

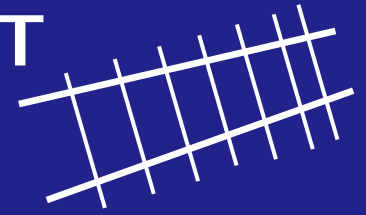


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**SMART
RAIL**



SMARTRAIL – WP 3 – New rehabilitation technologies

Institut IGH d.d.

Irina Stipanovic Oslakovic

Goran Puz

Marko Vajdic



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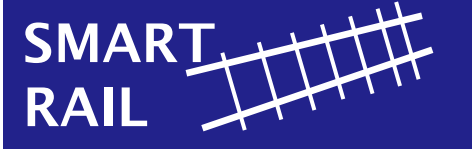


Table of Contents

- **Introduction**
- **Working plan for WP 3**
- **Roles of participants**
- **Doubts and questions**

- **Pilot project – Marko Vajdic**

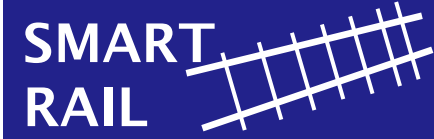


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SEVENTH FRAMEWORK
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IGH team

Dr. Goran Puz, Head of the Department for infrastructure design. From 1991 until 2004 worked at the University of Zagreb, Department for Structures.

From 2004 until 2008 director of the Development, Technical Regulations and Technology Department at Croatian Motorways Ltd., where he managed the project on Cross Asset Management System.

From 2008 working at IGH, managing different departments, and involved in design projects of infrastructure networks (roads and railways).

Expert and research work in bridge design, repair and strengthening projects and asset management systems.

Assistant Professor at the University of Zagreb.



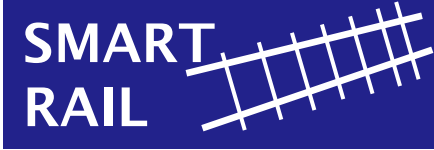


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SEVENTH FRAMEWORK
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IGH team

Institute for infrastructure

Department for infrastructure design: Goran Puz - coordinator, Marko Vajdic, Petra Sesar, mr.sc. Stjepan Kralj

Numerical modelling: Josko Ožbolt, Nina Popovac

Geotechnical department: Davor Milakovic, Kresimir Bolanca

Institute for materials and structures

Laboratory for structures: Igor Dzajić, Luka Fukat

Laboratory for road structures: Slavisa Rajic, Mladen Fistic

Laboratory for materials: Tomislav Jelavic, Dalibor Sekulic, Donka Wurth



WP 3 content

DeMontfort University (Prof. Collop)

Task	Leader	Title
Task 3.1	University of Nottingham	Assessment of typical problems on existing railway tracks
Task 3.2	ZAG	Rehabilitation methods for open track in the transition zones
Task 3.3	IGH	Rehabilitation methods for engineering structures (tunnels and bridges)
Task 3.4	TU Munchen	Validation of the model

Task 3.1 Assessment of typical problems on existing railway tracks

(DMU CR, ZAG, SŽ, IGH, TUM, IK and EURNEX – Riga TU)

EPFL missing

Task leader: **DeMontfort University**

- Selection of demonstration - pilot sites (IGH, ZAG Ireland?)
 - Bridge –transition zone - Croatia
 - Bridge – UHPFRC – Slovenia
 - Tunnel – Slovenia
 - Landslides - ??
- Collection of data - testing on site and in the laboratory (IGH, HZ?, ZAG, SZ, EPFL, IK?)
 - Should be in accordance with 2.4 Track settlement and stiffness
 - Pilot sections investigated with embedded sensors, geotechnical invest., GPR, geophysical methods)
- Modeling of vehicle-track superstructure-track substructure interaction – current condition (DMU CR, TUM, RTU ?)

Task 3.2 Rehabilitation methods for open track in the transition zones

ZAG, DMU, HŽ, CR, IE, IGH, SŽ, TUM, IK, FERHL-EPFL and EURNEX-MIIT

Task leader: **ZAG**

3.2.1. (a) Strengthening of the existing substructure

(ZAG +)

- Geosynthetic reinforced soil retaining walls, geosynthetics + reflector strips, steel slag aggregate in substructure

3.2.2 (b) Improving condition of the existing permanent way

(ZAG +)

- ballast recycling, asphalt or other protective bearing layers with recycled ballast, mixing new materials, use of sleeper pads

(triaxial ballast and RTF testing and modeling in 2.4)

Task 3.3 Rehabilitation methods for engineering structures (tunnels and bridges)

(IGH, CR ?, ZAG, SŽ, TUM, DMU, EURNEX, IK)

Task leader: **IGH**

- Evaluation of ballastless track systems for tunnels and bridges

3.3.1 Tunnels (ZAG, IGH, SZ, ?)

- Replacement of ballast with concrete or asphalt bearing layer (recycling?)

3.3.2 Bridges (ZAG, IGH, HZ, SZ, ?)

- Steel bridges – strengthening with UHPFRC
- Recycling and reusing of existing ballast material
- Laboratory (IGH, ZAG, ?) and modeling (TUM, DMU, ??)



Task 3.4 Validation of the model

(TUM, CR?, IGH, ZAG, SŽ)

Task leader: **TU Munchen**

Verification of the model developed in WP2

- vehicle – track superstructure – track substructure interaction is modelled using Multi-Body-Simulations in combination with FEM
- measurements recorded at the demonstration/pilot sections of the track.

Assessment of the rehabilitated condition at pilot projects

(measurements of vehicle / track behaviour and track substructure)

Validation of the material and structural models



DELIVERABLES

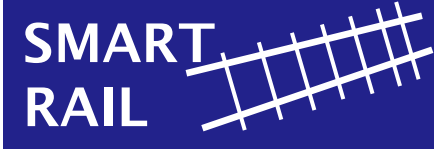
- D3.1) Report on typical problems faced by aging railways:** A diagnostic /assessment tool for typical problems on existing railways will be presented. [12]
- D3.2) Rehabilitaton of Open Tracks and Transition Zones:** Recommendations for the rehabilitation of open trackcin the transition zone on the existing railway [24]
- D3.3) Rehabilitaton of bridges and tunnels:** Recommendations for the rehabilitation of engineering structuresc(bridges and tunnels) on the existing railway track with ballastless track system. [30]
- D3.4) Report on demonstration projects:** Report on the verification of the model based on the executed pilotccsections [32]



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MILESTONES

MS 1 Selection of test / demonstration sites (3)

MS 3 Report on efficacy of demonstration site before remediation (30)

Minutes from the meeting held in Zagreb, 28-09-2011 at IGH

Subject: SMART RAIL project, cooperation between ZAG and IGH

Present:

ZAG: Jaka Kovač, Karmen Fifer Bizjak, Mirjam Bajt Leban, Aljoša Šajna, Stanislav lenart

(in Japan, over Skype)

HŽ: Sabina Seražin Korper

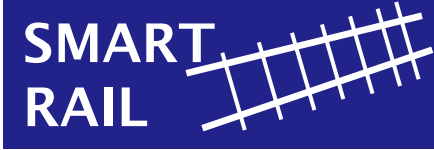
IGH: Goran Puž, Irina Stipanović Oslaković, Marko Vajdić, Petra Sesar, Nina Popovac



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In Croatia pilot section should involve the implementation new techniques in the transition zones, before and after the bridge (or overpass). Proposed object (in cooperation with HŽ) is railway bridge *Buna* at km 398+422, track Novska – Sisak – Zagreb, which is going to be fully renovated. The possibility for the usage of this object for condition assessment and monitoring of the existing and new structure will be examined.

ZAG will have meeting with Slovenian Railways before meeting in Dublin to have information about possible pilot section. Current problem is changing of management board and any decision could not be confirmed. The idea is that in Slovenia pilot section should involve bridge or tunnel where ballastless track (with UHPFRC) will be implemented

Work load

Participant number	Participant short name	PM per participant
2	Sž	34.00
3	FEHRL - EPFL?	5.00
4	EURNEX	8.00
5	IGH	51.00
6	ZAG	44.00
9	TUM	15.00
10	IK	8.00
12	HZ	10.50
13	IE	1.00
14	DMU	10.00
	Total	186.50