

## New Wuppertal sky train: commissioning tests

Testing the new "Generation 15" train cars with imc measurement systems



New Wuppertal sky train, © image: WSW

## 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 the 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., 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



New Wuppertal sky train, © image: WSW

Technically, the Generation 15 train cars represent a new development. One major technological progress consists of the use of three-phase asynchronous motors with the ability to recover energy during the braking process. The electronic equipment on the overhead railway has been completely remodeled, and the new ETCS signaling, control and train protection system has been installed. With the introduction of these modernized and rede-

signed train cars, the old fleet, build between 1972 and 1974, will be replaced.

## Commissioning tests



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 construction, 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.

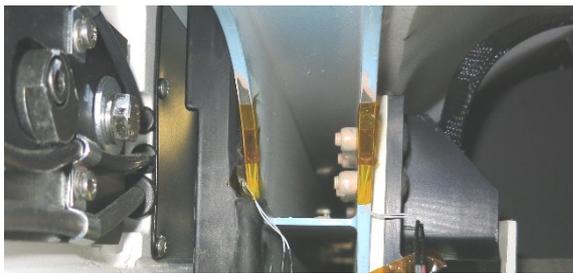


imc CRONOS-family measurement device

## 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 flexion and stress within the structure. In particular, these measurements were made to extensively test the fatigue strength of the train car bodies, bogies and articulation points.



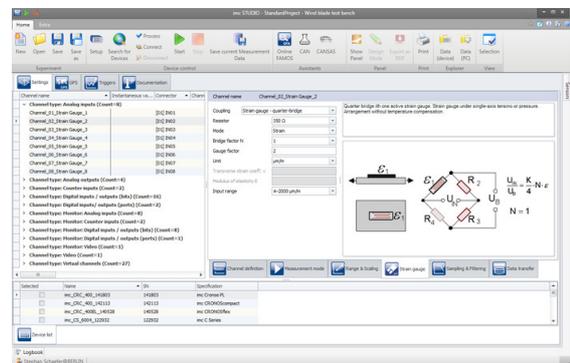
Strain gauges applied to train car structure, © image: PROSE AG

Recording of strain gauge signals requires precise and reliable measurement devices since the voltage signals to be measured are in the range of only a few microvolts. imc CRO-NOS systems were the ideal solution.

It was possible to record sensor signals with relevant spectral content of frequencies up to 200 Hz and to process that information 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 supported the test engineers to quickly fulfill their tasks and reach their targets.



imc STUDIO software

The interplay of software and hardware worked perfectly. The desired configurations of the recording devices could be set easily and simply via the user interface.

## Conclusion

Commissioning of the new Wuppertal sky train, on schedule and safe, was facilitated, among other things, by the robust and proven measurement solutions from imc Meßsysteme GmbH. Close cooperation with PROSE AG, which have accredited testing centers and extensive know-how in the field of rail vehicle technology, ensured successful project implementation.

## Additional information:

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For over 25 years, imc Meßsysteme GmbH has been developing, manufacturing and selling hardware and software solutions worldwide in the field of physical measurement technology. Whether in a vehicle, on a test bench or monitoring plants and machinery – data acquisition with imc systems is considered productive, user-friendly and profitable. So whether needed in research, development, testing or commissioning, imc offers complete turnkey solutions, as well as standardized measurement devices and software products.

imc measurement systems work in mechanical and mechatronic applications offering up to 100 kHz per channel with most popular sensors for measuring physical quantities, such as pressure, force, speed, vibration, noise, temperature, voltage or current. The spectrum of imc measurement products and services ranges from simple data recording via integrated real-time calculations, to the integration of models and complete automation of test benches.

Founded in 1988 and headquartered in Berlin, imc Meßsysteme GmbH employs around 160 employees who are continuously working hard to further develop the product portfolio. Internationally, imc products are distributed and sold through our 25 partner companies.

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