



TNE3-CT-2003-506513

EURNEX

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**N**etwork of **EX**cellence

SIXTH FRAMEWORK PROGRAMME

PRIORITY 1.6.2: SUSTAINABLE SURFACE TRANSPORT

## Pole Action Plan

### Pole 3: ROLLING STOCK

Date of preparation: 1 April 2005

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Version:	1.0	01 April 2005
	1.1	18 April 2005
	2.0	20 May 2005
	2.1	23 May 2005

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## Introduction

The Rolling Stock Pole regroups more than twenty EURNEX research institutions from nine different countries. Its challenge is to integrate the wide range of complementary competences of its members, covering the areas of vehicle dynamics and suspension, traction and power systems, wheel-rail interaction, condition monitoring, new materials and manufacturing technologies, noise and vibrations.

Rolling stock is recognized as one of the ERRAC key technologies, and this pole is directly concerned by the ERRAC strategic priority "Modular Interoperable Rolling Stock". The pole members are committed to share and disseminate their knowledge in order to build new multidisciplinary competences in accordance with the ERRAC research priorities and the R&D plans of the railway stakeholders. This implies a strong policy of knowledge sharing by researchers' mobility, workshops and seminars.

The pole involvement in the research priorities identified by ERRAC will concentrate on interoperability, safety, environmental issues and innovative materials. The pole is intending to effectively contribute to several strategic research areas defined by the railway sector, namely passenger and freight system technology, vehicle-infrastructure interaction, motive power units, braking and running gears systems technology, and environmental topics related to rolling stock.

Rolling stock is at the core of the railway system and the pole will consequently promote exchanges and collaborations with all the other EURNEX poles, and more particularly with the poles devoted to Infrastructure, Safety and security, Environment and energy efficiency, Operation and system performance.

The pole members are already involved in research projects and they are aiming at being key actors of new ambitious research programs with technical and scientific objectives dedicated to the design of next generation rolling stock. This will be achieved by strengthening the existing links with the railway manufacturing and supply industry as well as their representing associations UNIFE, UIC and UITP.

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## Pole Action Plan

### Pole 3: Rolling Stock

#### 1 Objectives of the pole

The Pole aims at developing innovative solutions to the challenges of tomorrow's rolling stock:

- Improve the performance and the attractiveness of passenger and freight vehicles:
  - Higher operational speeds, both for freight and passenger transport
  - Enhanced passenger comfort: reduced noise and smoother ride
  - Larger capacity and payload of freight wagons: high axle loads
  - More efficient railway systems: innovative traction technology, lighter and efficient ancillary equipment
- Maintain and improve safety and reliability
- Provide the scientific and technical foundation to develop innovative solutions and support the establishment of new standards.

##### 1.1 Thematic areas

The critical thematic issues and challenges for new generation rolling stock concern:

- Light-weight vehicles
- Passive safety
- Low energy consumption
- Track friendly vehicles
- Comfortable passenger vehicles
- Low life cycle costs and reliability

##### 1.2 Required capabilities

To achieve the objectives and address the critical thematic issues, the following competences are necessary within the Rolling Stock pole:

- Dynamics and suspension
  - Vehicle dynamics
  - Bogies and wheel set
  - Crashworthiness
  - Mechatronics
  - Aerodynamics
- Traction and power systems
  - Traction systems
  - Power systems

- Braking
- Wheel-rail interaction
- Condition monitoring
- New materials and manufacturing technologies
  - Innovative materials and hybrid solutions
  - Innovative manufacturing and production technologies
- Noise and vibrations

The main relationships between the competences and the thematic issues are presented in the following table:

	Passive safety	Light weight vehicles	Low energy consumption	Track friendly vehicles	Comfortable vehicles	Low LCC and reliability
Dynamics and suspension	✓			✓	✓	✓
Traction and power systems		✓	✓			✓
Wheel-rail interaction	✓			✓	✓	✓
Condition Monitoring				✓		✓
New materials and manufacturing	✓	✓		✓	✓	✓
Noise and vibrations		✓		✓	✓	✓

## 2 Capabilities involved in the pole

### 2.1 Institutions and contact persons

The current list of the 23 EURNEX members participating to the rolling stock pole is:

Member	Institution		Country	Contact person
2	UoB	University of Birmingham	UK	Colin J. Goodman
3	INRETS	Institut National de Recherche sur	France	Hugues Chollet
4	IST	Instituto Superior Tecnico	Portugal	Manuel Seabra Pereira
5	TFK	Intitutet for Transportforskning	Sweden	Peter Bark
12	RWTH	University of Technology Aachen	Germany	Arne Berger
13	TUB	TU Berlin	Germany	Markus Hecht
15	TUBs	TU Braunschweig	Germany	Helmut Mosebach

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17	DLR	Deutsches Zentrum für Luft- und Raumfahrt	Germany	Gunter Schupp
24	CD-VUZ	Czech Railways - Railway Research Institute	Czech Rep.	Jaroslav Opava
31	Soton	University of Southampton	UK	Michael J Griffin
34	MMU	Manchester Metropolitan University	UK	Simon Iwnicki
35	LU	Loughborough University	UK	Roger Goodall
41	USTL	Université des Sciences et Technologies de Lille	France	Philippe Dufrénoy
44	EC Lille	Ecole Centrale de Lille	France	Gérard Degallaix
46	UVHC	Université de Valenciennes	France	François Monnoyer
49	IDMEC	Instituto de Engenharia Mecanica	Portugal	Antonio A. Fernandes
50	CEIT	Centro de Estudios e Investigaciones Técnicas de Gipuskoa	Spain	Jordi Viñolas Prat
55	UPV	Univesidad del País Vasco	Spain	Ernesto García Vadillo
56	Chalmers	Chalmers University of Technology	Sweden	Anders Ekberg
59	KTH	Kungl Tekniska Högskolan	Sweden	Stefan Östlund
65	DITS	Università di Roma - DITS	Italy	Riccardo Licciardello
66	POLIMI	Poltecnico di Milano	Italy	Stefano Bruni
67	UNICT	Univerisity of Catania	Italy	Alfio Consoli

In addition, the railway associations UNIFE, UIC and UITP have been invited to designate representatives to be associated to the pole activities.

## 2.2 Competences

The partners bring their competences to build the pole excellence. Their detailed contribution is listed in the following table:

	<b>Member</b>							
<b>Competence</b>	<b>CD-VUZ</b>	<b>CEIT</b>	<b>Chalmers</b>	<b>DITS</b>	<b>DLR</b>	<b>EC Lille</b>	<b>DMEC</b>	<b>INRETS</b>
<b>Dynamics and suspension</b>	1	2	2	2	3		1	2
Vehicle dynamics	1	1	1	1	1		1	1
Bogies and wheel set			1	1				1
Crashworthiness								
Mechatronics		1			1			
Aerodynamics					1			
<b>Traction and power systems</b>			1			1		2
Traction systems								1
Power systems								1
Braking			1			1		
<b>Wheel-rail interaction</b>		1	1	1	1			1
<b>Condition monitoring</b>								
<b>Materials and manufacturing</b>						1	2	
Materials and hybrid solutions						1	1	
Manufacturing technologies							1	
<b>Noise and vibrations</b>			1	1				1
<b>Total</b>	<b>1</b>	<b>3</b>	<b>5</b>	<b>4</b>	<b>4</b>	<b>2</b>	<b>3</b>	<b>6</b>

	<b>Member</b>							
<b>Competence</b>	<b>IST</b>	<b>KTH</b>	<b>LU</b>	<b>MMU</b>	<b>POLIMI</b>	<b>RWTH</b>	<b>Soton</b>	<b>TFK</b>
<b>Dynamics and suspension</b>	1	4	3	2	3	1		
Vehicle dynamics		1	1	1	1			
Bogies and wheel set		1	1	1		1		
Crashworthiness	1							
Mechatronics		1	1		1			
Aerodynamics		1			1			
<b>Traction and power systems</b>		2				1		3
Traction systems		1						1
Power systems		1						1
Braking						1		1
<b>Wheel-rail interaction</b>		1		1	1			
<b>Condition monitoring</b>			1					1
<b>Materials and manufacturing</b>		1						2
Materials and hybrid solutions		1						1
Manufacturing technologies								1
<b>Noise and vibrations</b>		1			1		1	
<b>Total</b>	<b>1</b>	<b>9</b>	<b>4</b>	<b>3</b>	<b>5</b>	<b>2</b>	<b>1</b>	<b>6</b>

<b>Member</b>								
<b>Competence</b>	<b>TUB</b>	<b>TUBs</b>	<b>UNICT</b>	<b>UoB</b>	<b>UPV</b>	<b>USTL</b>	<b>UMC</b>	<b>Total</b>
<b>Dynamics and suspension</b>	2				2	1	2	34
Vehicle dynamics					1	1		13
Bogies and wheel set	1				1			9
Crashworthiness	1						1	3
Mechatronics								5
Aerodynamics							1	4
<b>Traction and power systems</b>		2	2	2		1	1	18
Traction systems		1	1	1				6
Power systems		1	1	1				6
Braking						1	1	6
<b>Wheel-rail interaction</b>	1				1			10
<b>Condition monitoring</b>				1				3
<b>Materials and manufacturing</b>								6
Materials and hybrid solutions								4
Manufacturing technologies								2
<b>Noise and vibrations</b>	1				1			8
<b>Total</b>	<b>4</b>	<b>2</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>2</b>	<b>3</b>	<b>79</b>

## **2.3 Facilities**

The pole members are willing to make their large testing and simulation facilities listed below available for collaborative research projects. In addition, most of the research teams are also equipped with state-of-the-art measurement laboratory apparatus and data acquisition systems.

A number of pole members also have free or privileged access to large facilities owned by third parties.

## **3 Collaboration opportunities**

Numerous research collaboration opportunities have already been identified in Work Package 1 (see Deliverable D04) and will not be enumerated in detail at this point.

Some of them have already led to the initiation of common activities in the frame of the researcher mobility program promoted in Work Package 2 (e.g. UVHC visit at KTH on railway aerodynamics).

A number of collaborative projects relevant to the rolling stock pole have been proposed in Work Package 5. These have been passed to the pole.

One of the first integration tasks in the pole will be to promote new collaborations, possibly on ongoing projects or in the frame of their continuation.

## **4 Projects towards Business Case**

### **4.1 Support to the railway industry**

- Identify existing links between research teams and railway stakeholders, including the rolling stock manufacturers and suppliers, the railway operators and the infrastructure managers.
- Activate existing contacts with the manufacturing and supply industry and foster new collaborations: visits, meetings.
- Propose new collaborations with industry exploiting the pole synergies.
- Support standardization activities.

## 4.2 Collaboration with other poles

It is most likely that other EURNEX poles will appeal to rolling stock specialists in the frame of some of their specific projects.

Strong links are expected with the poles: Infrastructure and signalling, Operation and system performance, Safety and security, Environment and energy efficiency, Human factors and applied ergonomics.

In addition, the rolling stock pole is committed to contribute to the training and education activities led by pole 10.

## 4.3 Service to the industry

- Perform specific analysis of the needs and expectations from the manufacturing and supply industry and from train operators in terms of RTD services
- Develop an advisory technology forecasting service for the railway sector and contributing to the ERRAC SRRRA (primarily dedicated to rolling stock, but possibly extended to a broader area if other poles develop similar tools)

## 5 Pole development and Milestone planning

### 5.1 Short term schedule (March – July 2005)

- Establish the pole member list .....31/03/05
- Complete the action plan (1<sup>st</sup> draft) .....31/03/05
- Define pole structure .....01/04/05
- Analyse FP6 Call 3B .....15/04/05
- Pole follow-up meeting (Milan) .....19/04/05
  - agreement on the action plan
  - pole structure definition, incl. pole leader
  - selection of pilot projects (WP5, Call 3B...)
- Make an inventory of existing links with industry .....30/06/05
- Prepare proposals for selected pilot projects .....30/06/05
- Web page and leaflet (1<sup>st</sup> ed) .....31/07/05
- Prepare 1<sup>st</sup> workshop with industry.....31/07/05
- Promote the submission of contributions to WCRR (Montreal) .....31/07/05
- Support specialized workshops and mobility
- Initiate and support short training courses with Pole 10

## 5.2 Mid term actions and milestones

- Mobility and internal knowledge sharing
- 1<sup>st</sup> Pole workshop .....09/05
- Workshop with industry.....11-12/05
- Launch pilot projects .....12/05
- Web page and leaflet update .....03/06
- New projects proposal
- Organize service to industry
- 2<sup>nd</sup> Pole workshop .....04/06
- Establish advisory technology forecasting service .....06/06

## 6 Pole structure and organisation

### 6.1 Membership

- All EURNEX members may be member of the Rolling Stock Pole. However, in order to avoid a dispersion of capacities, the participation to the pole is subject to the limit of pole memberships per member established by the EURNEX Executive Committee.
- The Rolling Stock Pole members are listed in the Pole Action Plan.
- New EURNEX members are entitled to seek admission to the Rolling Stock Pole.
- Admission of new pole members is subject to having an established reputation in rolling stock related research, acceptable to the Pole Team.
- Research institutions outside EURNEX may not be members of the Rolling Stock Pole, but they may participate to research activities supported by the pole.
- Any modification of the pole membership shall be promptly notified by the Pole Coordinator to the EURNEX Coordinator.
- Each pole member will appoint an authorised representative to the pole. The representatives will constitute the Pole Team and participate to the decisions relating to the pole. Replacement of representatives and delegation of substitutes is possible.

### 6.2 Pole Team

- The representatives of the pole members constitute the Pole Team.
- Pole Team meetings will take place at least every six months
- The Pole Team members will give their agreement on:
  - the pole Action plan and its revision;
  - the pole budget plan;
  - research project proposals and the means to support them;
  - acceptance of new pole members.

- Each representative or its substitute will have one vote in the Pole Team.

### **6.3 Pole Committee**

- The Pole Committee consists of executive members from the Pole Team, representative of the main competence areas of the pole.
- The Pole Committee assists the Pole Coordinator with the implementation and the supervision of the Pole Action Plan. The executive members will be responsible for:
  - coordinating the tasks defined in the Pole Action Plan, and more particularly all activities related to their specialized competence domain;
  - supporting the Pole Coordinator in the overall follow-up of the costs, schedule and execution of the activities performed in the pole;
  - assisting the Pole Coordinator in preparing and approving reporting tasks to the EURNEX Executive Committee and to the EURNEX Coordinator;
  - implementing decisions and recommendations of the EURNEX Executive Committee and amending the Action Plan, to be agreed by the Pole Team.
- The executive members are elected for a period of twelve months by the Pole Team. The election requires a quorum of two thirds of all members of the Pole Team or their deputies. The relative majority rule applies and re-election is possible.

### **6.4 Pole Coordinator**

- The Pole Coordinator chairs the Pole Committee and represents the Rolling Stock Pole in the EURNEX Executive Committee. All executive members are de facto deputy coordinators.
- The Pole Coordinator is in charge of coordinating all pole activities with the assistance of the Pole Committee, and in particular:
  - each planning period, prepare or update the Pole Action Plan, including the budget plan, to be submitted to the EURNEX Executive Committee upon approval by the Pole Team;
  - follow up and report to the Executive Committee on the use of the EURNEX budget;
  - prepare activity reports and deliverables, in compliance with the requirements of the Joint Program of Activities;
  - decide on transfer of tasks allocated in the Pole Action Plan between the pole members;
  - present the requests of the Pole, approved by the Pole Team, to the EURNEX Executive Committee, implement the decisions and recommendations of the Executive Committee, and relay documents and information to the pole members;
  - convene, prepare and chair the Pole Team meetings.
- The Pole Coordinator is elected from among the executive members for a period of twelve months. A quorum of two thirds of all members of the Pole Team or their deputies is required to validate the election. The relative majority rule applies and re-election is possible.
- The elected Pole Coordinator must be confirmed by the EURNEX Council. If the

election is invalidated by the EURNEX Council, a new election must take place within two months.