



MARKET IMPACT EVALUATION

ERRAC was set up in 2001 and is the single European body with the competence and capability to help revitalise the European rail sector :

- To make it more competitive
- To foster increased innovation
- To guide research efforts at the European level

ERRAC Project Evaluation Working Group (EWG)

Objectives:

- Determine the market impact of previous rail research to improve use of research funding
- Ensure a strategic approach to the prioritisation of rail research

Project Evaluation

- Individual projects are evaluated after they have been completed to ensure successful dissemination of project results
- To ensure that the results of previous rail research can be taken into account for future projects
- To avoid weak market uptake of results by learning the lessons of previous research
- The EWG will provide intelligence based on the project evaluations for input into future European Framework Programmes



ERRAC Project Evaluation Group

ALJOIN PLUS

EVALUATION FROM MAY 2008

Project acronym:	ALJOIN PLUS	
Funded by:	UK Railway Safety & Standards Board (RSSB) with contribution from Bombardier Transportation	
FP:	N/A	
Programme acronym:	N/A	
Project Reference:	N/A	
Call identifier:	N/A	<input type="checkbox"/> Presented by: M. Robinson
Total Cost:	£ 45,000	<input type="checkbox"/> Date evaluation: 28.05.08
EU Contribution:	N/A	<input type="checkbox"/> Market uptake: Strong
Timescale:	October 2002 - September 2005	<input type="checkbox"/> Follow up projects: None
Project Coordinator:	George Kotsikos (NewRail)	<input type="checkbox"/> Other related Projects: ALJOIN
Web references:	None	



ALJOIN PLUS

Rationale:

ALJOIN PLUS was commissioned as additional work to the European collaborative project ALJOIN, developed under the aegis of Competitive and Sustainable Growth, one of the four thematic programmes of the Fifth RTD Framework Programme (1998-2002) which was set up with the aim of improving the crashworthiness of future designs of rail vehicles.

ALJOIN PLUS was commissioned to provide the necessary information to create a benchmark for joints in aluminium rail vehicles against which improvements in joint design are measured and was funded by the UK Railway Safety & Standards Board (RSSB) with contribution from Bombardier Transportation.

ALJOIN PLUS: Background

Main Objective:

- The main objective of ALJOIN PLUS was to provide the necessary information to create a benchmark for joints in aluminium rail vehicles against which improvements in joint design are measured.
- Other secondary objectives included:
 - ✓ To assess the effect of welding parameters on the failure of joints observed in the Ladbroke Grove rail accident
 - ✓ To assess the influence of joint geometry on the weld failures observed in the Ladbroke Grove rail accident
 - ✓ Explain the failure mechanisms of the aluminium welded joints during the Ladbroke Grove rail accident.



ALJOIN PLUS: Background

Details

- **Project Reference**
- **Total Cost: 45,000 UK POUNDS STERLING**
- **EU Contribution: N/A**
- **Timescale: 01.10.'02- 31.09.'05**
- **Project Coordinator: Dr. George Kotsikos**

Partners

- **NEWRAIL – The University of Newcastle**
- **Railway Safety & Standards Board (RSSB) - UK**
- **BOMBARDIER TRANSPORTATION LTD**



ALJOIN PLUS: Background

Partners interviewed:

<u>Organisation</u>	<u>Name of interviewee</u>	<u>Country</u>
➤ NewRail – Newcastle University	<input checked="" type="checkbox"/> G. Kotsikos	UK
➤ Bomabardier Transportation	<input checked="" type="checkbox"/> M. Roe	F
➤ Railway Safety & Standards Board	<input checked="" type="checkbox"/> R. Ford	UK

ALJOIN PLUS: Background

Project description:

1. The research during ALJOIN PLUS has examined the welding regime and joint geometries from the rail vehicles that were involved in the Ladbroke Grove accident and performed tests on samples extracted from these vehicles to assess their dynamic fracture behaviour.
2. The results from ALJOIN PLUS were compared with data from aluminium welds prepared using Al-Mg filler wire in extruded sections, studied under the ALJOIN project. This has demonstrated that using this filler wire results in an improvement of the tearing resistance of the joints.
3. The results from ALJOIN PLUS also show that the weld unzipping observed in the rail vehicles during the Ladbroke Grove accident is more dependent on the weld strength undermatching rather than the tearing resistance of the weld material.

ALJOIN PLUS: Background

Achievements:

- **Material testing techniques**

A technique based on the energy dissipation rate approach, using relatively small centre cracked tension (CCT) specimens (150mm wide), has been developed. This allows for the use of small sections of plate from the actual rail vehicles involved in the collision to be used.



ALJOIN PLUS: Evaluation

1. Were the results implemented in the design of the new products and services? Were these new products/services put into commercial operation
 - **Yes, the output from ALJOIN PLUS has demonstrated the importance of joint geometry in suppressing weld unzipping. The project contributed to the output of the FP5 -ALJOIN project culminating in recommendations to European Norms for aluminium rail vehicle welded joints.**

2. Is new legislation and standardization based on findings from this research project
 - **Yes, the output from ALJOIN PLUS has contributed to additions in EN 15085 "Railway applications - Welding of railway vehicles and components" Part 3, Annex H and EN 15227, the draft standard for Crashworthiness of Rail Vehicle Bodies**

3. Are the results of the project implemented across Europe or only in a small number of Member States
 - **The results will be implemented across Europe.**

ALJOIN PLUS: Evaluation

4. Are the results of the project implemented outside Europe before being accepted in Europe
 - **It is not known at the moment but interest has been shown by Japanese aluminium industry.**

5. Did the projects increase competitiveness of the European railway sector abroad with regard to products, services, standards and system design
 - **Yes, implementation of the recommendations from this project have enhanced the crashworthiness of new rail vehicles produced in the EU and consequently improved the safety of passengers using rail transport.**

6. Did the project increase competitiveness of the railway transportation compared to other transport modes
 - **Yes, the railways are one of the safest modes of surface transport and this project has contributed towards enhancing its safety record.**

7. Are the results of the project taken into consideration when preparing public tenders
 - **Yes**

ALJOIN PLUS : Evaluation

8. Does the implementation of the project results help facilitate cross-border operations by problem-solving in the domain of interoperability
– **No**

9. Does the implementation of the project results help facilitate inter-modal operations by problem-solving in the domain of inter-modality
– **No**

10. Can benefits be assessed in financial terms
– **No information available**

11. Applicability of results to future scenarios
– **Yes,**

12. Usefulness of research procedures for future projects (incl. modeling)
- **Yes the use of small specimens to assess dynamic fracture of welds is advantageous since for such types of work large specimens are normally used (1metre wide panels)**

ALJOIN PLUS : Reasons for outcome

- ✓ ALJOIN PLUS has produced a benchmark of joints in aluminium rail vehicles against which improvements in joint design are measured.
- ✓ The project analysed in detail existing joint designs found on the class 165 DMU involved in the Ladbroke Grove accident, and characterised them in terms of their mechanical properties and their geometries.
- ✓ The project has also provided the RSSB with the likely reasons for the weld unzipping of the welded joints observed in the Ladbroke Grove accident.
- ✓ ALJOIN PLUS has also provide input to the FP5 project ALJOIN by contributing towards the development of improved joint geometries to suppress weld unzipping failures.