

# Press Release

Date: March 2024  
Topic: Drop Test Design: Student Team Relies on Miniature Shock Absorbers Sponsored by ACE

Miniature Shock Absorbers

## **Impact without Rebound: Students Opt for ACE's Miniature Shock Absorbers for Drop Test Construction**

**When testing wheelchairs, manufacturers play it safe for understandable reasons. That is why three aspiring mechanical engineers took no risks when they developed a drop test construction for wheelchairs on behalf of the renowned German company MEYRA. They relied on miniature shock absorbers made by ACE to protect the inner life of their construction.**

Recently, Arne Hankemeier, Julian Raimann and Tobias Ridder completed their training as state-certified technicians in the field of mechanical engineering at Felix-Fechenbach-Berufskolleg, a vocational college in Detmold, Germany. Volker Geise, responsible for educational management there, states that the proportion of practice-oriented work is very important in the mechanical engineering department at the technical college. Therefore, he welcomed right from the start that his three graduates wanted to work closely with nearby company MEYRA GmbH as part of their final thesis.

As a member of internationally operating MEYRA Group from Kalldorf, Germany, the company is one of the leading manufacturers of high-quality wheelchairs and has also made a name for itself as a supplier of rehabilitation equipment. Following their claim "We move people", MEYRA supports and motivates many people with disabilities around the world to achieve more mobility and independence. It is also constant exchange with those affected as well as with medical experts and those in therapy and care that enable MEYRA to develop

practice-oriented products, last not least in close cooperation with medical supply retailers. This holistic, practical approach was very suitable for the learning group at the German college, although another connection existed: Tobias Ridder, one of the three young talents, was already working as a designer for custom-made products at MEYRA when he decided together with Arne Hankemeier and Julian Raimann to develop a professional drop test unit for wheelchairs as his final thesis at the college. With full support from his employer, they embarked on building a construction that is mainly intended to test the load capacity of MEYRA's new wheelchair models.

### **Requirement: High load capacity**

The testing unit is designed in such a way that each wheelchair is loaded at first with the maximum permissible weight and then gets moved into the construction. Each model is then latched onto a gripper and raised using pneumatics and, after being latched, dropped from a previously defined height. To dampen the force of the lifting device's impact plate and to protect their whole structure the three technicians considered installing shock absorbers. This plan was backed by their goal that not only the stability of the wheelchairs should be proven, but the test device itself should also be as stable as possible and not have to be repaired after just a few cycles of use.

In an interview the students said, they were familiar with one of the main advantages of hydraulic damping elements in that they work without rebound effects due to their linear characteristics. "Thanks to a presentation by ACE Stoßdämpfer GmbH, which we were able to join as part of our lessons, we knew that certain shock absorbers can not only solve the tasks of deceleration better in terms of their damping properties, but they also help ensure that testing is carried out more quietly than before, especially when comparing the damping tasks to the performance of steel springs or rubber buffers," remembers Arne Hankemeier.

Since ACE offers tools for sizing on their homepage [www.acecontrols.co.uk/uk/sizing.html](http://www.acecontrols.co.uk/uk/sizing.html) and since many other helpful services accompany the products, the students turned to ACE's European headquarter in Langenfeld, Germany. To their delight the sales engineers not only confirmed the design data of the young engineers on the phone, they also sampled them with four miniature shock absorbers free of charge. This support of young engineers has been ACE's practice for years, as the company has experienced that sponsoring young academics and technical schools often result in innovative solutions and even new product series.

## **Problem solvers: Hydraulic damping elements**

After the team received the four MC25EUM miniature shock absorbers from ACE everything happened very quickly: Due to their compact design the hydraulic components are predestined to be quickly integrated, also into already existing designs. Available in versions with and without diaphragm seal technology, the shock absorbers optimize a variety of machines by decelerating masses quickly and non-destructively. Customers can choose between adjustable and self-compensating versions. The latter were used in this case. The outer bodies of the miniature shock absorbers are produced from one solid piece of steel and are filled with temperature-stable special fluids. These hydraulic machine elements also come with integrated positive stops and are maintenance-free, having been developed and perfected by ACE, the technology and market leader for industrial shock absorbers for more than 60 years. The models used in this application provide a stroke of 6 mm and are suitable for energy capacities of 2.8 Nm per cycle.

The teamwork of the three college graduates worked perfectly throughout the entire project. Tobias Ridder took over the design, while Arne Hankemeier and Julian Raimann were responsible for design and documentation. In the end, the integration of the four components sponsored by ACE was a small exercise, says Arne Hankemeier and draws this positive conclusion: "We were able to make the adjustment precisely using the continuous thread of the components and reliably hold it in the preset positions using the supplied lock nuts. These dampers really absorb the permissible load reliably, quietly and quickly and fulfill their purpose to the fullest extent. We have also noted very happily in our test series that quite a variety of large masses can be decelerated almost without any noise and certainly with no rebound within the small space of our construction."

922 words, 5,959 characters with spaces

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## Pictures and Captions

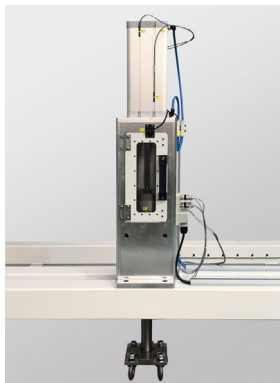
Picture 1 ACE MC at FFB and Meyra drop test unit.jpg



Drop test unit for testing the stability of wheelchairs with controls in the foreground on the right and the pneumatically operated construction for engaging and disengaging the wheelchairs at the top

**Credit:** Felix-Fechenbach-Berufskolleg

Picture 2 ACE MC at FFB and Meyra test pneumatics.jpg



The wheelchairs are latched, pneumatically lifted, unlatched and dropped, with the sensitive inner workings of this device being hydraulically dampened

**Credit:** Felix-Fechenbach-Berufskolleg

Picture 3 ACE MC at FFB and Meyra drop test unit absorbers.jpg



The impact plate itself must not impact, which is why four ACE miniature shock absorbers reliably and precisely reduce the mass forces to protect the overall structure

**Credit:** Felix-Fechenbach-Berufskolleg

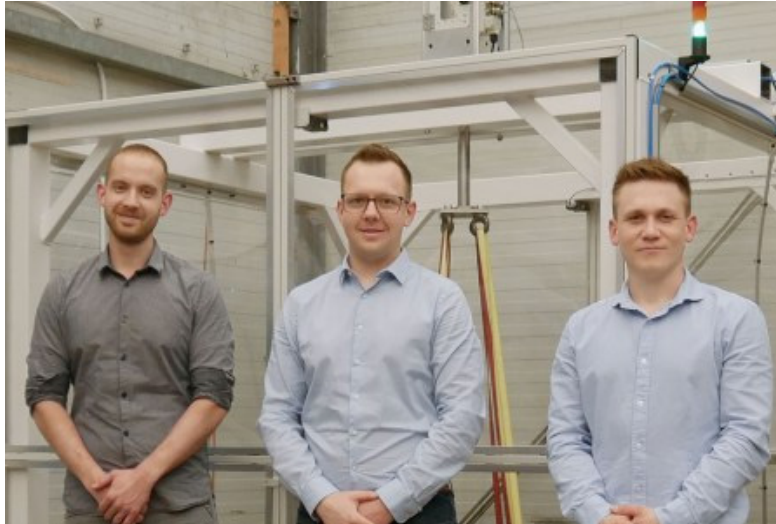
Picture 4 ACE MC5-MC75.tif



Self-adjusting miniature shock absorbers from the MC5 to MC75 series made by ACE with thread sizes from M5x0.5 to M12x1 for the reduction of effective weights between 0.5 kg and 72 kg

**Credit:** ACE

Portrait Engineers and their drop test unit.jpg



Julian Raimann, Arne Hankemeier und Tobias Ridder (from left to right), state-certified technicians in the field of mechanical engineering at Felix-Fechenbach-Berufskolleg, in front of their construction

**Credit:** Arne Hankemeier

**Links**

<https://www.acecontrols.co.uk/uk/products/automation-control/miniature-shock-absorbers.html>

<https://www.acecontrols.co.uk/uk/products/automation-control/miniature-shock-absorbers/mc5-to-mc75/mc25eum.html>

<https://www.acecontrols.co.uk/uk/sizing/automation-control/online-calculation.html>

<https://www.youtube.com/user/acecontrolsglobal>

<https://www.meyragroup.com/>

## Trade fair dates

March 25 – 28, 2024, Global Industries, Paris, France, Hall, Booth: 5C14

April 23 – 26, 2024, Control Expo, Stuttgart, Germany, Hall, Booth: 5, 5203

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