

Institute of Rail Welding 20th Technical Seminar

Part 1 - Strategic Aspects of Rail Welding

The IoRW's seminar at the BOC site in Wolverhampton on 15th November 2011 was divided into two areas - strategic matters and developments in ultrasonic testing of rails and rail welds. We report in this issue on the strategic aspects and the UT testing presentations will be reported in the first issue of 2012.



Mick Downing

The day, chaired by Mick Downing of Sky Blue Welding, began with a presentation about the **National Skills Academy for Rail Engineering (NSARE)**, delivered by Chief Executive, Gil Howarth.

Gil described the current setting for NSARE, referring to an initial industry plan drawn up last October by Network Rail, ATOC, RFOA and RIA. It emphasises key issues relevant to the training requirements of the rail industry, including the continually increasing demand for rail services of all kinds, the very large planned programmes of investment and renewal, and the significant efficiency savings that are being demanded.

It concludes that the existing workforce needs to be significantly re-skilled, 30% more professionals will be needed over the next five years and the number of apprenticeships offered annually will need to double.

Challenges include the large transient workforce, the large number of independent private sector training organisations and a lack of interest in the industry on the part of universities and colleges.

NSARE has pan-industry support. The Government first announced its formation in November 2010, NSARE Ltd was formally incorporated this January and was open for business by February. It was awarded its first major concession, from Network Rail, in September 2011.

It is supported mainly by Government grant, with additional support from the Lloyd's Register Educational Trust, but is remitted to become totally self-sustaining in 2013. Its Board is currently chaired by Terry Morgan of CrossRail and has members drawn from all parts of the industry.

NSARE covers all engineers in the industry, from school leavers to PhDs, working with

bodies like the Infrastructure Policy Group, the Traction and Rolling Stock (T&RS) Policy Group and external bodies such as the National Apprenticeship Service and the Professional Institutions' Policy Group. It is drawing up and agreeing consistent national standards and qualifications for all engineering roles in the industry and working to create a unified industry training accreditation scheme.

NSARE has a website portal, supported by a core IT system that incorporates a common reference library. The latter will hold all relevant information about rail engineering training and qualifications for all



Gil Howarth

companies and all individual rail engineers and technicians. Eventually all engineering personnel will have their own skills passport covering all aspects of their education, training and development, which will be totally portable around the industry. The aspiration is to have all this accessible through mobile devices.

The Academy is working in schools, to raise the profile of the industry with pupils and teachers. Gil invited businesses to join the 80 companies that are already members of the Academy. This entails payment of a one-off fee which is only £250 for smaller businesses and £1000 for large ones.

Roger Griffiths of **Network Rail** spoke about his company's **Innovation Strategy**. Innovation matters for the obvious reasons, such as the demands of the ORR and McNulty, and because there is an industry resource shortfall. Network Rail recognised a need to clarify and simplify its approach to innovation to maximise the benefits to be gained from its own people and its suppliers.

The innovation process focuses on the needs of the company's customers, following the

sequence 'Think-Explore-Prove-Do' before checking 'Did we deliver?'

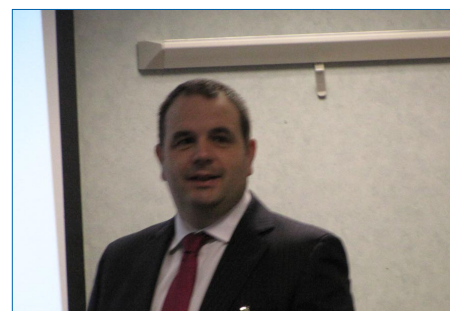
Setting the strategic agenda are four Innovation Portfolio Groups. Each covers a specific area of the business and controls the innovation process. The company has embarked upon a process of targeted engagement with its own staff through 'iStorm' a special area of the in-house intranet. This is intended to link together people and groups with common interests and ideas.

A specific section of the company website is designed to engage with suppliers and steer their innovative activities. This offers guidance about the company's needs and allows people to submit innovative proposals.

Network Rail has four strategic research centres, set up in collaboration with Sheffield University, the University of Nottingham, Birmingham University and Imperial College.

Annual research showcases, the most recent held at Sheffield University on 5th October this year, show the progress being achieved.

The website currently holds 19 open challenges to innovation, and has received over 250 supplier submissions. Projects adopted to date have shown high rates of return.



Roger Griffiths

Roger gave some examples of the innovations to date:

- iP65 weld repair of tri-metal zone of cast crossings
- iP20 concrete cable management sleeper (for 3rd rail lines)
- iP75 LED replacement lamps for conventional signal heads
- iP43/45/47 efficient OLE construction

Institute of Rail Welding 20th Technical Seminar - continued

Third up was another Network Rail speaker; Sean Heslop. He spoke about **Network Rail deployment strategy for flash-butt welding**. This aims to make mobile flash-butt welding (MFBW) the preferred site welding methodology for Network Rail's infrastructure.



Sean Heslop

Sean described the history of MFBW; how early machines had limited mobility and could not stress the rail; how choice of weld method was based solely upon welding cost and how major concerns about possible damage to the infrastructure, in particular electrical damage to S&T systems, inhibited full application.

The imperative to reduce significantly the time taken for rail defect replacement drove the need to re-examine the situation. Recently introduced methods, eg repair welding of certain defects, were good, but more needed to be achieved.

A big change was the introduction of MFBW machines that could stress the rail. Network Rail got seriously involved with developments around the time that this happened. The possibility of infrastructure damage was tackled by appropriate research work and the development of standards and specifications for machines and methods that prevented any risk.

An acceptance procedure was developed for stressed FB welds and trials were instigated for welding heads. Work was done on how best to use MFBW, on improving mobility of the machines and on reducing the costs of welds. A particular driver of higher costs was the cost of moving the machines between sites, which could amount to 25% of the shift cost.

Network Rail MFBW was developed; a package including working practices, performance specification and crew specification and competences. The objective was to be able to go into a site, replace a section of defective rail, stress the rail and get

off site again within two hours. This obviously also had to be cost effective. Sean described the challenges that had to be met by the project, including obtaining the funds needed and convincing the sponsors that the project was a winner.

The outcome was an order for four machines with the option for six more later. Ten machines would cover 30% of Network Rail's welding needs.

The specification is for the welding head to pull up to 400mm, with external tensors to take this to 1000mm, while welding rails with a depth differential up to 3mm.

The strategy is to employ the welding machines based upon business need, each within a given geographic area (rather than on a route or asset basis). This was shown to be the best way to reduce time lost in travel between sites. One machine is to be brought into service at a time, with two dedicated teams for each.

Provision of MFBW services will be managed by a dedicated in-house organisation. This was agreed after detailed review of the alternatives concluded that this was the best option.

The first MFBW is due in service in March 2012, with the other three following sequentially. If these are a success, others may be purchased under the option in the contract.

The fourth speaker was Tamas Sandor of ESAB, with **Resurfacing tram rails by arc welding without pre-heat**. Tamas explained tram rails need to be welded without pre-heating because the rails are normally embedded. The embedment materials cannot



Tamas Sandor

safely be exposed to pre-heating temperatures and the possession times available on tramways are too short to permit digging out and restoration of the embedment material.

Rails are almost always basic grade, susceptible to the development of brittle

martensite if welded without pre-heating and without controlled cooling.

The ESAB concept was to use the heat generated by the weld deposition process itself to control the martensite formation. If a sidewear scar was repaired by applying several passes of weld deposition, it is possible that the heat of the second and subsequent passes of the welder would anneal the metal effectively enough to prevent significant risk



Gauge corner restoration welding equipment

of brittle fracture in service.

Tamas described the theoretical development of this concept into a practical methodology, showing how it had been modelled and subjected to practical trials. This showed it is crucial to use the correct number of passes and the right cycle times. These parameters vary depending upon where on the rail the repair is to be made; gauge corner repairs need different treatment from repairs on the top of the head. ESAB have determined the correct parameters for various repairs and proven the effectiveness of the technique.

An automated flux cored welding head mounted in a rail-borne tractor unit is used. The total unit weight is 20kg, making it reasonably portable. It will apply weld bead at 60cm/min, though the time needed to complete a repair clearly depends upon how long it is and how many passes are required. Rail grinding to the correct profile also needs to be carried out after welding of course.

At the end of the seminar, the Chairman thanked the hosts, BOC, for their excellent hospitality and for making workshop space available for the demonstrations. This blend of formal presentations and informal workshop demonstrations has become an attractive feature of IoRW seminars held at BOC.

The above is an extract of an article by Chris Parker which will appear in 'The Rail Engineer'. This journal can be obtained free by any engineers working in the rail sector. Email: tre.subs@railstaff.co.uk www.therailengineer.co.uk

Agency Worker Regulations 2011

On 1 October 2011 the Agency Worker Regulations 2011 came into force.

Who does it cover?

The Regulations cover agency workers who are working under contract of employment or service with an agency. Workers directly recruited by employers will not be covered.

What will happen?

Agency workers who are supplied by an agency will be entitled to the same use of collective facilities and also the same 'basic working and employment conditions' as a comparable employee who is employed by the employer. The agency worker will be entitled to:

- use the hirer's collective facilities, such as canteens, childcare and transport
- the same rate of pay
- the same rest periods and breaks
- the same annual leave

When does the agency worker acquire these rights?

The right to access collective facilities exists from day one but the right to the same 'basic working and employment conditions' only arises after 12 continuous calendar weeks. The regulations do allow for breaks for certain reasons to be counted as part of continuous service. Specific reasons include illness, jury service or holiday. In addition maternity, paternity and adoption leave are also counted for the purposes of calculating continuity.

Anti-avoidance provisions

The regulations have anti-avoidance provisions which prevent employers from trying to avoid the provisions by, for example, moving the agency worker from job to job or between associated employers to try and prevent them from achieving the 12 weeks qualifying period. If an employer is found guilty of this, they could be liable to pay the agency worker up to £5,000 in compensation in addition to any compensation an Employment Tribunal awards to cover back pay.

Is there anything which the regulations do not cover?

The regulations do not give agency workers the right to unfair dismissal, nor do they allow the agency worker to seek parity of other terms, including occupational sick pay, retirement benefits, redundancy payments, payment for family friendly leave or certain bonuses.



Awards for IoRW Members

Two members of the IoRW Management Committee recently received prestigious awards from the Permanent Way Institution.

John Oates, Babcock Rail, received the Institution Gold Award for his article: 'A mobile flash but welding perspective on the Sterling-Alloa-Kincardine project'.



John Oates

Bill Mosley, Network Rail, received the Arthur Maber Award for his article: 'Recent developments in track welding'. Congratulations to John and Bill!



Bill Mosley



WELDING LINES

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Designed by: Jenny May

Printed and published by TWI Ltd, Granta Park, Great Abington, Cambridge, CB21 6AL, UK

Telephone +44 (0)1223 899000

Facsimile +44 (0)1223 894219

E-mail: iorw@twi.co.uk

Website: www.iorw.org

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