NeTTUN

New Technologies for Tunnelling and Underground Works

Example of TBM (courtesy of RAZEL SAS)

Concept of robotised maintenance system

The robot detaching the cutting disk
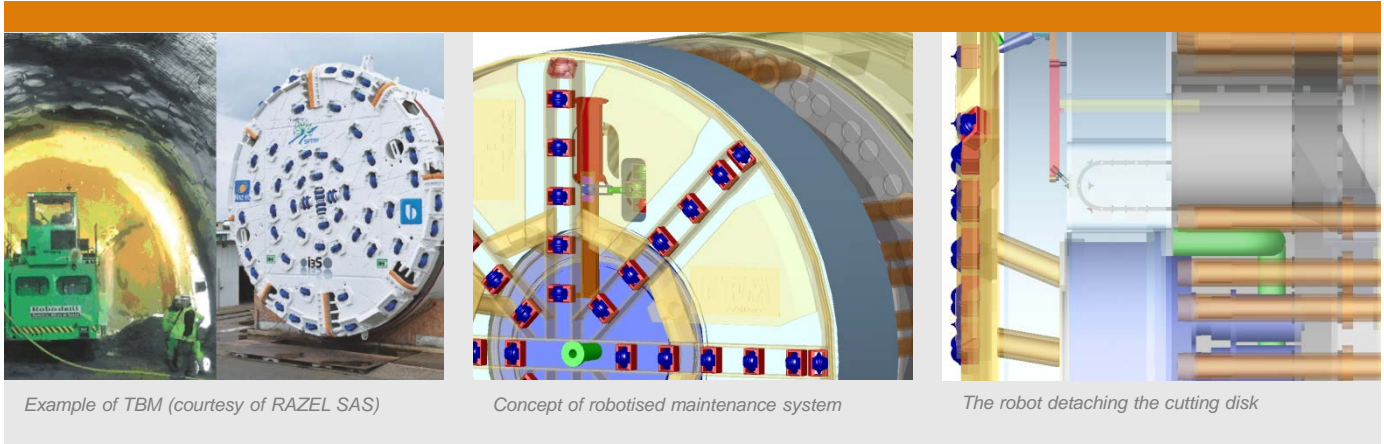
The aim of NeTTUN is to enable ground-breaking change in the construction, management and maintenance of tunnels. The main scientific and technical challenges of the project are: i) a multi-sensor ground prediction system for TBMs (Tunnel Boring Machines) to enable effective look-ahead during boring; ii) a robotic maintenance system that enables automation of inspection and exchange of cutter tools; iii) the design of cutter tools with increased lifetime; iv) a system for modelling of global risks on tunnel projects; v) a system for modelling and controlling the impact of tunnelling on surrounding structures; vi) a Decision Support System for tunnel maintenance management.

The Consortium and its objectives

The NeTTUN Consortium, composed of 21 partners from all over Europe, has been assembled to address this challenging set of research topics and objectives. The NeTTUN project results are envisaged to impact the tunnelling industry in many ways: enlarging business perspectives, increasing the productivity, delivering underground operations with zero impact on surroundings, answering societal needs significantly by improving safety, and strengthening competitiveness of European industry.

The robotised maintenance system

In cooperation with the producer of the TBMs, the company NFM Technologies, DFKI Robotics Innovation Center will develop a robotic arm to inspect, clean and maintain the cutting tools of the TBMs. The

robotic maintenance system will be automated for standard operations, and remotely controlled whenever unforeseen situations are encoun-tered. In a typical task sequence, the drilling head of the TBM is rotated such that its section of interest is located within the workspace of the robot. Then, the cutting tools are cleaned by the robot and remotely inspected by the maintenance personnel. Finally, if a defective or consumed tool is identified, the manipulation system performs its substitution.

A combination of automated and tele-controlled opera-tions will enhance and facilitate the maintenance of the TBM, reduce the risk and the physical effort for the personnel and speed up the overall maintenance sequence.

Duration: 09/2012 – 02/2017

Partners:
Ecole Centrale De Lyon, NFM Technologies, BG Ingénieurs Conseils, Delft University of Technology, National Technical University of Athens, Ecole Polytechnique Fédérale de Lausanne, Ingegneria dei Sistemi S.p.A., Inexia, Ecole Nationale des Travaux Publics de l'Etat, ME2i, METRO C scpa, OHL Group, RAZEL, University of Leeds, Société Nationale des Chemins de Fer Français, Tallinn University of Technology, University Roma Tor Vergata, Université de Limoges, Cistème, MI Partners

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