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# “Railway Track Science & Engineering” (RTSE) International Workshop on Ballast Issues and Challenges held at UIC in Paris

(Paris, 6 December 2013) UIC, SNCF, and Heriot Watt University were pleased to open this new series of international Workshops on railway technologies. This Inaugural Workshop held over two full days, 5 and 6 December, brought over 130 key experts to Paris UIC HQ from around the world to network and discuss the issues and challenges surrounding ballasted tracks at all train speeds and axle weights.

The workshop’s keynote speakers were:

- **Tim Smart,** Director, International HSR & Head of Engineering & Ops, High Speed 2 Limited, UK, on “A National Strategy for High Speed Rail”
- **Dr Hideyuki Takai,** Executive Director, Railway Technical Research Institute, RTRI, Japan, on “ Research and Development on ballasted track in Japan”
- **Prof Dr Farhang Radjai,** Research Director, CNRS, University Montpellier 2, France, on “Micromechanics of Ballast Material”
- **Prof Dr Uwe Krueger,** Chief Executive Officer, Atkins Plc, on “High Speed rail and cities in the future”

Even if slab track solutions are increasing, especially for high speed applications, more than 95% of tracks around the world still rest on ballast. This makes ballast a crucial track component and the maintenance of the ballast system quite an expensive budget for infrastructure managers.

Ballast has multiple roles: distributing stress from the ballast layer to the subgrade, anchoring the track, providing elasticity to vertical loads, acting as a form of drainage, attenuating noise and vibrations – all of which are dependent on the knowledge of its characteristics and an acute understanding of its behaviour and its deterioration process.

Infrastructure managers face three key questions regarding their existing and future ballasted tracks:

- How to assess the remaining lifetime of ballast in-track? (in terms of tools and criteria)
- How to extend this lifetime at low cost?
- Is ballast an economically and technically sustainable solution to meet the challenge of very or ultra high speed?

The increasing demands of higher axle loads, commercial line speeds and track usage means that understanding ballast behaviour and its interactions with infrastructure still remains a critical element to the design and successful operation of ballasted railway tracks. Indeed, the transition to high and perhaps even ultra-speed in the future, has led to the amplification and acceleration of the degradation pathways such as track geometry deterioration and increased ground vibration transmission.

In parallel, the need to increase the operational capacity of railway lines and the renewal of existing, high speed and classical networks, requires a combination of non-intrusive monitoring, accurate diagnostic and efficient maintenance. Railway ballast knowledge remains insufficiently developed in comparison to recent developments in granular science. This essential component of the railway system needs to be addressed more rationally and by using modern and scientific approaches and techniques.

If we are to improve the performance of ballasted tracks for current and future operational needs, a complete examination of the science and engineering governing ballast track behaviour needs to be carried out.

In the beginnings of high speed rail, it was said that it was impossible to go faster than 250 km/h because the ballast would disintegrate. Now that we have reached 350, we cannot be sure what future research will hold; so it is a question of cost and sustainable development.

Hoping that the success of the Workshop on Ballast Issues and Challenges will be the first of a long series of RTSE workshops, for more information please consult:

**http://railway-science-workshops.org/**

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