# Seisenbacher

## Setting the Table for Safety

**Ensuring Rail Passenger Safety with Virtual Validation and Testing**

Simulation solutions help service provider and railway interior manufacturer Seisenbacher gain valuable insights in the development of its new patented table system.

Simulation reduces the need for physical testing, increases product quality and ensures passenger safety in railway vehicles – ultimately paving the way to make every physical test pay off.

*"Without simulation, costly physical testing results are almost worthless because there's nothing our team could compare the results with. In other words – no simulation, no insight. Using simulation, we can evaluate and understand the impact of different parameters better, gain insights from the physical measurements, and build better products."*

**Jakob Anger, R&D Mechanical Engineer Product Development, Seisenbacher**

What do you need to feel comfortable when travelling by train: an aisle seat with a table to work at? A plug socket? A USB port? Workstation tables in trains (and other vehicles) have become a crucial element that increases passenger comfort, especially for people who have to work while travelling. Since they're so popular, these tables have to withstand a lot. As such, manufacturers must ensure that their designs comply with quality and durability standards, pass operational tests and can withstand repeated long-term use.

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Seisenbacher, a service provider and manufacturer of innovative railway interior solutions based in Ybbsitz, Austria, knows these tests all too well. Until now, these tests only made sure that nothing happens to the table when hit by passengers or objects. But Seisenbacher looked at the other side, too, asking: How can we protect passengers in a collision should they be thrown against the table? Fortunately, train collisions are rare in Europe. That said, any crash is a threat to passenger safety. When Seisenbacher started to include its innovative table systems in its list of interior solutions, the company wondered why no international applicable safety standard existed for these types of train tables.

As an innovative development partner for the railway industry, Seisenbacher wants to go beyond the current standards and think ahead. Thus, the idea for the new Crash Absorbing Table System (C.A.T.S.) was born – a table for the future of railway public transport that addresses passengers' increasing needs and demands for comfort, design and safety.

## C.A.T.S.: Safer Tables for European Tracks

C.A.T.S. features a crash element developed for the secondary impact after a collision, which is integrated under the table surface in a metal frame to absorb and diffuse impact energy through friction and shock absorption. Seisenbacher wanted to perform comprehensive simulations and tests to show that C.A.T.S. significantly reduces injury risk.

Upon realising that there were no international applicable safety standards regarding train tables, Seisenbacher drew upon the American Public Transportation Association (APTA), which outlines passenger safety regulations in seating scenarios with fixed workstation tables in railway vehicles. APTA's goal is to reduce the serious injury risk should passengers be thrown against a table during rail accidents.

## Safety Needs Testing

It's no secret that product testing is an expensive investment for manufacturers, particularly for the railway interior sector. For a one-week test series (five tests) that's supposed to provide meaningful results, you need a test hall, meticulous preparation and a special crash test dummy equipped with the right sensors. For the test series with the new table design, Seisenbacher used the H3 and THOR-50M model. The preparations, prototypes, test hall and dummies alone cost the company €100,000 per week, or €20,000 per test. It's obvious that with these enormous costs, each test must give manufacturers usable, insightful results so their money is used in the best possible way.

## How to Maximise Costly Physical Testing

The main development challenge for this table system was developing the crash absorber that would make this table system stand out. Seisenbacher immediately

saw the need to virtually model its product to better prepare and select conclusive test scenarios. With that in mind, it turned to **Altair** for simulation solutions that would empower them to build virtual prototypes.

The Seisenbacher team started with creating the model in **Altair ® HyperWorks ®** and then performed several crash simulations with **Altair® Radioss®** using the Humanetics crash test dummy models provided via the **Altair Partner Alliance** to compare the simulations with the physical test results. Together with Altair, the team created a simulation model that provided reliable information that helped them identify possible improvements. *"The Altair solutions and comprehensive support were key to derive insights from the physical testing,"* said Jakob Anger, R&D Mechanical Engineer Product Development, Seisenbacher. *"Without simulation, the costly physical testing results would be almost worthless because there would nothing to compare the results with. In other words – no simulation, no insight. Using simulation, we can evaluate and understand the impact of different parameters better, gain insights from the physical measurements, and build better products."*

Additionally, with simulation, the test series can be optimised since the simulation results can be considered in the test setup. *"Thanks to simulation, we were able to focus on the most important issues during the five days of physical testing,"* Anger said. *"With simulation, you can even draw knowledge from a physical test that's considered a failure. Without simulation, it simply wasn't possible to incorporate optimisations since there's too little knowledge."*

## Virtual and Traditional Testing: Harmonising for Greater Insight

Seisenbacher goes beyond the given 'vandalism' load case scenarios to develop a new design that focuses on safety, a topic which has received little attention in Europe so far. The final product is C.A.T.S., which enables the adaptation of passenger areas and customer preferences in compliance with all applicable passenger safety regulations, the APTA PR-CS-S-018 Rev. 2 guideline in particular. The new table design is both safer and more visually appealing; best of all, the new safety features are invisible to passengers, creating a seamless user experience.

Comprehensive simulations using Altair solutions and lab tests prove that C.A.T.S. is more effective regardless of travel direction or seat orientation and that risk of injury is significantly lower in all possible seating configurations. At the same time, the modular system offers a great deal of seating area customisation, enabling increased consideration of passenger needs and customer design requests. Seisenbacher's C.A.T.S. shows how virtual testing complements and augments physical testing and ensures that manufacturers are getting their money's worth on every euro spent on physical testing. Ultimately, C.A.T.S. paves the way towards a new rail travel table system and, in the long run, the travel experience of the future.

*"It does not matter if train collisions are exceedingly rare in Europe – if we save just one life with this development, then it was worth the effort,"*

**Christian Forstner, Head of Sales and R&D, Seisenbacher**

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