issues for AWG. Option 3 would not address this issue.

6. Recommendations

- 6.1 An adhesion management group should be reformed along the lines outlined in option 1 of this report. This should involve the adhesion management group becoming a sub group of VT-SIC for technical matters and reporting to NTF-OG on operational matters. (Section 5.2).

This recommendation was not supported by the AWG Management Group at its meeting on 2nd February. The Management Group consider that a dual reporting line to NTFOG and VTSIC would be confusing. The Management Group considers that, for governance purposes, AWG should become a sub group of NTFOG only.

- 6.2 VT-SIC should consider whether changes are required to its remit or membership to take into account more formalized responsibilities for low adhesion issues. (Section 5.2.1).

The AWG Management Group did not support this recommendation as a result of its response to recommendation 6.1.

- 6.3 RSSB should provide administrative support for an adhesion management group. (Section 5.2.2)

The AWG Management Group did not support this recommendation and proposes that administrative support should be determined by NTFOG and ATOC.

- 6.4 Railway undertakings should be prepared to provide management time and support for adhesion related activities. For the TOC community ATOC should co ordinate provision of this support. (Section 5.2.2).

This recommendation was supported by the AWG Management Group.

- 6.5 The new adhesion management group should carry out a review of its communication strategy. This must specifically address how information about adhesion management can be provided to front line staff in the most effective and efficient way. (Section 5.2.3)

This recommendation was supported by the AWG Management Group.

- 6.6 Results of an adhesion management group work should be published through the RSSB website. Existing AWG material should be moved to an AWG section of the RSSB website. (Section 5.2.3).

This recommendation was not supported by the AWG Management Group. Given that current website costs are small it was felt that a decision on the future of the AWG website should be made as part of the review recommended in 6.5.

- 6.7 Network Rail should continue the analysis of wrong side track circuit failure incidents. (Section 5.2.3).

This recommendation was supported by the AWG Management Group.

- 6.8 AWG conferences should be merged with the Network Rail Seasons Management Conferences. The adhesion management group should be involved in setting the agenda for the conferences. (Section 5.2.3).

This recommendation was supported in principle by the AWG Management Group provided that the wider remit and membership of AWG is reflected in the conferences.

- 6.9 A single contact list for weather and adhesion issues should be held centrally. (Section 5.2.3).

This recommendation was supported by the AWG Management Group.

- 6.10 The adhesion management group should co-ordinate and track TOC responses to adhesion related issues. This includes keeping records of the status of mitigations within each TOC. (Section 4.4.1).

This recommendation was supported by the AWG Management Group.

Appendix 1 Consultation Questionnaire

Adhesion Working Group Review: Consultation Questionnaire

Name of respondent (amend if necessary)	
Company	
Contact telephone number (please add)	

To what extent do you consider adhesion remains a significant problem for the rail industry? What are the main areas of challenge? How important is adhesion compared to other weather issues facing the industry e.g. flooding, high winds, heat?

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Who do you believe is responsible for managing the adhesion issue?

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What role has the Adhesion Working Group had in tackling the adhesion problem?

How do you believe the industry should be managing adhesion issues going forward? What is the appropriate structure? Is there a requirement for a cross industry group? What is the appropriate funding mechanism?

Do you have any other comments?

Appendix 2 Proposed Options

Activity	Supported By					Disposition	
	Historical Activity	Current Activity	Current AWG Aims	Stakeholder Opinion	Review Group Opinion	Option 1	Option2
Website	X	X				Network Rail and RSSB	Network Rail
Adhesion Management System		X	X	(X) Limited comments. Split between +ve and -ve		RSSB funded project subject to funding being granted	RSSB funded project subject to funding being granted
Manual	X	X	X			RSSB guidance note	Network Rail website
Conference	X	X	X	(X) (but seen as requiring a refresh)		Network Rail seasons conference	Network Rail seasons conference
Stakeholder for adhesion research projects	X	X		X		AWG	VT-SIC(?)
Sponsorship of industry experts		X			X	AWG	ATOC or NR
Ensure high profile for adhesion issues within the industry	X	X	X	X		AWG	Whole industry. NR to take the lead
Communication of developments in adhesion management			X	X		AWG / RSSB	Network Rail
Gripping stuff	X	X	X			AWG	n/a
Identify best practice in autumn management	X	X	X	X		AWG	Network Rail and ATOC
Share good practice with foreign railway systems	X	X	X	X		AWG	Network Rail co-coordinated, but limited TOC involvement
Publish best practice in autumn management	X	X		X		RSSB guidance note	Jointly between ATOC/NR
Identifying solutions to emerging adhesion problems	X		X	X		AWG	Local activity between TOCs/NR NTFOG/Ops Council action where necessary
WSTCF analysis	X	X				Network Rail Seasons	Network Rail Seasons

Activity	Supported By					Disposition	
	Historical Activity	Current Activity	Current AWG Aims	Stakeholder Opinion	Review Group Opinion	Option 1	Option2
						Management Team	Management Team
Research human factor element of adhesion management			X			RSSB subject to funding, AWG to identify possible areas for research	RSSB subject to funding
Hold distribution list of adhesion contacts	X	X				AWG, but combine with Network Rail slow time contact list	Network Rail and ATOC
Act as coordinator for TOC activities				X		ATOC	ATOC
Consider other climate related impacts on the railway				X		Network Rail	Network Rail
Linking operations and engineering approaches to adhesion management				X		AWG	VT-SIC(?)