Overhead line measuring system
Introduction to EUROPAC

EUROPAC is gathering major European railway stakeholders around a research project on vehicle infrastructure interaction through the pantograph-catenary contact. The project aims at enhancing interoperability between pantographs and catenaries, decreasing the number of incidents related to this system, and reducing maintenance costs by switching from corrective to preventive maintenance. On that purpose, EUROPAC is developing a comprehensive system composed of joint software for interoperability, a track-side monitoring station and an on-board monitoring system. EUROPAC is budgeted at 4.9 million euros and is co-funded by the European Commission within the Sixth EU Framework Programme for Research and Technological Development (FP6). Project start: 1st January 2005 - Term: 3 years

EUROPAC project partners

- SNCF (France) - coordinator
- Alstom Transport (France)
- ARTTIC (France)
- Banverket (Sweden)
- České dráhy akciová společnost (Czech Republic)
- Deutsche Bahn (Germany)
- Faiveley Transport (France)
- Kungliga Tekniska Högskolan (Sweden)
- Instituto Superior Técnico Lisboa (Portugal)
- Mer Mec S.p.A. (Italy)
- Politecnico di Milano (Italy)
- Réseau Ferré de France (France)
- Rete Ferroviaria Italiana S.p.A. (Italy)
- Trenitalia S.p.A. (Italy)
- Union Internationale des Chemins de Fer (France)
- Výzkumný Ústav Železniční, a.s. (Czech Republic)

EUROPAC website

www.uic.asso.fr/europac

Glossary

DSS: Decision Support System
RTA/RTDA: Real Time Data Analyser
T: Task
Transfer function: Relates the measured data to the actual data (for example, because of resonance effects a measured force of 10 N may correspond to a true force of 8 N)
Reference

The contents of this dissemination document is based on the information of the genuine deliverable "EUROPAC-D42-MM-R3.0" which is a confidential document directed for the use of the EUROPAC consortium members only. The dissemination information includes therefore selected information for public access. This selection has the approval of the EUROPAC consortium.

Deliverable's information

The document contains the description of the measuring system prototype without real-time data acquisition, data analyser and decision support system. The deliverable describes only the multi-sensor system, interfaced with acquisition system/control unit and adapted to be installed onto a high speed prototype. The system will be operated in stationary conditions. The document contains a description of the employed pantograph, here referred as “EUROPAC pantograph”, and a description of each sensor, with corresponding specifications.

Implementation

The pantograph

The EUROPAC prototype was mounted for the first time on a Czech locomotive and a measuring coach was used to collect data and assist the tests during the first campaign held near Velim (CZ). A second set of tests will be carried out on a high-speed line in France, the prototype will be mounted on a TGV and will be assessed the integration and the correct functioning of the integrated system (prototype, RTDAs and DSSs).

The chosen pantograph is a Faiveley CX 25kV with Eurostar bow, instrumented by SNCF with sensors provided by Mer Mec, SNCF and DB.
The contact forces between the pantograph and the catenary are adjusted by using pneumatic cylinders in the wiper armature. These elements can tune the stiffness of the pantograph upper stage, optimizing contact at any speed and boosting its performance. Special aerodynamic airfoils were designed and fitted up, as well as three different sets of sensors.

The pantograph and all the equipment were first assembled and tested on a DB test bench.

The sensors

The need to measure and collect data both on the catenary contact and on the location & environment, conducted to set up three groups of sensors:

- Contact wire and catenary diagnostic (load cells, acceleration, arcing, main frame and plunger vertical distance measuring sensors, etc.);
- Speed and location sensors (GPS for location and speed, Radar Doppler for position on the rail, encoders, odometers, etc.);
- External condition sensors (temperature, air humidity, track-car body distance measuring sensors, etc)

In order to concentrate all the efforts not in developing new measurement systems, all the sensors are standard equipment and were tailored to accomplish integration and required specifications.
Conclusion

The prototype is implemented and improved after the analysis of the raw data with the aim to deliver a tool able to collect data of great quality and reliability during the second test campaign in France. This scope, the experience and the data collected in Velim are important.

The prototype will be used during the second test campaign on the TGV line in France.
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