AEGIS NEWS

THE POSITIVE CHOICE

Issue 13 - Autumn 2020

Welcome to the AEGIS AUTUMN NEWSLETTER

The newsletters this year have been dominated by COVID and how positively AEGIS has reacted to it by establishing our teams at home, focussing on their wellbeing and job security and ensuring that they can continue to support delivery of our clients' projects. And this one is no different – the pandemic is still news story #1 and we still don't know when we might get back to some kind of future normality.

In early September we reactivated the AEGIS Derby offices and welcomed back those team members who found homeworking most challenging. So it was, with hoverboards fully charged, doorknobs disinfected, hands sanitised and distance socialised (ed?) that an advance crew ventured back to a brave new future. It turns out that the future office looks much like the past office but with more signs and cleansing products.

Then of course the government put the brakes on and introduced the real prospect of a further 6 months of restrictions and homeworking. So now it's all about whether working at home can be done "effectively" or not – and that's how we're moving forward at AEGIS. For us this means continuing to focus on the impact a winter of homeworking might have on people's mental health, as much as on offices, productivity, and effective working. To that end five more of our people have just qualified as MHFA England Certified Mental Health First Aiders and we're doubling down on the need for us all to check in with each other regularly. But – amazingly perhaps – there is more to life than COVID; no, not Brexit! October is a time for AEGIS to reflect on another year completed. Our financial year ended on 30th September and it has been another incredible one. Last year we won the RIA Growth in Rail Award in the SME category and despite the minor distraction of a global pandemic we have achieved another fantastic performance with growth this year approaching 20%.

We continue to recruit and develop the best people in our industry (10 new team members since the pandemic started), we are diversifying our service offerings (a significant new signalling assurance project; on-train testing and validation work) and we look forward to announcing formally the opening of our Spanish office (OK maybe a little nod to Brexit) in the very near future. ¡Mire este espacio….!

I am in no doubt that our continued success is due to the resilience and positivity of the AEGIS Team and the relationships they have developed with our clients. Day in, day out they apply their knowledge and expertise to make a success of our clients' projects. So, I'll finish this quarter's Introduction with the same message I have found myself saying daily throughout the summer – Thank you to every individual member of Team AEGIS!

Mark McCool

Some Current Highlights

AEGIS is currently undertaking various obsolescence projects for Angel Trains. Two 3-car, Class 150/0 units, originally built as prototypes have recently been transferred to Northern Rail's Newton Heath depot. These units have some differences from the rest of the Class 150 fleet operated by Northern, including the arrangement of the relays used for the train control circuits. As these relays are now approaching the end of their useful life and are obsolete, AEGIS has carried out a concept design for their replacement with modern, plug-in relays mounted on pre-wired and pre-tested panels. This will permit the existing relays to be removed from the cab back wall and body-end cupboards and quickly replaced with the new assemblies ensuring minimum downtime for the vehicles.

In addition, the existing auxiliary water heaters used for saloon heating of the Class 150/0 units are also obsolete. AEGIS is creating a modification instruction and new electrical schemes and wiring diagrams which will be used to enable the replacement of the old water heaters with an efficient, modern type of water heater which will allow commonality of spare parts across the Class 150 fleet.

Certification of the new Polaris Rail Ranger for Fitzgerald Plant Services

Alastair Roberts, Head of Certification (Plant) at AEGIS describes the work undertaken in certifying the first Fitzgerald Plant Services Polaris Ranger, converted to Rail use – The Polaris Rail Ranger.

Road Rail Vehicles (RRVs) are machines which are converted to be used on rail by the addition of rail wheels/ bogies and the associated control systems, along with any modifications required in other areas of the machine to ensure they meet the relevant standards to be used in the railway environment.

Approvals Process

The process for approving machines for use on rail within a possession is detailed within RIS-1710-PLT. The specific technical requirements for RRVs are contained within RIS-1510-PLT, currently issue 6. Whilst compliance to this rail industry standard (RIS) is not a legislative requirement, it is mandated by Network Rail. Each individual machine must be certified by a Plant Assessment Body (PAB) prior to use on the rail infrastructure. This certification is in the form of an Engineering Conformance Certificate (ECC) which remains valid for up to seven years from the date of issue. In addition to the ECC, each type of machine must also be granted Product Acceptance by the Infrastructure Manager. Legislative requirements mandate that the machine is CE marked. RIS-1530-PLT requires that the harmonised standard for RRVs, BS EN 15746-2:2010+A1:2011, is used. Although CE marking is fulfilled by the manufacturer self-certifying the machine, this is also reviewed in part during the PA process.

AEGIS have been an accredited PAB since December 2017 and authorised by Network Rail to undertake PA scrutiny since January 2018.

AEGIS Certification Services (ACS) undertook all of the certification and assurance activities relating to this project. This consisted of Certification in accordance with RIS-1710-PLT, including witnessing of the First of Class testing and ultimately issuing of the Engineering Conformance Certificate (ECC), review of the application for and recommendation to Network Rail for granting of Product Acceptance.

Following the review processes above, AEGIS were able to issue a First of Class ECC and make a recommendation to Network Rail to issue Product Acceptance for the machine type

Human Factors

An important feature of the Rail Ranger is the human – machine interface. The system used is something you would normally see on larger, more expensive machines. All rail gear functions are controlled via the touch buttons on the in-cab display. Additionally, the machine status is displayed in real time, with the system providing diagnostic details and error reports on the machine.
As with larger machines, the rail equipment is deployed hydraulically. This removes the need for manual manipulation and setting of the rail equipment, or the potential to incorrectly set the machine up on track. As a type "9C" low ride machine, the rail wheels provide guidance only for the machine. All tractive and braking effort is provided by the road wheels. The critical road/rail wheel loading is monitored and controlled by the intelligent control system.

The cab provides fixed seating for up to 6 personnel, enabling safe, comfortable transport to site of personnel, with a rear load area for the transportation of small tools.

Machine Testing

To demonstrate the machine meets the requirements of both RIS-1530-PLT and Product Acceptance, the machine was extensively tested at both the FPS workshops at Cwmbran and the Blaenavon heritage railway.

Track testing at Blaenavon focussed on demonstrating the machines towing abilities, braking performance, prevention of derailment and compatibility with required track geometry and features.
Testing included a range of activities in both the laden and unladen condition of the machine. This is to ensure that the most adverse conditions are used for each test scenario.
Although the machine has no working mode, and thus the requirements of the emergency recovery system are greatly simplified, the system was also tested on site to demonstrate it was fit for purpose, enabling the machine to be recovered from rail in the event of machine failure.

Static testing, conducted in a controlled workshop environment, focussed on the critical relationship between rail and road wheel loading. This is particularly important as the mass of the machine changes due to changes in the payload and number of passengers being transported.
Other testing covered DQ/Q over the full range of track conditions, including maximum cant, gradient and track twist, impedance testing of the earth bonds to allow the machine to be used under both live and isolated overhead line equipment, noise emissions and testing of the park brake to simulate holding a fully laden machine on the maximum gradient.

Towing

Machines of this type are often used to tow small trailers to and from the worksite. Typically, these trailers have "single line" park/service brake systems controlled by either hydraulic or pneumatic systems.

To ensure compatibility with as many of the existing and potential new trailers on the rail network, and to comply with the relevant railways standards, this machine is fitted with single line hydraulic and dual line pneumatic trailer brake systems. The machine can therefore be used with all existing trailer types approved for use on the network.
It is envisaged the machine will be used with either bespoke 2 tonne trailers, or the more usual rail trailers found on the network, such as Chieftain, GOS, Rexquote etc.

During testing, the machine successfully demonstrated it met all requirements to enable it to tow trailed loads of up to 10 tonnes.
This towing capacity is significantly more than similar RRV buggies and greater than road rail machines such as Land Rovers and other jeeps.

Electromagnetic Compatibility

As often is the case with RRVs, the base machine may not be able to demonstrate that it meets the requirements of the rail industry in terms of Electromagnetic compatibility (EMC). As the base machines Declaration of conformity did not specify EMC standards with an equivalence to EN 50121-3-1 and EN 50121-3-2, the machine was subjected to full testing by a UKAS accredited test organisation to these standards.

Meeting the requirements of these EMC standards demonstrates that the machine will not adversely affect any railway systems, including the signalling system which it is in the vicinity of. Neither will it be affected by EMC emitted from other systems on the railway infrastructure.

In part, compliance with these standards will enable the machine to be used Any Line Open (ALO).

Structural Verification

Items of On Track Plant (OTP) which are being upgraded after 7 years are usually able to demonstrate their suitability for continued use from their historic service record. Specifically, clause 5.29.1 of RIS-1530-PLT states "written evidence that the stress levels are acceptable through the safety record of machines having a comparable design with the same or greater wheel loadings. It shall; be based on a minimum of 1000 hours of normal operation"
As this is a newly designed and built machine, compliance to this clause could not be demonstrated. Therefore, to provide "Evidence by calculation and / or measurement that the stress levels are acceptable for a minimum of 5000 hours normal operation….", extensive Finite Element Analysis (FEA) of the rail equipment was undertaken by FPS and provided to AEGIS.
This evidence was used to successfully demonstrate the suitability of the structure of the rail conversion.
The exercise was also used as a final year project for an AEGIS student studying for their Mechanical Engineering degree. Upon completion of the course, the student was awarded a first-class honours degree.

Whilst FPS are contracted to maintain many OTP's in the UK, they utilised their specialist knowledge in this area to optimise the maintenance requirements for the machines.

Following the review processes above, AEGIS were able to issue a First of Class ECC and make a recommendation to Network Rail to issue Product Acceptance for the machine type.

AEGIS

The sister company to ACS, AEGIS Engineering Systems Ltd (AES) also provided support activities to Fitzgerald Plant Services, providing impartial guidance in the process.

The collaboration also resulted in an ideal opportunity for an AEGIS undergraduate to combine this work with her final year project for her degree in Mechanical Engineering, where she attained a first class honours degree.

We're very excited to reveal Test and Automation as our latest service offering! We have been supporting leading rolling stock companies in this field of work, carrying out multiple levels of verification and validation of train fleets across their development, testing and homologation cycles.

We have established this new line of business to support our existing customers as well as to cater to the future needs of the UK rail industry, where we are see a rising demand for digital transformation skills to make smarter and more intelligent trains and infrastructure solutions.

In line with Network Rail's "Digital Railway Transformation" strategy, we are gearing up our capabilities and capacity in this new sector, focusing on Next Generation, Smart, Digital Transformation solutions for Rail. Our aim is to be future-proof in new skills which are permeating the rail industry from automotive and other sectors, to enhance safety, reliability and operational efficiencies for all key players involved in the design, production, validation, operation and maintenance of the rolling stock and infrastructure solutions. Skills like modelling, simulation, virtualisation and automation are no longer alien to modern rail industry professionals.

Test Early, Test End-to-End and Automate!

We believe in the age-old maxim, if you build it right, then it works right the first time!
The key is to integrate the top level inputs to the subsequent phases of design and development, and ensure that at each development phase, there is a cumulative testing element that reduces overall test efforts down the stream, and more importantly, de-risks the programme and end goals.
With the emphasis on getting things right in the early stages of design and development, we are focused on offering not only conventional "Testing" as a service, but also to give support early. We help our customers in performing Verification and Validation (V&V) across all phases of the product life cycle – from concept phase to operational maintenance – providing an end-to-end whole product life cycle "Test and Automation" support.

Modelling and Simulation are here to stay

We offer automated validation of requirements via modelling and simulation tools, to provide a base for generation of test input vectors based on the modelled simulations of the functionality, during the validation phase of the development cycles. Modelling requirements and generating functional models enables key stakeholders to explore, evaluate and ensure what they are "building" is the right functionality.
Once there are functional models, it is very efficient to generate test input vectors to drive the automated testing of the functionality. This can be achieved by using standard industry tool chains like MATLAB, Simulink which execute the functional models and provide the generated input test vectors and validate the implemented solution. This two-level verification and validation ensure the right things are being built and what is built is working as desired.
The automotive industry has realised huge cost savings and achieved a step-change in efficiencies by deploying these digital, smart design, verification, and validation methodologies over the past decade. We are aware that a lot of experimentation is already happening in the rail world to explore how these can be adopted with minimal disruption to existing ways of working. The rail industry is poised to embrace these proven techniques and methods and AEGIS is ready to help our customers implement these digital, software-based verification and validation techniques.

Integrated Automation across life cycle

One of the key aspects is the system / software lifecycle development tool chains, and we offer specialist consultancy in automation and integration across life cycle development tool chains, to enable seamless traceability and flow of evidence across the entire product development life cycle. Apart from the basic benefit of having traceability to prove things, our automation solutions offer much needed efficiencies in the most crucial phases of the development - authorisation and homologation, where the documentation is all automated for the numerous modification cycles.

On Cloud Nine...

We also offer innovative solutions for enabling scalable, cloud based automated test platforms. We can put physical test labs on the cloud, with obvious benefits of scalability, access from anywhere, and create clones with different configurations to provide more volume of automated testing across various configurations of the products and so de-risk the end goal.

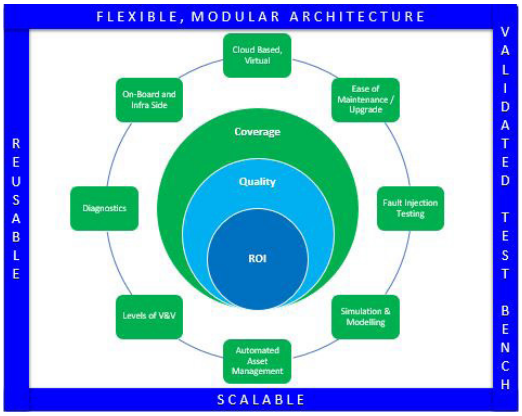


Figure 1-AEGIS Cloud Based Automated Test Platform Features

With a modular, flexible architecture, the test platform can cover a wide array of functionalities and the simulated components can mimic any product, system or sub-system used within the operational scope of the entire rail industry (both on-board rolling stock and infrastructure side). The multiple levels of V&V can be repeated as and when required to enhance coverage, quality and ROI. Fault injection tests and automated asset monitoring and management can also be included to test for anomalous

behaviour, and there is scope to integrate with other AI based, machine learning systems as well.
AEGIS Certification Systems –our independent certification company – can certify and validate this cloud-based test platform to enable formal validation. The return on investment from having a cloud-based, scalable test platform is a no brainer!

Since January 2020, our Test & Automation team has been busy supporting key customers for on-train static and dynamic testing. Our teams carry out the functional and performance tests on trains and bespoke test infrastructure. We also support our customers in end-to-end product development life cycle V&V by

- Carrying out verification reviews of functional and performance requirements to ensure their testability and traceability
- Support in definition of test specifications as per functional requirements
- Performing Testing and drafting formal test reports to support vehicle homologation
- Triaging of defects found during testing and producing KPIs for test productivity and vehicle functional maturity aspects
- Support in commissioning of new build vehicles
- Analyse functional change requests for their impact on regression testing and test documentation
- Identifying and resolving bottlenecks by process improvements to enhance operational efficiencies

Gopalakrishnan Sivaswamy – Head of Test and Automation Sector

Gopal joined AEGIS in October 2019 as a Principal Engineer. He has 21 years of cutting-edge embedded software industry experience, across multiple domains, including Telecommunications, Broadcast, Healthcare and Rolling Stock product design, development, validation, assurance, and authorisation. He is now our Sector Head for Test & Automation. He also has a wide range of consultancy experience spanning process engineering, continuous improvement, operational excellence, governance, and delivery models, across the entire product life cycle. He enjoys identifying and unblocking delivery bottlenecks and helping customers to achieve their key business goals by providing bespoke value propositions.

Matthew Topley – Senior Engineer

Matt is a Senior Electrical Engineer and has 10 years of railway experience. He has detailed knowledge of UK rolling stock, including train borne electrical and electronic systems, modification design and installation management, commissioning of new rail vehicles and the application of rail standards for assurance. He also has significant experience in standalone and rail vehicle testing, fault finding and the repair of the associated electronic and electrical systems. Matt is managing our train functional testing and diagnostics work stream.

Arunlal Nair - Senior Engineer

See photo of Arunlal in the recruitment section

Arunlal has recently joined the Test and Automation team, Within this newly formed team, Arunlal supports the requirements management for new / changed requirements against Functional Change Control Board (FCCB) recommendations and guidelines, performs impact assessment and flows down the requirements to lower level building blocks / sub-systems.
He also provides support for the functional architecture aspects for the vehicle verification and validation activities for functional testing of vehicles.

Robert Martin - Senior Engineer

See photo of Rob in the recruitment section

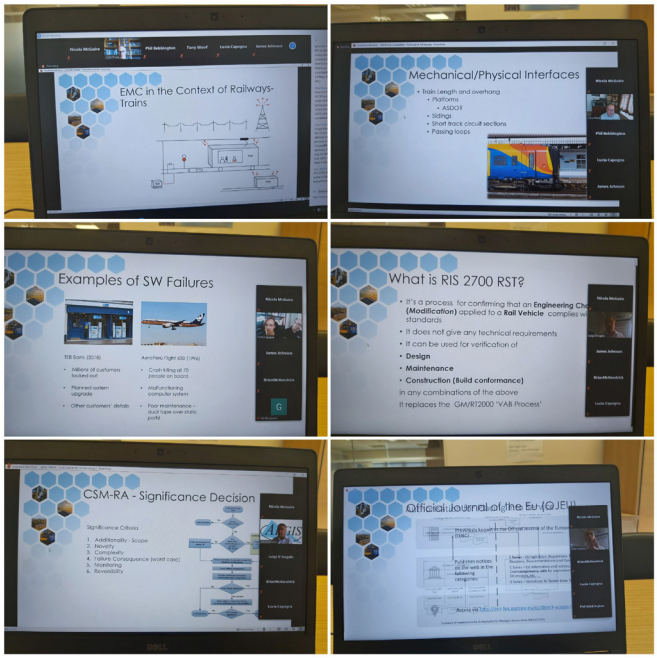
Rob has also recently joined the team. He is working on the Aventra Functional Testing Support project for Bombardier. Rob is leading our on-train Network and Dynamic testing work stream.

Apart from the team mentioned above, there are about 20 AEGIS Associates who support our various projects.

Rail Market Approvals Demystified – Webinar

RSN 2020 was due to take place in early September but became another casualty of the Coronavirus pandemic. Happily, it will return as RSN 2021 and will be held at Derby Arena on 1st July next year.

AEGIS had planned to host the "Rail Market Approvals Demystified" seminar during this event but instead adapted to the new way of working and hosted it as an online webinar instead.



The series of presentations on topics such as Interoperability, Safety, Engineering Changes, Cyber Security, Software Assurance and RAMS, Compatibility and EMC were delivered by our in-house experts. They explained the key approvals requirements, the route to satisfying those requirements and our own approach to providing the services that progress railway approvals to a successful conclusion. We answered some fantastic questions from our 50+ participants during the Q&A sections and received lots of positive feedback from those who took part on the day.

The webinar was a high-level, taster of a few of the many training courses that we can deliver.

The extent of the engineering expertise of our team in technical subjects across the rail environment means AEGIS is perfectly placed to offer a wide range of training courses to the rail industry

Visit our web page for more information https://aegisengineering.co.uk/training-courses/

Women in Rail Annual Awards - Shortlisted

We were delighted to have been shortlisted in two of the eight award categories at the Women in Rail Awards due to take place on 22nd September at the Roundhouse in Camden, London now postponed until May 2021.

The Women in Rail Awards aim to showcase and reward individuals and companies (large and small) who have made a significant contribution to improving gender balance, diversity and inclusion in the UK railway industry in the year.

AEGIS was shortlisted in the Top Employer Award category and our Development Director Chris Hoare was shortlisted in the Inspirational Man of the Year Award category. We were delighted and honoured that judges recognised AEGIS as "Highly Commended" in the Top Employer Award category. Next year we will aim to go one better!

The Three Peaks Challenge - AEGIS Peaky Climbers

As mentioned in previous issues, AEGIS has entered a team into the Porterbrook Three Peaks Challenge by Rail. Due to the current virus outbreak, this event has now been postponed for the second time and will now take place 6-8th May 2021. The team "AEGIS Peaky Climbers together with everyone at AEGIS, have pledged to raise £3500 for the Railway Children charity. At time of printing we have raised 78% of our target, so not too far to go now! To sponsor the team please visit

https://uk.virginmoneygiving.com/Team/AEGISPeakyClimbers1

All donations gratefully received.

RECRUITMENT

Arunlal Nair

Arunlal has joined us as a Senior Engineer, he has 9 years of engineering experience within the aerospace industry, previously working for Quest Global at Rolls Royce. Arunlal has hands-on systems engineering experience, including requirements management and project management. He joins our newly developed Test and Automation team and will be responsible for planning and tracking the vehicle functional baseline releases and associated functional change requests for various on-board sub-systems.

Rob Martin

Rob is a Senior Engineer and has extensive maintenance experience gained within the Aviation, Automotive and Rail industries. Rob previously worked as the 15X Fleet Engineer at East Midlands Railways and most recently within the Rolling Stock team at Ricardo Rail. He undertook a mechanical based apprenticeship and has electrical and electronic qualifications and plentiful all-round systems knowledge.

Barry Allan

Barry is Principal Engineer and railway safety specialist who has broad experience of technical risk management as applied to diverse railway subsystems, including rolling stock, command control and signalling systems (CBTC, ETCS, Class B systems) and trackside signalling (interlocking). Barry started in the railway on the graduate training scheme run by Interfleet (now SNC-Lavalin) and his first appointment was within the safety and assurance team, coordinating NoBo/DeBo submissions, as well as performing risk assessments, using techniques such as HAZID, HAZOP, FTA. He then joined Lloyd's Register (now Ricardo Rail) as an Independent Safety Assessor.

Barry joins us from the safety and certification team of Stadler Valencia, where he has been responsible for the application of the Common Safety Method for locomotives, metros and light rail vehicles destined for operation in several European countries, including the UK (Class 88 locomotives, Sheffield TramTrain, Class 777 metro vehicles, Cardiff TramTrain).

Claire Nicklin

Claire has been working with AEGIS on an HR consultancy basis for over the last 3 years and has now joined us as now as a HR Manager. Over the course of the last year, Claire has worked on a number of policies and procedures, from Maternity to Ill Health Capability to ensure that AEGIS has the backbone required for effective Human Resources management. She has also partnered on more strategic HR projects such as Health and Wellbeing and Employee Engagement. Most recently, AEGIS has tapped into Claire's railway health and safety experience to assist the formulation of on-site working Risk Assessments and Processes.

Claire has over 25 years strategic and operational HR management experience, including previously in the rail industry, and has worked as a consultant in numerous industry sectors over the last 9 years. She brings that wealth of HR and business management knowledge into the AEGIS team.

Future objectives for Claire will be to continue to build a progressive HR function that upholds the core values and promotes AEGIS as the positive choice for employees

Jeanette Traynor

Jeanette has joined us a HSQE Manager. She is a Safety, Quality and Compliance Manager with 29 year's experience in the rail industry.

She joins us from East Midlands Railway where she has worked in various roles over the last 18 years most recently as QHSE Manager. She is a qualified BSI Lead Auditor and Internal Auditor, has a NEBOSH General Certificate and is a Tech IOSH Member. She is experienced in the management of health and safety, risk management, competence management and development and quality and safety management systems.

Within her role Jeanette is responsible for ensuring compliance to H&S legal obligations, she is accountable for our Quality Procedures and Accreditations, she leads our supplier assessment process and will support our HR Manager Claire Nicklin to ensure that HSQ competency requirements of our team are met and we actively manage their safety and personal welfare.

Alvaro Gil Gonzalez

Alvaro has joined us as Senior Engineer. He has 8 years' experience in project safety management and assessment.

He is an Industrial Engineer having previously worked as Safety Engineer and Assessor for various railway companies in his home country Spain including Bombardier RCS South Europe Division based in Madrid and also working for Siemens Mobility UK where he worked as a RAMS Engineer. He has extensive experience working in safety management of projects and also as a safety assessor according to CENELEC standards EN50126, EN50128, EN50129 and CSM-RA.

Alvaro will be working with the BT Safety RAMS team and as safety assessor for certification assessment projects having previously worked as Safety Engineer and Assessor for various railway companies in his home country Spain including Bombardier RCS South Europe Division based in Madrid and also working for Siemens Mobility UK where he worked as a RAMS Engineer. He has extensive experience working in safety management of projects and also as a safety assessor according to CENELEC standards EN50126, EN50128, EN50129 and CSM-RA. Alvaro will be working with the BT Safety RAMS team and as safety assessor for certification assessment projects.

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