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New Wuppertal Sky Train: Commissioning Tests

Testing the New “Generation 15” Train Cars With imc Data Acquisition Systems

imc Test & Measurement
Application Note

APPLICATION NOTE

Wuppertal On Cloud Nine

The sky train is considered to be the landmark of the North Rhine-Westphalian city of Wuppertal. Since 1901, inhabitants and visitors alike have been hovering above theis mountainous metropolis with this unique means of travel. Around 85,000 passengers use the suspension railway on a daily basis. The sky train has always been a robust means of transport for even the largest and heaviest of passengers – e.g. when a young elephant went for a ride. During a publicity stunt in 1950, this young rider, named “Tuffi”, panicked while underway in the train. The nervous animal broke through a window and jumped into the Wupper River below. Luckily, the young elephant came out with only a few scratches, and the myth of the sky train became even richer. But the history of the train continues – recently, the new “Generation 15” train cars were launched. For commissioning tests, measurement systems from imc were used.

New Train Cars for Wuppertal

Technically, the Generation 15 train cars represent a new development. One step forward is the use of three-phase asynchronous motors with the possibility of energy recovery during the braking process. The electronic equipment on the overhead railway has been dramatically changed, and the ETCS signaling, control and train protection system has been installed. With the new overhead railway, the replacement of the old fleet of articulated train cars built between 1972 and 1974 was ushered in.

FIGURE 1.
New Wuppertal sky train.

© image: WSW

Commissioning Test

FIGURE 2.
Three imc measurement devices in operation,

© image: PROSE AG

In such a large project, as with the introduction of the new sky train, numerous companies are involved. On behalf of Vossloh, the general contracting firm entrusted with vehicle con-struction, PROSE AG was contracted with the entire mechanical development of the new vehicles and the system integration of the Wuppertal sky train.

For the commissioning tests of the new sky train, PROSE AG focused on the diversity of the measurement solutions offered by imc Meßsysteme GmbH. Three imc CRONOS measurement systems with four UNI2-8 amplifier cards were used. Each of the imc measurement devices has 32 channels. The robust and compact design is ideally suited for mobile applications.

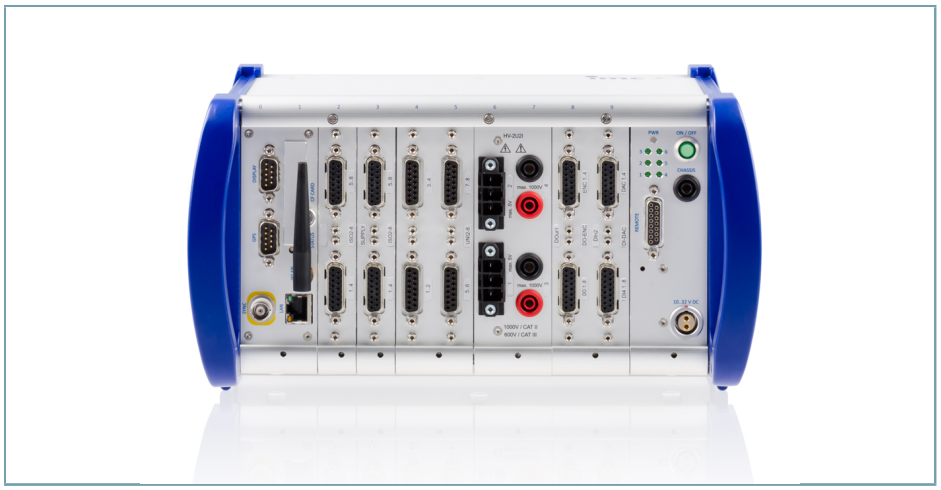

FIGURE 3.
imc CRONOS-family measurement device

Acquisition of Strain Signals

A large part of the channels served to record strain signals in order to be able to make safety-relevant assessments of the structural components. The resistance changes detected by strain gauges represent the minimal changes occurring within the structure. For example, these measurements were made to extensively test the fatigue strength of the train car bodies, bogies and articulation points.

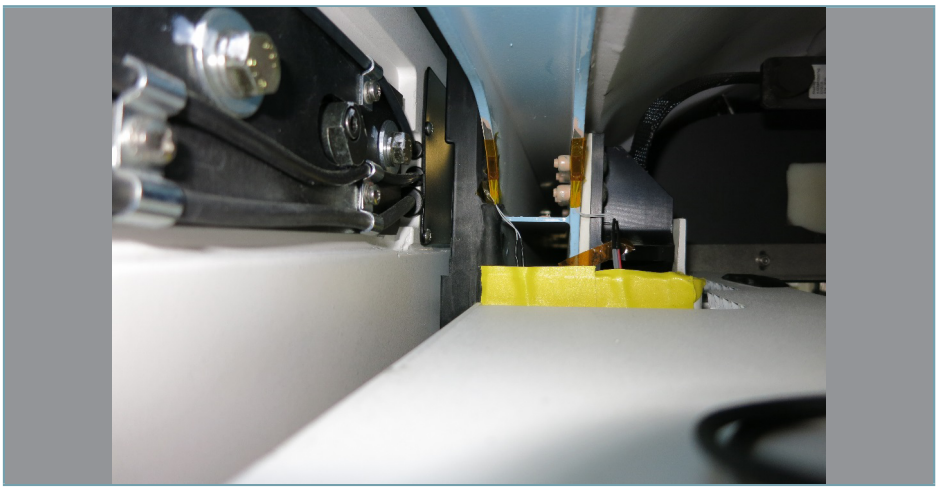

FIGURE 4.
Strain gauges applied to train car structure,

© image: PROSE AG

The recording of strain gauge signals requires precise and reliable measurement devices since the voltage signals to be measured are in the range of a few microvolts. imc CRONOS systems were the ideal solution. It was possible to record frequencies relevant for the measurements of up to 200 Hz and to process signals with a correspondingly high resolution.

The Configuration

The imc CRONOS measurement devices have been configured with imc STUDIO software. A clear channel list for configuration, extensive sorting and filtering functions, numerous assistants, integrated sensor management and TEDS support are just a few of the helpful features that have brought the test engineers to their target.

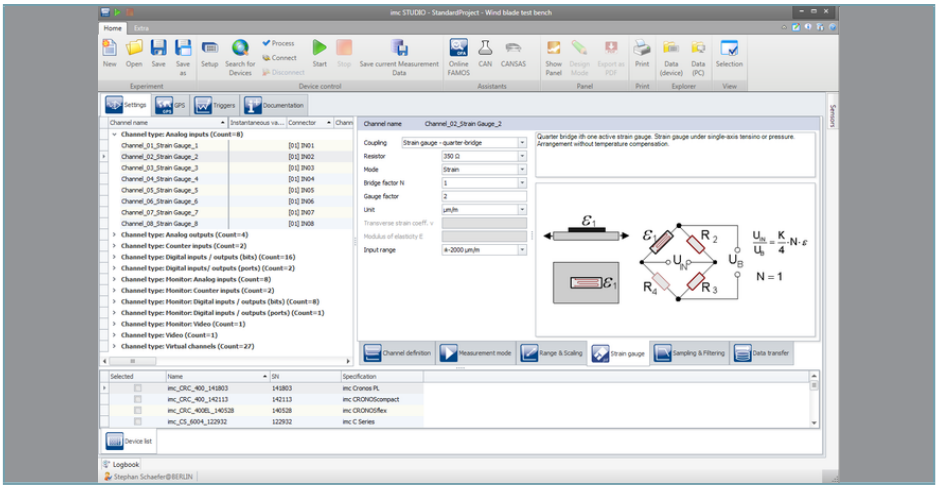

FIGURE 5.
imc STUDIO software

The interplay of software and hardware worked perfectly. The desired settings of the recording devices can be realized easily and simply via the user interface.

Conclusion

An on-time and safe commissioning of the new Wuppertal sky train was made possible, among other things, by the robust and proven measurement solutions from imc Meßsysteme GmbH. Together with the know-how of PROSE AG, which have accredited testing centers in the field of rail vehicle technology, successful project implementation was possible.