

# We test the future!



Battery systems



Hydrogen applications

## Sincotec NEWS

### **Energieefficient testing and reducing costs**

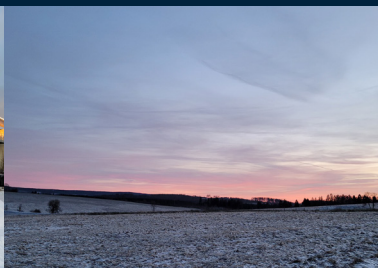
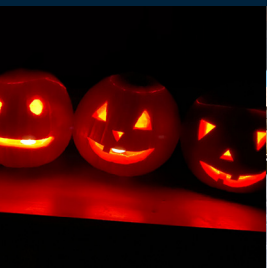
Save energy with our resonance test systems!

### **Unique on the market - Newly developed hydraulic wedge clamping device**

Universal clamping device for flat and round specimens for nominal forces from 5 kN to 2,000 kN axial force

### **With high-pressure into the future**

Testing under hydrogen atmosphere



Dear SincoTec friends,  
dear SincoTec customers,

times are still very dynamic. Issues such as rising energy prices, high inflation, Ukraine war, supply shortages and Covid continue to determine our daily actions. Never before it has been so important to use energy wisely, economically and to reduce consumption.

The era of cheap energy is suddenly over, and we all face daily the question of how to save precious energy: in our private lives, when driving our cars, and when heating our homes - but how is it in your testing laboratories?

Many testing tasks could often be completed for 1/100 of the energy expenditure and much faster on our very energy-efficient resonance test systems.

We look forward to being your reliable, innovative and competent partner in testing technology and fatigue strength in the coming year.

Together we make the world safer!

On behalf of the SincoTec-Teams

Your Dr.-Ing. Joachim Hug,  
your Dipl.-Ing. (FH) Sven Henze  
your Dipl.-Ing. Steffen Krause and  
your Sabrina Hug-Lohmüller, M.Sc.



f.l.: Steffen Krause, Sven Henze,  
Sabrina Hug-Lohmüller and  
Dr. Joachim Hug

## OVERVIEW

### SincoTec Test Systems GmbH

- 3 Energyefficient testing and reducing costs  
Save energy with our resonance test systems!
- 4 Unique on the market  
Newly developed hydraulic wedge clamping device

### SincoTec Test & Engineering GmbH

- 5 Energy efficiency in wheel bearings  
Determination of the frictional torque under load at the wheel bearing
- 6 With high-pressure into the future  
Testing under hydrogen atmosphere
- 7 The rotor and its metal sheet package  
An inseparable connection?

### SincoTec Group

- 8 Our annual company team event  
SincoTec family summer party  
Apprentices get off to a good start!

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### IMPRESSUM

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Sabrina Hug-Lohmüller, M. Sc.



## Did you know, that ...

... you can operate a resonance testing machine with only 4 solar modules?  
World champion in energy saving!

## Energysaving testing and reducing costs

Save energy with our resonance test systems!

**N**ever before have energy prices risen so quickly and unexpectedly. In the past, electricity was simply always available and cheap. You hardly had to worry about it. But since this spring, a lot has changed. Since then, everybody has been looking at areas where can be saved electricity.

Surely you have already replaced your old energy-guzzling lighting with energy-efficient LED lamps to save electricity. But even very energy-efficient test technology can make a big contribution to saving electricity.

Switching to energy-efficient technology does not always have to be expensive. The investment usually pays for itself through the energy savings and, especially at current energy prices, usually within a year.

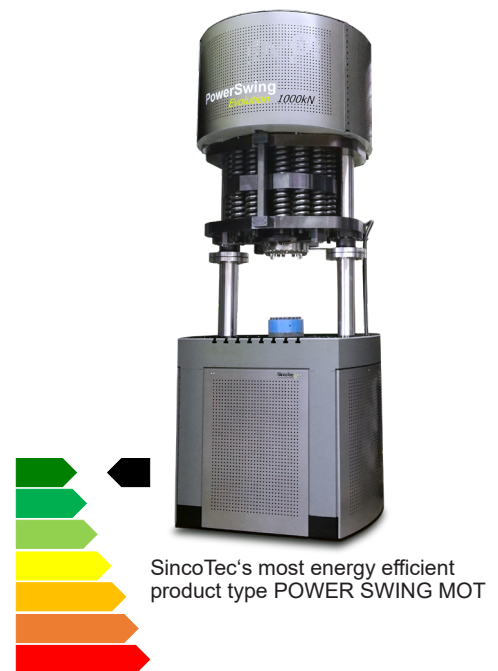
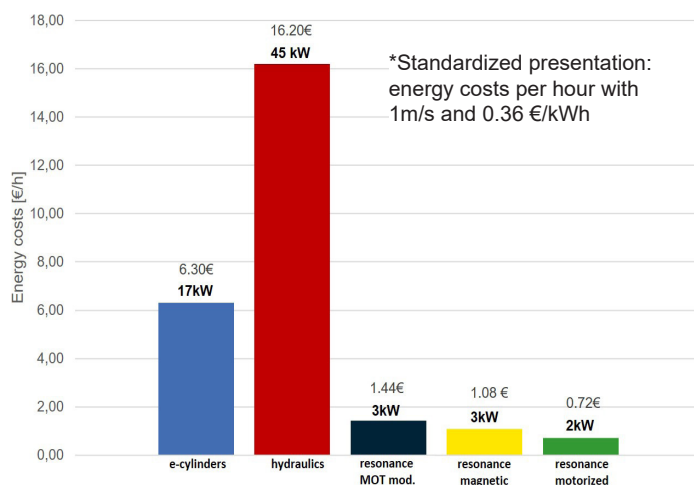
Below in the diagram, the energy costs per hour for the different drive types are shown in comparison. Indisputably, our **POWER SWINGS** are not only very energy efficient, but tests can also be performed 10x faster on a resonance testing system compared to a hydraulic testing machine, saving even more energy.

Would you like to equip your test laboratory in an energy-efficient way and thus redesign it to be future-proof and sustainable?

We are happy to support you with the:

- Analysis of your test field
- Development of energy-efficient concepts for your laboratory
- Implementation to a sustainable and future-proof test laboratory
- Provision of energy-efficient resonance test systems

### Comparison of energy costs per hour\* for different drive concepts



## Sales team strengthened by Klaus Osterhage



Klaus Osterhage (56) has been supporting our sales team since October 01, 2022.

Mr. Osterhage studied mechanical engineering at (the) Technical University of Braunschweig and at (the) University of Waterloo in Canada. During his 22-year professional career at OPEL, he has worked in various functions in the field of fatigue strength, initially as a test engineer and since 2008 as head of the fatigue strength department. He has represented OPEL for many years as a member of the DVM Program Committee on fatigue strength and in 2017 he was awarded the DVM Gold Badge

of Honor for his technical and scientific achievements in the field of material research and testing.

Mr. Osterhage is looking forward to putting his many years of experience in fatigue strength at the service of customers in southwestern Germany, Switzerland, Lichtenstein, and Austria from the Rüsselsheim location.

You can reach Mr. Osterhage at +49 (0) 163/ 2016912 or by mail: klaus.osterhage@sinco-tec.de.

# Unique on the market - Newly developed hydraulic wedge clamping device

Universal clamping device for flat and round specimens for nominal forces from 5 kN to 2,000 kN axial force

For uniaxial quasi-static or dynamic testing of flat and round specimens on all test systems, the newly developed hydraulic clamping device provides a system that combines increased operational reliability with very simple operation.

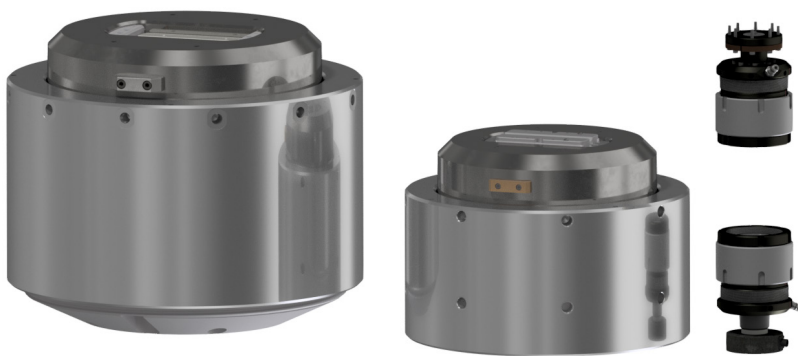
The exchangeable clamping jaws perform an orthogonal infeed movement to the test part while applying a hydraulic pressure of max. 500 bar, without the test rig control having to be active. This avoids axial stresses in the component during the clamping process. The clamped condition is mechanically conserved by a central clamping nut, which allows the hydraulic clamping pressure to be reduced to 0 bar even before the test. This prevents pulsing on the oil volume, protects the hydraulic components, especially the seals, and thus contributes to increased safety. By merely applying the clamping nut by hand, no time-consuming manual operations with heavy tools, such as tightening several bolts to torque, are required.

With the reduction of the gripping pressure before the test and the mechanical gripping, we offer a gripping system that is unique on the market in this combination.

The compact and thus, compared to other solutions, very light clamping is characterized by a wide range of testable specimen diameters up to Ø80 mm or specimen thicknesses up to 90 mm and is available - tailored to the SincoTec **POWER SWING** series - in nominal sizes from 5 kN to 2,000 kN. The larger fixtures include extensive tools and fixtures to handle larger and heavier components, specimens and clamping wedges. With the associated hydraulics, we complete the self-sufficient complete system of the hydraulic wedge clamping device.



Wedge clamping device 30 kN



Clamping heads for nominal load 2 MN (left) or 1 MN (center) in size comparison for complete clamping for test loads up to 30 kN

## Did you know, that ...



... frequencies up to 500 Hz and angular accelerations up to approx. 1 million (rpm)/s can be achieved with our torsional resonance testing systems?

This can be used especially for the testing of rotors from e-mobility, as these dimensions cannot be reached by far by hydraulic or shaker systems.

# Energy efficiency in wheel bearings

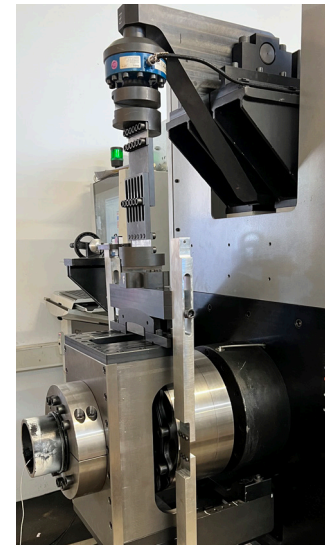
## Determination of the frictional torque under load at the wheel bearing

For battery-electric vehicles, adequate range is currently one of the greatest challenges to achieving a widespread breakthrough.

In addition to increasing battery capacity, research is therefore also being carried out at full speed on the consumption side to reduce losses in the entire powertrain. The focus here is on determining the frictional torque in bearings. Due to the complex mixture in the bearing of grease distribution, temperature and frictional influences under load on the balls, it is difficult to simulate the frictional torque. Even in tests, experience is helpful in order to be able to interpret the results in a meaningful way.

With the specially developed friction torque test rig for truck wheel bearings and the patented measuring method, we are able to measure large and small wheel bearings (up to  $r_{dyn} = 450$  mm). The rotating bearing can be loaded with vertical forces (vehicle weight) and/or horizontal forces (cor-

nering) in the typical range for cars and trucks. Speeds up to 2,500 rpm as well as temperature control and preconditioning of the bearing are possible both as a block program and as a service load test. For example, the frictional torque can be determined while driving on a definable track, such as the Nürburgring. The comparison of different bearing manufacturers or bearing concepts can also be investigated in this way.



Friction torque determination for truck wheel bearings



Friction torque determination for passenger car wheel bearings

## Expansion of the sales team



Since August 2022, Hendrik Fröhlich (25) has been in charge of sales at SincoTec Test & Engineering GmbH and, together with Henning Frisch, is looking forward to your exciting testing tasks.

We continue to expand the sales team in order to best meet the constantly growing requirements and test scopes. The sales manager team consisting of Mr. Bahn for SincoTec Test Systems GmbH and Mr. Fröhlich for SincoTec Test & Engineering GmbH works hand in hand to ensure the satisfaction of our customers.

Mr. Fröhlich completed his Bachelor Professional in Engineering in Clausthal-Zellerfeld. He has been very close to motorcycling since the age of 4 and now uses his expe-

rience to support the next generation in this field. Thus, for example, engine components and chassis components are part of his daily life.

He enjoys spending his free time on his mountain bike in the Harz mountains and in other sporting activities.

Mr. Fröhlich is looking forward to applying his technical understanding to your testing tasks and to advise you competently on your testing requirements together with the SincoTec team.

You can reach Mr. Fröhlich at +49 5323 9692-132 or by mail: [hendrik.froehlich@sincotec.de](mailto:hendrik.froehlich@sincotec.de)



## With high-pressure into the future Testing under hydrogen atmosphere

The topic of hydrogen has been gaining momentum for several years. The visions range from vehicles with zero harmful emissions to steel production without coal and the generation of electricity and heat in the home.

Since we already have a great deal of expertise in the field of dynamic pressure testing with liquids and gases and have also a suitable test container with safety equipment in the context of battery testing, the first steps towards testing options for testing under a hydrogen atmosphere were quickly taken. In the meantime, a second test container has been set up specifically for testing with hydrogen.

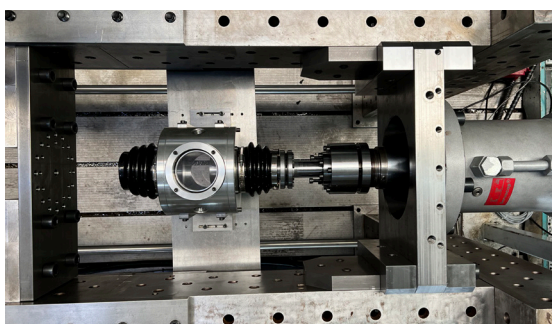
The first project deals with the mechanical testing of valve components in a hydrogen-argon environment at normal ambient pressure. The system is thus only flooded with the gas mixture. The aim of the investigation is to assess the wear behavior.

In the meantime, a new, patented testing device has been developed for testing mechanical components up to currently 1,000 bar, which operates without moving seals and therefore has a unique robustness and accuracy compared to conventional autoclave testing systems. The system enables us to dynamically stress the test mechanically without the influence of seal friction and stick-slip effects. Test frequencies of 100 Hz and more can be achieved, which is only possible with a lot of effort or not at all with a test system with a moving seal due to friction and wear of the seal. However, quasi-static and crack propagation tests can also be carried out in a hydrogen atmosphere.

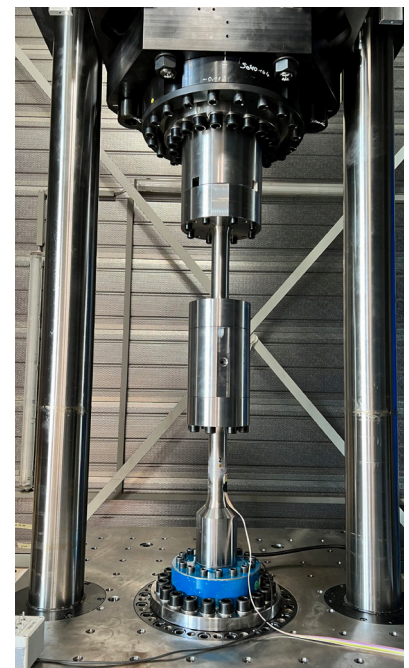
Due to the modular concept, hydraulic cylinders or resonance pulsators can be used as actuators. By using the resonance pulsator, testing can be carried out inexpensively at high frequencies and up to very high numbers of load cycles with minimal energy input.

Typical applications are components from hydrogen compressors, fuel cells, hydrogen burners, power generation and hydrogen storage.

Due to the possibility of using very energy-efficient resonance pulsators, the experiments can be carried out with minimal energy input. We think that this harmonizes excellently with the topic „Energy of the Future“.



Test facility for testing  
in hydrogen atmosphere



Patented high-pressure test  
equipment for dynamic tests under hydrogen atmosphere

# The rotor and its metal sheet package

## An inseparable connection?

One of the most important components in an e-vehicle is logically the electric motor of the drive. Such a motor usually consists of a stator housing and a rotor. The rotor is the component that rotates during operation and thus generates the necessary kinetic energy for the drive.

The design of a rotor appears very simple at first glance. Ultimately, it consists of two main components, the rotor shaft and the metal sheet package that sits on the rotor shaft.

However, a closer look at the design, construction, production and testing reveals a highly complex component. The manufacture of the rotor alone is very complex, as the rotor is usually a hollow body made up of several parts.

There are quite a few tests for the mechanical testing of the rotor shaft:

- Rotating Bending
- Torsion
- Testing of the gearing
- Testing of the joining

If the sheet metal package is then added, the bouquet of testing options becomes even larger:

- Determination of the material properties of the E-sheets and the sheet stack packages
- Expansion measurement under temperature and centrifugal force (elastic and plastic)
- Speed change and burst tests
- Determination of the maximum transmissible torque

The determination of the maximum transmittable torque - i.e. the moment at which the plates start to slip on the rotor shaft - is a particular challenge.

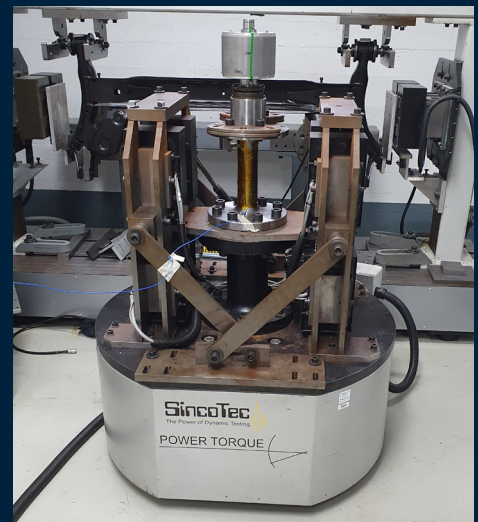
Common methods need the sheet package to be connected to the testing machine by means of a material, force or form fit and thus the moment up to the point of slippage can be determined. Such methods usually influence the properties of the sheet package and evaluate the entire stack of sheets as a rigid coherent body. In reality, however, the metal sheet package is made up of hundreds of individual layers, and even the twisting of a single sheet can lead to the rotor no longer being able to work properly.

The test setup we developed uses the moment of inertia of the electrical laminations and extremely high angular accelerations of up to 120,000 rad/s<sup>2</sup> to generate a moment without having to restrain the laminations in any way. The rotor oscillates quasi freely around its longitudinal axis.

The slippage of the laminated core can be measured, for example, optically or by means of differential acceleration measurements. For example, with this setup, a torsional moment of up to 3,600 Nm can be applied to a rotor with a moment of inertia of the stack of laminations of 0.03 kgm<sup>2</sup>.



Porsche Taycan on visit at the SincoTec headquarters



Torsion test on rotors with very high angular accelerations

### Did you know, that ...



... you can usually test a multi-axis highly loaded point by an inexpensive and simple single-axis test?

# Together we are stronger!

## Company team event to the „mine“ in Holzminden

Finally, after 2 years, we were able to go on a „real“ excursion again. After a breakfast at the company, this year's company outing took us to the „mine“ Holzminden, where a „Mine Escape Adventure“ and team challenges awaited us.

The „mine“ Holzminden is probably one of the most unusual Escape Room providers in Germany. In two deceptively real mining tunnels you encounter locked doors and have to solve various puzzles to get to the next room. This was indeed not easy, especially since in some cases the only way to get through the dusty tunnels was to crawl or climb.



And while two groups tried to master the way out of the mining tunnel, the other groups had fun with team challenges under the theme „Together we are stronger!“ For example, we built a marble run out of hollowed bamboo pieces, clothespins, toothpicks, and rubber bands. Musical instruments such as a triangle and a xylophone could also be built, which earned valuable additional points.

When we saw the many bamboo sticks and partially porous rubber bands, we could not imagine at first that a tower could be built from them. Here, our constructors in particular were called upon.

And indeed: True to the motto „no solid stand without a stabilizing diagonal“, meter-high towers were created. Transporting a ball over hollowed-out bamboo poles into a bucket provided was also very funny and required precise coordination, speed and skill.

We spent a very eventful day in Holzminden, with a lot of fun and team spirit. The great day was ended with a dinner of the company.



## SincoTec Family Summer Party

**A**t the end of August, our family summer party could finally take place again. All family members of our employees were cordially invited.

The SincoTecies provided a varied program for young and old. In glorious weather, we were able to offer various activities, such as a children's bouncy castle, a real fire truck with activities, face painting for children, a children's driving course, goal wall shooting, soccer table and company tours. Family members were excited to take a

look behind the scenes of the family business during the guided company tours. The bouncy castle and the fire truck, in which the children were allowed to take a short tour around the premises, were the highlights of the day for the young visitors. Delicacies were also well provided for. To cool down, there was ice cream and chilled drinks.

The day was a success and we are very pleased that we were able to celebrate together again.



## Apprentices get off to a good start!

For us, training in our own company is the best way to obtain qualified and motivated employees who know and meet the special requirements of the company today and in the future.

This year, three new apprentices started in two different professions: Industrial Mechanic and Electronics Technician for Devices and Systems. We wish our three new trainees a successful start and a great training period!