

Tender No *TREN/E2/26-2002*

Contract No *ETU/B27040B/E2/S07.18570/2002*

Inventory of railway test installations in Europe and detection of synergies
between them. Their implication in the certification process.

RAILTEST

FINAL REPORT

Executive Summary

This report provides a comprehensive detailed overview of the results obtained as part of the work carried out in RAILTEST. The work has been based on direct contacts on a voluntary basis with the key players responsible for the running of the railway testing and certification installations. The deliverables Outcome A, B(a), B(b) and Outcome C included in this interim report meet points 2.1 to 2.9 of the tender's Terms of Reference. Outcome A consists of an inventory of railway testing installations in the 15 EU member States plus Switzerland, Norway and the accession countries (point 2.1). As a first stage it was considered to cover all thirteen candidate countries, but after some consideration, it was decided that it would be more effective to concentrate on the accepted new members of the European Union. As a result, twenty-five countries have been included as part of this survey. Due to the voluntary basis of this survey, five out of the twenty-four countries approached have not provided their inputs yet, although interest in RAILTEST and intention to collaborate has been shown. The results obtained are positive, setting the path for improved further versions which should complete this survey to a higher degree. This inventory also includes a description of the facilities (point 2.2) and the cooperation status (point 2.3).

Outcome B(a) identifies possible synergies between railway testing and certification organisations, including any kind of new cooperation between facilities which might result in a cost reduction (point 2.4). It also includes a calculation, as far as possible of the expected benefits that would result from the application of these synergies, using three different case studies (point 2.5). Case study 01 focuses on ERTMS/ETCS users group, case study 02 focuses on Industry-railway systems integrators, while case study 03 considers vehicle approval procedures. Once again, the voluntary basis of this exercise has conditioned the results, although the organisations subject to these case studies have provided clear support to the activities carried out at RAILTEST and any other future initiatives addressing these topics. Nevertheless, the case studies are positive, describing the different environments faced and the possible valid approach that can lead to cost reductions.

Outcome B(b) addresses point 2.6 of the terms of reference and provides the results of the RAILTEST Open International Workshop "Improved Efficiency of Railway Testing and Certification Facilities in Europe", which took place in Edinburgh, Scotland, UK on 30th September 2003, running parallel to the activities of the World Congress on Railway Research (WCRR'03).

Finally, Outcome C reports on the contacts established by RAILTEST with representatives of different European Notified Bodies, as well as AEIF, ERC, UNIFE, and other representatives of the industry. These contacts were established to find out about the strategies aiming at reducing costs and delays attributable to the certification process (point 2.7), compare the procedures for conformity assessment of interoperability constituents before and after the implementation of the TSIs (point 2.8) and analyse the certification, accreditation and mutual acceptance activities on the voluntary field (point 2.9) so recommendations to the European Commission can be drawn.

Contents

1. Introduction	5
2. Outcome A	6
3. Outcome B (a).....	10
3.1. Synergies Study	10
3.2. Case Studies.....	11
4. Outcome B(b).....	15
5. Outcome C	16
6. Conclusions.....	17
ANNEXES	20

1. Introduction

This report provides a comprehensive detailed overview of the results obtained as part of the work carried out in Contract No ETU/B27040B/E2/S07. 18570/2002 Inventory of railway test installations in Europe and detection of synergies between them. Their implication in the certification process, RAILTEST. The contract was signed at the end of December 2002, with this final report due on month 14 (end February 2004).

The work has been mainly based on the direct contacts established by the RAILTEST consortium with the key European players responsible for the running of the railway testing installations. The deliverables included in this final report meet the points 2.1 to 2.9 of the Terms of Reference and are the following:

- **Outcome A:** Inventory of railway testing installations in the 15 EU member States plus Switzerland, Norway and the accession countries (point 2.1). This inventory includes a description of the facilities (point 2.2) and the cooperation status (point 2.3);
- **Outcome B(a):** Identification of possible synergies, including any kind of new cooperation between facilities which might result in a cost reduction (point 2.4). Calculation of the expected benefits that would result from the application of these synergies, using three different case studies (point 2.5);
- **Outcome B(b):** Organisation of a open workshop to analyse the results of points 2.4 and 2.5, as well as create the appropriate conditions for effective implementation of such results (point 2.6);
- **Outcome C:** Contact and consult the Notified Bodies to set up strategies aiming at reducing costs and delays attributable to the certification process (point 2.7), compare the procedures for conformity assessment of interoperability constituents before and after the implementation of the TSIs (point 2.8) and analyse the certification, accreditation and mutual acceptance activities on the voluntary field (point 2.9) so recommendations to the European Commission can be drawn.

2. Outcome A

Outcome A (see annex I) has been carried out according to the task description in Work-Package1 (WP 1) contained in the RAILTEST proposal document dated 09 September 2002, based on the invitation to tender No TREN/E2/26-2002. It corresponds to points 2.1, 2.2 and 2.3 of the Terms of Reference of such tender.

A survey has been completed to identify relevant railway testing facilities according to the activities carried out and the users involved in them. This has been done by using the existing contacts network in the European Railway industry of the RAILTEST partners. Also, existing previous work on the topic provided by UIC (report 1993) and AEIF (small surveys 1998 and update 2002) has been considered. All required data have been collected via the distribution of a questionnaire. Interviews were performed when needed. The template of this questionnaire is enclosed in the Outcome A report (see annex I).

The different sections A and B from the questionnaire (see annex I) form the main structure of the database, dividing it into Main Data, Organisation, Cooperation, Test Information and Accreditation and Certification fields. For each country a separate file (Excel file - in order to make it user-friendly and accessible) with the available entries is provided. The structure of these files includes an overview sheet outlining some details of the organisations included for the specific country, and dedicated sheets providing all the details for each one of the organisations.

Each one of the entries provides a description of the facilities and how they are used by customers. It also identifies existing cooperation agreements and the willingness for collaboration.

Outcome A relates to one of RAILTEST main objectives which is to develop an inventory of all relevant private and public railway testing installations in the 15 EU Member States, Switzerland, Norway and the accession countries. As a first stage it was considered to cover all 13 candidate countries, but after some consideration, it was decided that it would be more effective to concentrate on the accepted new members of the European Union. As a result, the following 25 countries have been included as part of this survey:

Austria	Norway
Belgium	Poland
Czech Republic	Portugal
Denmark	Slovakia
Finland	Slovenia
France	Spain
Germany	Sweden
Greece	Latvia
Hungary	Switzerland
Ireland	The Netherlands
Italy	United Kingdom, UK
Lithuania	Estonia
Luxemburg	

It is very important at this point to highlight the fact that this survey, as well the main part of this interim report scope has been done on a **voluntary basis**. Bearing this in mind, the following countries have not provided any inputs so far:

- Denmark
- Estonia;
- Finland
- Greece;
- Latvia

Representatives of the most relevant organisations on these countries have been repeatedly contacted without any success.

The following countries have responded to RAILTEST contacts but have not provided any relevant information yet:

- Estonia;
- Lithuania;

These countries, together with organisations from the remaining countries have shown positive response to the initiative but not provided the information required yet, although they are willing to collaborate and they are expected to submit their inputs in the near future, providing the inventory is kept alive.

The following table gives an overview of the entries per country:

Country	Entries	Country	Entries
Austria	3	Lithuania	1
Belgium	7	Norway	2
Czech Republic	11	Poland	6
Denmark	0	Portugal	3
Estonia	0	Slovakia	2
Finland	0	Slovenia	1
France	3	Spain	7
Germany	29	Sweden	3
Greece	0	Latvia	0
Hungary	4	Switzerland	2
Ireland	1	The Netherlands	6
Italy	3	United Kingdom	12
Luxemburg	1		
TOTAL			107

Due to the nature of this inventory and its scope, this Outcome A has to be considered as a “live” document and therefore the version included in this report is version 3 of possible future versions. The main updates of this version 4 in comparison with version 1 submitted in the Interim Report are the optimisation of the Belgium entries (from 20 to 7), plus new entries for Lithuania, Sweden, Luxemburg, Spain and the UK. In order to wide-spread the accessibility to the results, and although it was not foreseen in the original tender, the inventory has been published on a dedicated website (www.railtest.org) run by the coordinator.

The structure of the survey is split into different levels, European overview, country-specific overview and organisation-detailed. The general overview file at European level includes the 107 questionnaire results which facilitates quick searching. There are 20 country-specific files containing an overview of the country entries as well as detailed information about each of the organisations featured.

The results of Outcome A have been submitted separately in electronic format as well as on a CD. The inventory can be also downloaded from www.railtest.org as previously mentioned.

3. Outcome B (a)

Outcome B (a) has been carried out according to the task description in Work-Package2 (WP 2) contained in the RAILTEST proposal document dated 09 September 2002, based on the invitation to tender No TREN/E2/26-2002. It corresponds to points 2.4 and 2.5 of the Terms of Reference of such tender. It comprises a synergies study identifying and developing any possibility of synergy which might cut costs for the stakeholders to the mutual benefit of the collaborating institutions as well as a calculation of the benefits that these could bring by a series of three representative case studies. See annex II for full Outcome B (a) document

3.1. Synergies Study

The aim of this study (see annex II for full document) is the identification of synergies between railway testing facilities by identifying and analysing all theoretically possible synergies among these institutions. For the purpose of this study, the term synergy implies all forms of co-operation with cost reduction potential for both the providers and the users. This synergy analysis is followed by three case studies. From these, specific development potentials and further additional information regarding potential cost reduction from synergy relationships are discussed.

The synergies analysis uses a 3-step approach as follows.

- In the first step, explicit parameters for the detection of possible synergy were defined;
- On the basis of these parameters, a questionnaire was developed which also served the stocktaking of inventories of European railway testing institutions;
- The data obtained from the completed questionnaires was used to create a comprehensive database of all European testing institutions;
- This general database was converted into a synergy matrix on the basis of which a comprehensive analysis of all potential synergy elements can be made.

The general identification of potential synergies among railway testing institutions and the analysis of a specific example (optional synergies for testing vehicle brakes) suggest that the development of synergy elements is possible and makes sense. However, in addition to the general parameters "Region", "Stakeholder", "Customer", "Test", "Products" and "Willingness of co-operation", the specific situation and

expectations of each institution must be known and considered on a case-to-case basis.

The setting up and intensification of synergy relationships brings a number of benefits both for the customers and the users of the test installations, such as:

- Under utilisation of the capacity of the European testing infrastructure is avoided;
- Co-operation generates quality and cost benefits, and
- Efficient testing networks can be set up to replace isolated testing institutions.

Due to the voluntary basis of this task and the fact that all testing institutions maintain strict confidentiality in connection with their activities, it is very difficult to gather specific data for the analysis of potential cost benefits for providers and users. However, valid approaches to obtain possible cost benefits are identified in the three case studies.

3.2. Case Studies.

Three case studies (see annex II for full documentation) have been selected to meet the requirements of point 2.5 of the tender's terms of reference. These case studies look into the synergies study from a different perspective, applying the background developed in the mentioned study to a practical case scenario. Again, the voluntary basis of this exercise partly compromises the results.

3.2.1. Case Study 01.

The principal objective of case study 01 is the identification of possible synergies from the simulation and testing of the ERTMS/ETCS technology. At the same time, information is obtained as to how and in what way the different units of the test institutions can be matched in an optimal set-up to obtain the highest possible cost reduction and also generate advantages in operations.

Within the European ERTMS users group, different test sequences and necessary inspections have been defined. The possibilities of practical railway service in closed or open systems have been looked into and simulations made in specific laboratory environments. This case study focuses on the analysis and identification of possible

synergies in the lab and simulation fields. After consultation with the ERTMS users group, the following institutions will be analysed:

- RAIL LAB, Institut für Verkehrsführung und Fahrzeugsteuerung des Deutschen Zentrums für Luft- und Raumfahrt (DLR) in Braunschweig, Germany
- ERTMS & Interoperability Lab of CEDEX (EMSET) in Madrid, Spain.
- In addition, Siemens PCW in Wegberg-Wildenrath, Germany, will also be included in the study.

The analysis of test and inspection institutions for product development within the ERTMS technology will generate valuable information to identify potential benefits:

- Co-operation between the institutions in order to add to and strengthen existing competence and knowledge advantages;
- Cost reductions (investment and operations) can be generated by the concentration of institutions;
- The users of the institutions benefit from access to regional sources and also special competence advantages;
- Government subsidies can be used to better effect by the concentrated orientation of tests and simulations;
- Their contribution to the development process of the European interoperability process furthers the interests of the European Commission.

Detailed information on the set-up and operation of the test and inspection institutions which were fed into cost-benefit analysis was obtained by intensive and frank co-operation with the above test and inspection centres in Germany and Spain. This makes it possible to describe different advantages.

The development of (regional) competencies within the range of tests and inspections is the focus of consideration. This allows each institution to concentrate on specific areas. At the same time each institution can contribute its competencies to a competence pool. This can improve the development and testing of the ERTMS/ETCS technology in general.

In the final analysis, this approach will allow the test institutions and the railway industry, the railway operators and the European Union to derive significant benefits. Internal cost benefits can be developed by international optimisation and

harmonisation of test and inspection procedures and the customers allowed benefiting from such advantages. At the same time, the development of overcapacity on regional and sectoral level is effectively avoided. These far-reaching advantages will result in European standardisation of test and inspection processes in the mean term.

3.2.2. Case Study 02.

Case Study 02 has focused on the reduction of costs by identification of synergies and establishing potential fruitful collaborations in an industry environment. With this task in mind, a systems integrator, Bombardier Transportation are supportive of this research and have been selected as a representative. A working methodology has been created and described to assist in the identification of such cost reduction synergies. This methodology consists of four stages: 1. Definition of testing requirements, 2. Description of the testing facilities involved in the study, 3. Cost-benefit analysis and 4. Recommendations. By following this methodology, Industry, users and the European Union could benefit. Potential benefits for industry are the avoidance of testing equipment duplication, the optimisation of the capacity utilisation levels of existing equipment and the identification of costs associated to the equipment leading to a better usage of the existing resources.

During the application of this case study methodology it has been identified that the viability of the physical testing approach is no longer valid in a changing environment where interoperability and standardisation are fundamental requirements. Instead, a virtual approach has been suggested, consisting of testing by validated modelling. Very significant cost reductions can be introduced by this approach if it proves reliable. A full scale crash test is a clear example that illustrates this. The traditional testing approach means that a full scale crash test would cost €200,000 while by a modelling and testing of components for verification to achieve the same approvals would cost €90,000. This achieves a substantial cost reduction (45%)¹. This development suggests that the remaining testing facilities should be converted into research and development centres to provide valid inputs to the design and modelling process in extremely relevant and safety critical issues such as material properties. Components would still need to be tested to put “real data” into the whole vehicle model. The certification as Notified Bodies has been suggested as another possible solution for the conversion of these exceeding testing facilities.

¹ Figures provided by Bombardier Transportation

Virtual approvals could support a move towards economies of scale leading to lower costs, more competition and more choice for the users, which would benefit them. Finally, this strategy could also lead to a standardisation of procedures throughout industry, contributing to the development of European standards.

3.2.3. Case Study 03.

Case Study 03 has focused on the investigation of activity in the case of vehicle approval of the Dutch National Railways Infrastructure Organisation: PRORAIL.

PRORAIL dealt with the approval procedure of THALYS and ICE high speed passenger trains, two of the clearest examples of interoperable services. PRORAIL carried out the investigations of conditions for approval procedure, the test facilities and certification procedure including the costs for these two procedures which could deliver the main arguments to possible synergy in this area.

The approach methodology was chosen to provide potential benefit to the actors of this chosen process (PRORAIL, NS Reizigers, Railway Authority (IVW) and Industry) to avoid duplicate testing facilities, to optimise the capacity of existing equipment and to identify of costs associated to the equipment leading to a better usage of the existing resources. All of this from the perspective of vehicle approval.

4. Outcome B(b)

This deliverable (see full report on Annex III) provides the results of the RAILTEST Open International Workshop “Improved Efficiency of Railway Testing and Certification Facilities in Europe”, which took place in Edinburgh, Scotland, UK on 30th September 2003. The aim of this workshop was to present the RAILTEST findings, focusing on creating the appropriate conditions (network building) for effective implementation of possible synergies. It also investigated any other possible forms of collaboration arising during the whole event and especially during the round table discussion. The participants were informed beforehand that they would be given the chance during the event to express their views on particular areas of interest where they would wish to set up collaborations. Participants were therefore encouraged to be ready to provide their suggestions during the event.

The event was structured in three parts. Firstly, an overview of the RAILTEST objectives and findings so far. The second part focused on two case studies developed by RAILTEST to give clear examples of potential benefits from the application of the synergies methodology. These included presentations from the stakeholders BOMBARDIER Transportation and DLR-RAIL LAB. The event concluded with a round table discussion, giving all the delegates the opportunity to express their opinions.

As a result of the collaborative activity, some major conclusions can be determined, as follows:

There is a need to review the essential requirements for testing. Why are we testing?

Validated modelling could be introduced as an effective measure in the assessment procedure to achieve reduction of costs. Modelling could be used to improve reliability and /or to simulate durability testing.

Harmonisation of procedures must be achieved. A limitation of the power of national homologation bodies should be reached in order to achieve the homogenisation of procedures across Europe. Cross-acceptance and cooperation between notified bodies is seen as essential.

Establishing a centralised “control” in Europe with full knowledge of all testing facilities based on the work carried out by RAILTEST, with decisions made based on suitability and geographical convenience for cost effectiveness and opportunities for collaboration would be an effective way of reducing costs.

5. Outcome C

Outcome C reports (see Annex IV for full document) on the contacts established by RAILTEST with representatives of different European Notified Bodies, as well as AEIF, ERC, UNIFE, and other representatives of the industry. These contacts were established to find out about the strategies aiming at reducing costs and delays attributable to the certification process (point 2.7), compare the procedures for conformity assessment of interoperability constituents before and after the implementation of the TSIs (point 2.8) and analyse the certification, accreditation and mutual acceptance activities on the voluntary field (point 2.9) so recommendations to the European Commission can be drawn.

6. Conclusions

The work of RAILTEST has been based on direct contacts on a **voluntary basis** established by the consortium with the key European players responsible for the running of the railway testing and certification installations. The deliverables included in this final report meet points 2.1 to 2.9 of the tender's Terms of Reference. Outcome A consists of an inventory of railway testing installations in the 15 EU member States plus Switzerland, Norway and the accession countries (point 2.1). This inventory includes a description of the facilities (point 2.2) and the cooperation status (point 2.3). It has proven to be an arduous task since the necessary voluntary basis of the approach highly conditions the quality of the results as well as influences the progress of the project according to the tight schedule. However, the results obtained are positive, setting the path for improved further versions which should complete this survey to a higher degree.

The RAILTEST website (www.railtest.org) was set up at the end of September as a tool for disseminating the results, especially the inventory, which has been kept up-to-date. During this time it has received a total of 5794 hits to date, at an average of 644 hits per month, reaching a height of 1625 hits during June 2004 and a low of 186 in November 2003. These figures are remarkably good taking into account the level of specialisation of the topic. This website, although it was not part of the original work specification and tender's conditions, has proven to be a very successful instrument to disseminate the results of RAILTEST, particularly the inventory.

Outcome B(a) identifies possible synergies between railway testing and certification organisations, including any kind of new cooperation between facilities which might result in a cost reduction (point 2.4). It also includes a calculation, as far as possible of the expected benefits that would result from the application of these synergies, using three different case studies (point 2.5). Once again, the voluntary basis of this exercise has conditioned the results. The organisations subject to these case studies all agreed to collaborate. This support is clear and it has continued through the duration of RAILTEST. Any possible future extensions of this work have already been welcomed and will be supported by these organisations. Nevertheless, the results of these case studies are positive, describing the different environments faced and the possible valid approach that can lead to cost reductions.

This leads to Outcome B (b). This deliverable provides the results of the RAILTEST Open International Workshop "Improved Efficiency of Railway Testing and

Certification Facilities in Europe”, which took place in Edinburgh, Scotland, UK on 30th September 2003. The aim of this workshop was to present the RAILTEST findings, focusing on creating the appropriate conditions (network building) for effective implementation of possible synergies. It also investigated any other possible forms of collaboration arising during the whole event and especially during the round table discussion. The participants were informed beforehand that they would be given the chance during the event to express their views on particular areas of interest where they would wish to set up collaborations. Participants were therefore encouraged to be ready to provide their suggestions during the event.

As a result of the collaborative activity, some major conclusions can be determined, as follows:

There is a need to review the essential requirements for testing. Why are we testing?

Validated modelling could be introduced as an effective measure in the assessment procedure to achieve reduction of costs. Modelling could be used to improve reliability and /or to simulate durability testing.

Harmonisation of procedures must be achieved. A limitation of the power of national homologation bodies should be reached in order to achieve the homogenisation of procedures across Europe. Cross-acceptance and cooperation between notified bodies is seen as essential.

Establishing a centralised “control” in Europe with full knowledge of all testing facilities based on the work carried out by RAILTEST, with decisions made based on suitability and geographical convenience for cost effectiveness and opportunities for collaboration would be an effective way of reducing costs.

Outcome C provides recommendations aiming at reducing the cost and delays attributable to the certification process. The strategy includes involving the notified bodies in the earlier stages of the design and production processes to improve their efficiency, the definition of common rules to facilitate cross-acceptance, specially for the assessment procedures and to make available a database of the certification processes together with information related to the testing, inspection and certification organisations across Europe in order to reduce the time to certification and improve competitiveness which can reduce costs. Other aspects of this strategy include the possibility of the acceptance by NoBos when assessing subsystems of certificates issued on the basis of the voluntary application of the manufacturer and the

possibility of setting up a single European certificate for the three categories of bodies involved in the certification process. However, there is a need to follow a set of actions that could create the right conditions to achieve a significant reduce in cost attributable to the testing and certification processes.

Therefore, in the light of the results outlined here, it is recommended that the EC publishes a green paper within the next 3 months to launch a consultation process with all the key players in the testing and certification process to corroborate the findings of this report. This should lead to the publication of a white paper in no longer than 12 months on the topic with a set of specific proposals for community action on these issues, in line with the recommendations given in this report. These recommendations and others are fully explained in Annex IV.

Finally, highlight the high level of support and willingness for cooperation from the key players as well as the interest created around RAILTEST in the industry, especially considering the low key of its dissemination activities. This, together with the experience gained during the length of RAILTEST suggests that further action should be taken to explore these and other possible solutions that could simplify the whole testing and certification process as well as optimise its cost.

ANNEXES

ANNEX I Outcome A

ANNEX II Outcome B (a)

ANNEX III Outcome B (b)

ANNEX IV Outcome C