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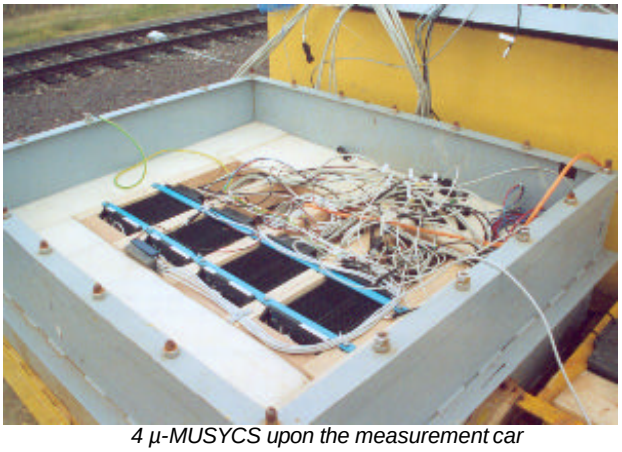
SAFE TRAIN

The object of the measurement is the so-called 'SAFE TRAIN' project. This project involves train collisions conducted by companies such as Bombardier, DB, SIEMENS AG, as well as other European railway institutes and companies.
So far, three crash tests have been performed under the umbrella of the DB and Bombardier near the city of Wroclaw (Breslau) in Poland (a test track of the Polish train institute CNTK).

The background of the test is an EU-wide effort to improve and standardize safety specifications applying to trains in crashes or similar accidents. Further aims have been to study the exact effects of train crashes as well as to evaluate and approve train model designs. In that context, an additional reason for this particular study was to test a damper mechanism between two cars. The dampers worked as shock absorbers and had the job of preventing the derailment of the cars.

The measurement was performed by a group of engineers from Bombardier.



4 µ-MUSYCS upon the measurement car

Nested in a metal housing directly upon the third car, packed and protected by a wooden frame and lots of foam materials, 4 µ-MUSYCS measurement systems were used by the Bombardier team. The system had to withstand a frontal crash of 54 km/h.

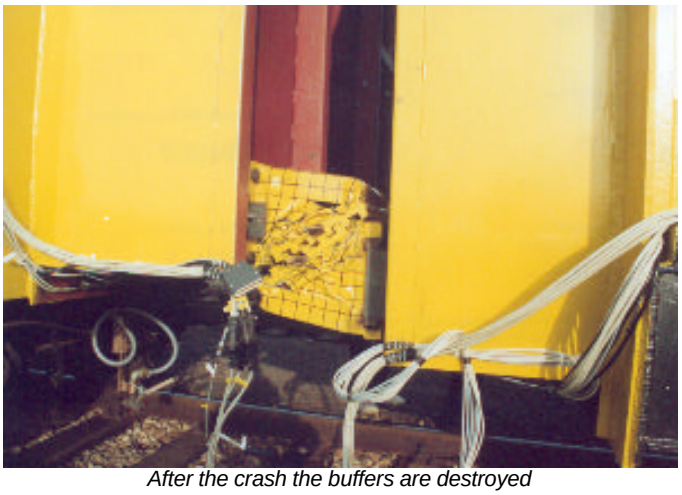
During that crash the entire system had to acquire and to store data from 24 channels. The required sampling rate was 10 kHz per channel.
Signals were: displacement, acceleration, force and strain gauges as well as some digital signals.

Measurement and video preparations before the crash

At the same time, high-speed cameras captured every single move between the two crashed cars and observed the shock absorbers (dampers) between them.

The dynamic force of over 80,000 kg weights on the rail is not easy to withstand. The shock-proof measurement system consisted of 4 identical imc systems.

- µ-MUSYCS standard housing (shock resistant up to 30g during the measurement)
- 9…36 V DC uninterruptible power supply
- 4 channel DC bridge amplifier + filter board
- Online FAMOS for online digital filtering
- PCMCIA-hard disk
- µ-MUSYCS in self-start-mode without PC connection



After the crash the buffers are destroyed

Post-processing and data-evaluation were performed with the help of the off-line data analysis tool FAMOS.