Can damping increase the performance of a hydraulic cylinder?

Barbara Schulz

Germany-based AHP Merklin has optimised the damping in hydraulic cylinders and introduced a linear damping concept, an innovative and ground-breaking new solution, the company claims. We wanted to learn more and talked to Development Engineer Philipp Santen.

**INFO**

AHP Merklin, Göttingen, Germany has been developing, designing and manufacturing high-quality hydraulic cylinders since 1973. It has around 150 employees in nearly 20 international agencies around the globe.

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**Q&A**

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Phillip, you were significantly involved in the development of linear damping. What was the motivation for this project?

Customers are increasingly demanding ever more powerful hydraulic drives and at the same time aim to further shorten cycle times. Our high-quality cylinders have an enormous power density. They are designed to move large masses at high speed. However, damping can quickly become the limiting factor here, because an accelerated mass must be decelerated again in its end position – a fact that is often neglected. Exceeding the damping limit here can lead to damage to the cylinder, a shorter service life of the cylinder and in the worst case a failure of the entire system. With the new linear damping, we eliminate these restrictions. The customer can specifically design the cylinder and thus the damping capacity for his specific application. Our intention was to develop a solution that would make the big unknown factor – damping – calculable and thus easier to grasp. This in turn makes it possible to increase the efficiency of the cylinder and the entire system.

Linear damping is a brand-new innovation. Among other benefits, you also promise greater efficiency and performance of the cylinder. What is the secret of linear damping?

It is very simple: The secret lies in the way it [the damping] is delayed. Linear damping achieves the fastest possible deceleration with little load for the cylinder. It does the same damping work, but in the shortest possible time.

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Indicates whether the damping is suitable or not.
In this context, it is perhaps also noteworthy that we offer useful workshop and training through our training programme at the "AHP Technikum". Linear damping will be a focus topic during our practice days. And when push comes to shove, we remain true to our promise: We are only a phone call away and always happy to help.

When will linear damping be available?

The new damping is already available, but for the time being only as a special cylinder. This year, we will successively introduce linear damping for all hydraulic cylinders of the HZ series.

How long have you worked on linear damping and what is development at AHP Merklin like?

At AHP Merklin, we have been working intensively on the damping of hydraulic cylinders for three years now, simply because practical experience has shown us that there is a component that potentially introduces uncertainty into the system. Or to put it another way, eliminating this factor would open up great potential.

Step by step and in many experimental set-ups, we have tested the damping and found a way to mathematically describe its operations. With this knowledge, we could then focus on the mechanical optimisation of the damping.

We are here in your state-of-the-art test lab, your second workplace. What activities do you perform here?

We carry out all relevant tests in the test lab, whether it is testing new sealing or control concepts, or the tests for the development of linear damping, which were also carried out here. Of course we also test the prototypes of our new cylinders in our test lab. In our specificity designed, very solid end position test bench with its extremely flexible hydraulic unit, we can provide enough power to accelerate even large cylinders. Because we can simulate different application scenarios, we also perform tests in close cooperation with our customers here.

Why do you think linear damping will win over customers and prevail in practice?

Linear damping is absolutely beneficial for the customer. It allows you to move larger masses faster and to reduce cycle times. I believe that for certain applications, like moving very large masses or synchronised cylinders, there is simply no alternative to linear damping. The usability offers decisive advantages when selecting and setting up the appropriate cylinder. During operation, linear damping helps prevent damages and prolongs the cylinder's service life. Our cylinders from the HZ series, which will gradually be equipped with linear damping this year, are identical to their predecessors, so they require no adjustments. Plug and Play. These are all arguments in favour of linear damping.

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Philipp Santen, Development Engineer, AHP Merklin