

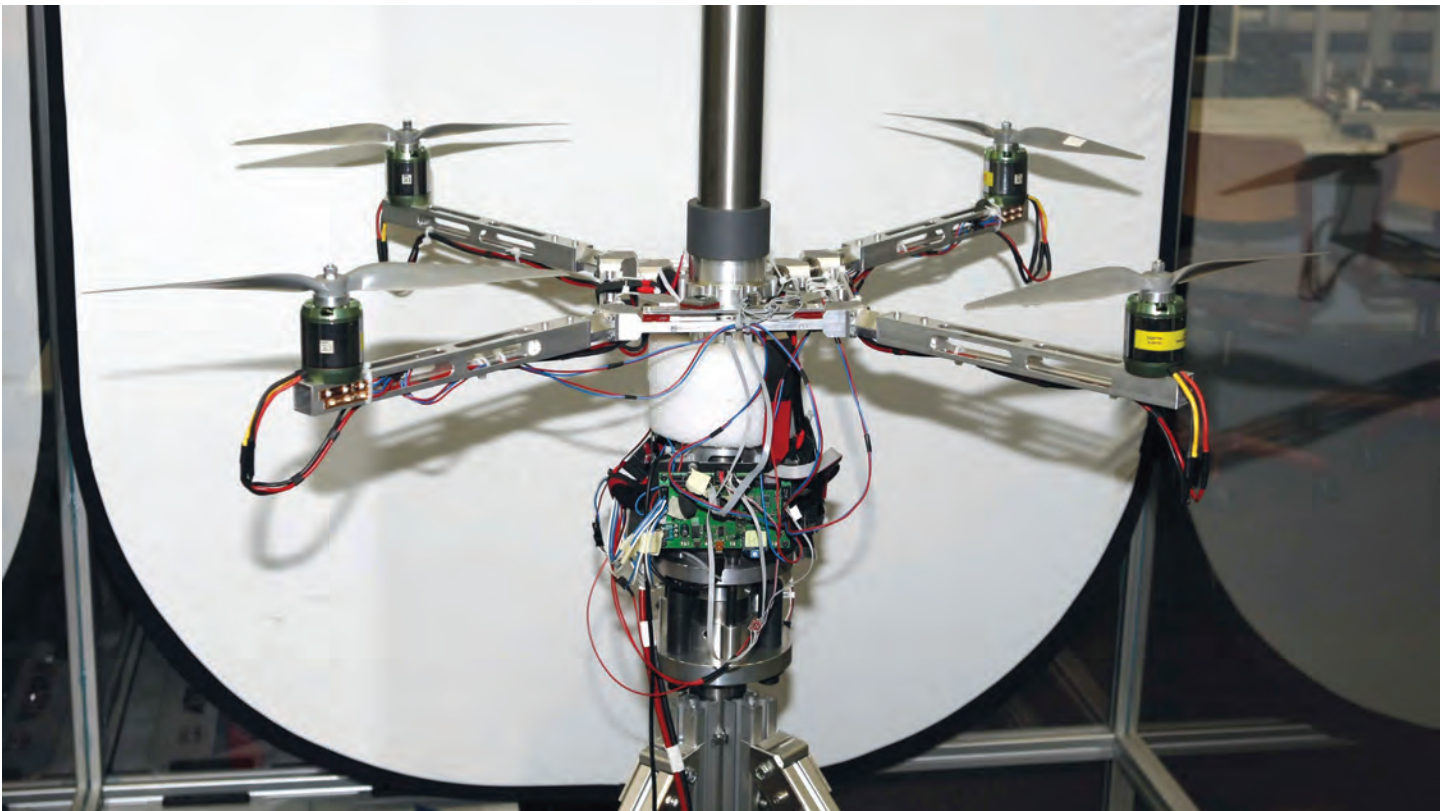
Protecting Falling Quadcopters With ACE Shock Absorbers

If you were to observe the graduate engineering students at the Technical University of Central Hesse (THM), you might think what they were doing was more fun than work. The students were working with a quadcopter: a four-rotor aircraft that can elegantly hover in the air.

As part of their studies in robotics, these students first learned how to fly the quadcopters—including how to measure their acceleration and angular velocity during

flight. They also learned about the aircraft's various sensors, such as air pressure sensors, which help control a flying quadcopter's position.

Although a relatively affordable technology, quadcopters must nevertheless be protected against damage in the event of a crash. Although the aircraft itself has a seemingly simple mechanical design, it integrates an array of costly components, such as accumulators, three-phase drives, sensors and cameras.



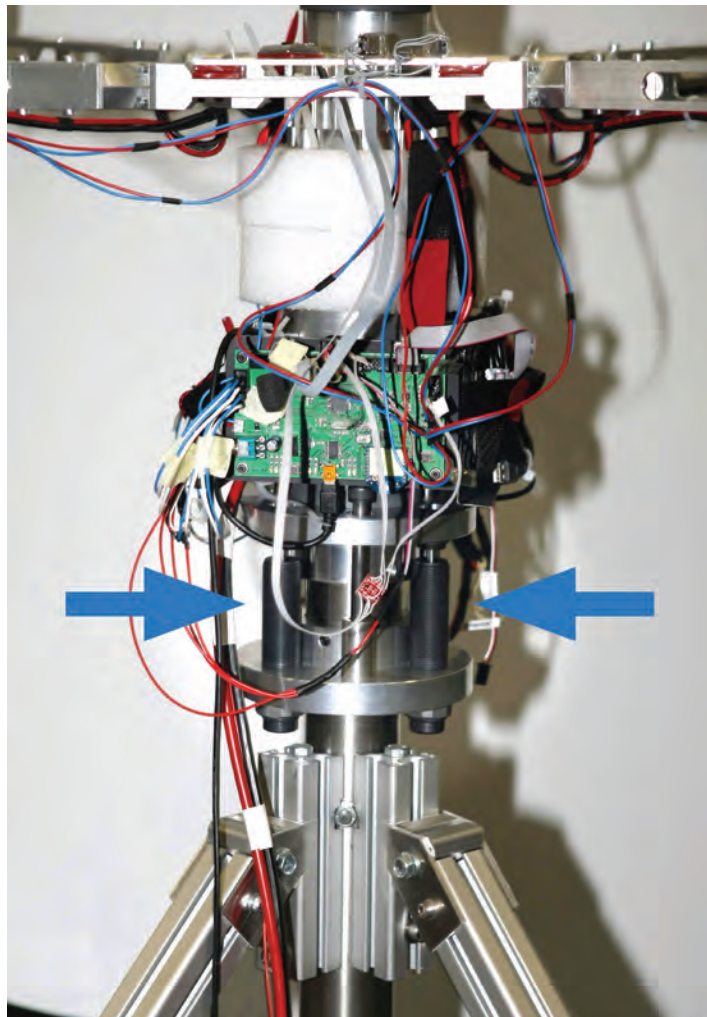
Quadcopters are part of students' robotics projects at the Technical University of Central Hesse.

Dampening Free Fall. For their project, THM's engineering students were tasked with designing the control parameters that allow the quadcopter to maintain a stable position during flight. Because quadcopters can fly in loops or along tight curves, they also had to account for how the aircraft might fall, potentially making impact with the ground on more than one side. They therefore outfitted their quadcopters with three shock absorbers from ACE, placing them on the top and bottom of the aircraft.

"They're compact and have excellent shock-absorbing properties," explained Michael Großfeld, teacher and research associate at THM's Laboratory for Robotic



ACE miniature shock absorbers (type SC650EUM-0) feature a long stroke and can be fitted with a linear or progressive brake curve.



The shock absorbers protect the quadcopter's components, including its accumulators, three-phase drives, sensors and cameras from damage in the event of a crash.

Actuator Sensor technology (LRAS). "These components work by dampening the impact during a crash, ensuring the system doesn't get damaged."

ACE miniature shock absorbers (type SC650EUM-0) are ideal for soft damping, thanks to their long, 25.4 mm strokes that produce smooth deceleration and low reaction forces. These maintenance-free, ready-to-install hydraulic machine elements can be designed with a linear or progressive braking curve and are equipped with an integrated positive stop for use in automation, including linear slides, pneumatic cylinders and handling modules. For this application, the shock absorbers dampened the quadcopter load (which was measured to be approximately 10 kg) by a 73 Nm/stroke—which was more than sufficient, as the dampers can handle loads up to 2,000 kg.

Additionally, ACE miniature shock absorbers were preferable to Großfeld and his team because of the ease with which they can be customized. Nickel-plated or weartec finish (seawater resistant) and other special finishes are available, as are models without a rod end button—making them a good fit for both present and future quadcopters, no matter what design iteration they take.

To learn more, please visit: www.acecontrols.com