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
European Rail Research Advisory Council

ERRAC Project Evaluation Group

SUPERTRACK

EVALUATION FROM JANUARY 2008

---

Project acronym: SUPERTRACK
FP: 5
Programme acronym: GROWTH: Competitive and sustainable growth
Project Reference: G1RD-CT-2002-00777
Call identifier: FP5-GROWTH
Total Cost: € 2,745,149
EU Contribution: € 1,458,348
Timescale: July 2002 - September 2005
Project Coordinator: Philippe Renard (SNCF)
Web references: http://www.supertrack.no/

- Presented by: C. Cheron
- Date evaluation: 24.01.08
- Market uptake: Medium
- Follow up projects: INNOTRACK
- Other related Projects: EUROBALT 1 & 2
ERRAC Project Evaluation Group

SUPERTRACK
Sustained performance of Railway Tracks
www.supertrack.no
PROJECT NAME: Background

Objectives
The main objectives of the project can broadly be described as

- Enhancement of the performance of ballasted tracks, hence reduction of maintenance, by better understanding the geomechanical behaviour of elements of the embankment and subgrade as well as the dynamic behaviour of the complete embankment-ground-train system,
- Assessment of performance of various track retrofitting methods for the selected segments of two railway lines which have been subjected to excessive deformation and settlement.

To achieve these objectives the following activities are undertaken

- Measurement of track and ground responses at several problematic sites with regards to settlement and maintenance
- Characterisation and modelling of the behaviour of soil and ballast using large-size specimens
- Laboratory testing of track using a large-scale track-box facility
- Advanced numerical modelling of non-linear dynamic behaviour of embankment and ground accounting for train-track interaction
- Assessment of traditional and innovative methods of retrofitting track, embankment and sub-grade
SUPERTRACK: Background

Details

- FP5
- Total Cost: 2 745 149 EUR
- EU Contribution: 1 458 348 EUR
- Period: 01/07/2002 to 30/09/2005
- Scientific Coordinator: Dr. Amir M. Kaynia (NGI)

Partners

- Norwegian Geotechnical Institute (NGI) - Amir M. Kaynia
- Société Nationale des Chemins de Fer (SNCF) Laurent Schmitt
- Administrador de Infraestructuras Ferroviarias (ADIF) Antonio Lozano
- Géodynamique et Structure (GDS) Alain Pecker
- Centro de Estudios y Experimentacion de Obras Publicas (CEDEX) Vicente Cuéllar
- Ecole Centrale de Paris (ECP) Didier Clouteau
- Linköping University (LU) Tore Dahlberg
- Swedish National Rail Administration (BV) Eric Berggren
SUPERTRACK: Background

Links to other Projects:
• EUROBALT 1 an 2

Follow-up Projects
• INNOTRACK with the main partners. It is admitted that Innotrack emerged out of Supertrack.
SUPERTRACK: Results (1)

Project Conclusions:

- Measurements, testing and numerical simulations in this study have shown that an important factor contributing to track deterioration is the non-homogeneity along the track. The non-homogeneity, which can be measured through the variation of track stiffness, can arise due to a rapid variation of track structure, for example at the junction of a bridge or transition from a shallow to a deep embankment, or as a result of insufficient track compaction leading to loose or hanging sleepers.
SUPERTRACK: Results (2)

- This research has **vividly shown** that **proper design/construction of a line** with **due consideration** for **track homogeneity** ensures a **healthy track** with **minimum maintenance** and **sustained satisfactory performance**.

- General view of embankment at transition to viaduct
- General view of working platform for grouting operation
SUPERTRACK: Results (3)

Achievements

• **Cyclic tri-axial tests on large scale samples at NGI and medium-scale samples at CEDEX**
  They represent major developments in material testing. Very few tests of comparable size, quality and detail have been performed in the world. The results of these will be used in the future to calibrate the constitutive models for granular material.

• **Construction of the track box facility**
  It is one of the biggest of its kind in the world, is a major contribution of this project to the future research on railway track. This state-of-the-art facility provides the opportunity to examine the behaviour of fullscale tracks under repeated train loading and under controlled environmental conditions. The construction of the track box was heavily financed by external sources provided by ADIF in Spain. This is considered an added value of the project to the European Community.

• **Numerical models for simulation of non-linearities and non-homogeneities in the track and their effects on the long-term response of the track**
  They represent state-of-the-art researches in this field. There are hardly any solutions in the market that can compete with these models in terms of detail and scale of analysis. These studies will motivate the university partners to educate new doctoral students, create post-doc opportunities and generate new research projects for their institutions.

• **Measurements at the test sites**
  They were made with state-of-the-art sensors and instrumentation set-ups. The collected data, which have extremely high quality, will provide valuable databases for future research and calibration of numerical tools by the research community. Moreover, the experiences gained in these studies will help streamline future measurements and improve their qualities.

• **Innovative grouting technique**
  It has been implemented successfully at a site in Spain is a valuable contribution of this project to the state of practice. The main advantage of this method is that it does not require interruption of train traffic; therefore, it can potentially represent a cost-effective retrofitting method. Besides the railway industry, the method has applications in the construction industry. Manufacturing of new machines, grouting equipment, and other related machinery are potential economic spin-offs of this work.
SUPERTRACK: Evaluation criteria

1. Were the results implemented in the design of the new products and services? Were these new products/services put into commercial operation – yes for some of them (CEDEX Track Box and grouting methods)

2. Is new legislation and standardization based on findings from this research project – Update of the UIC leaflet 719 “Earthworks and trackbed construction for railway lines”

3. Are the results of the project implemented across Europe or only in a small number of Member States – A little number

4. Are the results of the project implemented outside Europe before being accepted in Europe – No

5. Did the projects increase competitiveness of the European railway sector abroad with regard to products, services, standards and system design – It was not the objective

6. Did the project increase competitiveness of the railway transportation compared to other transport modes – Indirectly yes

7. Are the results of the project taken into consideration when preparing public tenders – A priori no

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 – Yes (cf. Cost-benefit analysis)

11. Applicability of results to future scenarios – Yes

12. Usefulness of research procedures for future projects (incl. modelling) – Yes
SUPERTRACK: Reasons for outcome

- The objective of increasing knowledge, understanding of the problem and potential solution have been achieved.
- No evidence of direct uptake in the short term in terms of change maintenance practice.
- SNCF and ADIF have used the test box in order to increase the scientific knowledge and it has been reused.
SUPERTRACK: Lessons learnt

• This project was setup in order to increase the knowledge and it achieved the target.
• If the object is to increase the knowledge it has to be made clear and not hided trying to find practical implementation
• Innotrack uptake the knowledge developed in this project