



Sincotec NEWS

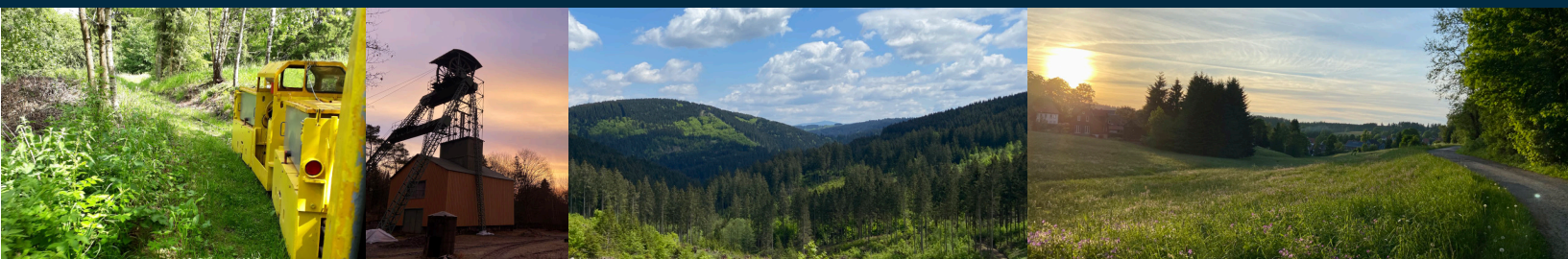
Freewheel testing for e-bikes

Always forwards, never backwards!

False Brinelling - Not even used and already damaged

Testing the loads on wheel bearings applied during transport

Relaunching Sincotec Website



Dear SincoTec friends and customers,

The world continues to be as dynamic as our testing systems and we are experiencing a mid-year upswing amid rising demand. Due to the upcoming federal elections, many decisions are being pushed back further into the year. While political events in Russia, China, Turkey, and the continued effects of Brexit continue to influence the market for test technology, the signals sent by the US government are stabilizing the market.

We have used these challenging times to work on numerous projects:

- Beginning of new development projects multiple sectors
- Implementation of new test methods in our fatigue strength laboratory
- Launching our new website whose new design shines by giving you easy access to detailed information about our range of testing services and testing systems

- Further optimization of internal processes

Hopefully, we will soon have the Covid pandemic behind us, and we are looking confidently into the future to work with you on your testing challenges.

Making the world safer together!

Yours sincerely,
Dr.-Ing. Joachim Hug,
Dipl.-Ing. Sven Henze,
Sabrina Hug, M. Sc.



Sustainable test fields

Changing over to (more) energy-efficient technologies

There are many steps we have all taken to be more energy-efficient and to reduce our carbon footprint, switching, for example, from halogen to energy-efficient LED light bulbs and from non-renewable to green energy sources, by, for example, added solar panels to roofs. Highly energy-efficient testing technology can also make an important contribution towards being climate neutral.

Contrary to what one might believe, the switchover to energy-efficient testing technology is generally not an expensive choice. In fact, thanks to rising energy prices and the energy savings offered, the investment normally amortizes itself within 1-2 years. In the diagram below, you can see a comparison of the per hour

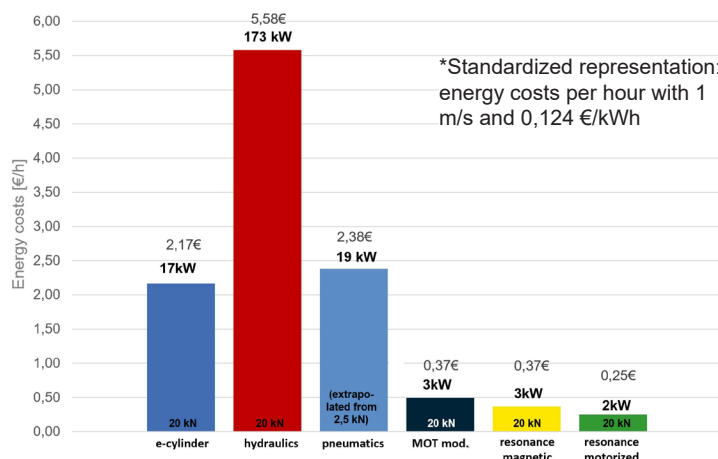
energy costs for different drive types. Our POWER SWINGS are not only highly energy-efficient but testing can also be performed 10x faster on a resonance testing system when compared to a hydraulic testing machine.

We are happy to advise you on how you can equip your testing field more energy-efficiently.

We conduct:

- An analysis of your test field
- A proposal of energy-efficient concepts to adopt in your laboratory
- Implementation of a sustainable test laboratory

Comparison of energy costs per hour* for different drive concepts



*Standardized representation:
energy costs per hour with 1
m/s and 0,124 €/kWh



SincoTec's most energy efficient product type POWER SWING MOT



Did you know, that ...

... the testing machine POWER SWING MOT can be operated with a 1 m² photovoltaic system?

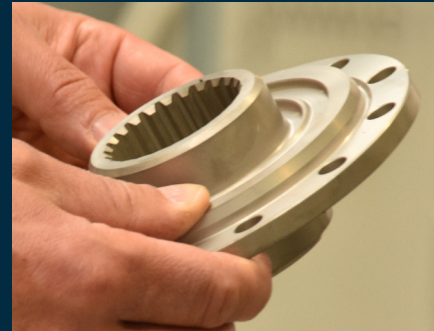
Not even used and already damaged - False Brinelling

Testing the loads on wheel bearings applied during transport

The process of developing, receiving approval for, and installing rolling bearings in vehicles takes a great deal of care and effort. Even before the bearings are subjected to their road loads, they face their first load challenge – transport.

Vehicles are typically loaded onto trains or ships before being parked therefore the duration of their journey often moving through different climatic zones. The combination of blocked wheels (resulting from the car's fixed storage position) and the forces exerted by the reaction of the vehicle's mass, leads to micromovements on the bearing and thus to wearing. "False Brinelling", as this phenomenon is called, leads to early damage to the bearing.

In cooperation with a renowned bearing manufacturer, we have recreated transport loads to replicate the wearing on the bearings. The result of this work is a test fixture that recreates the conditions of the bearing as it is installed in the vehicle and enables a targeted load application.



On the trail of failures!

Detective work done with an engineering degree

While failure is never the desired outcome as human lives are often at stake, when it occurs nevertheless, the search for its cause prevents further failures and allows for preventative action to be taken.

Apart from issues in construction, a chain of events can also lead to failures. Some possible factors influencing failures include:

- Geometry of a component (e. g. notches)
- Material choice (e. g. too low tensile strength (R_m))
- Manufacturing process (e. g. a missing surface treatment resulting in a rough surface (an ideal starting point for cracks))
- Type of load (e. g. multiaxial load conditions, combined loads)
- Operating environment (e. g. temperature influences, corrosion)

- Component life (e. g. prior damage, special events, repairs)

Fracture analysis is particularly informative when conducting failure investigations. Often, it is sufficient to determine the cause of failure as it suggests its origin and the stresses which led to failure.

Using test methods customized to the component, the mechanisms of failure can be reproduced and their cause identified. This allows for preventative action against further failures to be taken.

We are happy to support you in making your components more reliable and safer:

- (Preventative) failure analysis: determination of the cause of failure, i.e., investigation of the failure mechanism considering all relevant constraints

- Fracture analysis
- Development of testing procedures that reproduce the real-life failure mechanism on the testing system to develop safe and reliable components
- Determining component's ability to withstand operational loads
- Determining the safety factor of a component
- Technical reports/summaries of results including statistical evaluations



Freewheel testing for e-bikes

Always forwards, never backwards!

Freewheels have been used in machine drives for more than 250 years. They transmit torque in one direction and act like a normal bearing when the direction of rotation is reversed.

Freewheels continue to play an important role today. Bicycles contain the best-known applications of mechanical freewheels. Who hasn't heard the rattling of the rear wheel while riding down a hill and not pedaling? In this case, the use of the freewheel prevents the movement of the rear wheel from being transmitted over the bike chain into the pedals, offering both greater comfort and safety for the rider.

Modern e-bikes with middle motors present new challenges to the safety advantages offered by the freewheel. While the movement of the pedals by the rolling of the rear wheel needs to be prevented, it is also advantageous to convert via recuperation the kinetic energy thus generated into electric energy that can be used by the drive system.

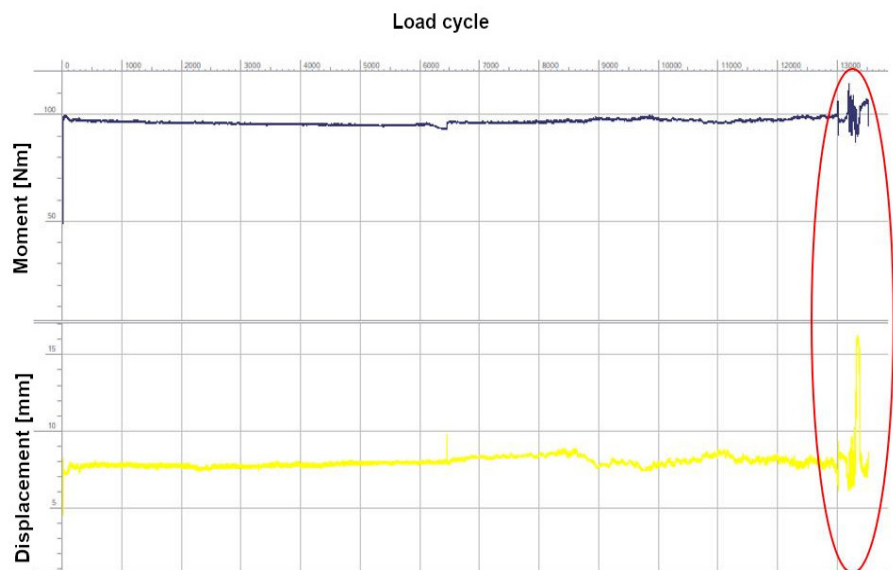
If you don't want to add even more mass to already heavy components such as the battery and motor, freewheels have to be moved from the rear wheel to the motor. However, this move poses new problems as the loads experienced by the freewheel are completely different in its new lo-

cation.

As part of our e-mobility push, SincoTec Test & Engineering overcame this challenge and developed a bi-axial testing system for freewheels, and their surrounding components, in their operational configuration. The testing system generates not only the recurring impact load of pedaling, but also moves the freewheel into a new position for each blocking impact. By testing the freewheel in its assembly, the freewheel is tested in its operational environment.

Potential misalignments of individual components, such as one-sided loads in a bicycle, and the properties of the materials used are taken into account.

These tests seek to establish the wear resistance of the freewheels. A constant monitoring of the drive moment and the therefore required angle of rotation makes it possible to determine the time until the freewheel is worn out and no longer fulfills its role.



Run of a freewheel test (Damage marked in red)

Did you know, that ...



... two independent freewheels are used on e-bikes?

The 2nd freewheel prevents the cyclist from having to turn the motor when it is inactive.

An interview with the new Technical Director of SincoTec Test Systems

Dr.-Ing. Marcel Heß



Dr.-Ing. Marcel Heß (35), graduated in mechanical engineering at TU Clausthal and earned his doctorate under the supervision of Prof. Dr.-Ing. Armin Lohrengel at the Institut für Maschinenwesen. He joined the

SincoTec Test Systems GmbH directly after completing his Ph.D. in August 2021. Dr. Heß, a mechanical engineer through and through, was appointed Technical Director and Co-Operating Director of the SincoTec Test System, alongside Sven Henze the managing partner. Outside of the office, Marcel enjoys spending time with his family and engages in voluntary work at the Technischen Hilfswerk (THW).

What is your favorite part of your new tasks?

The unbelievable variety and spectrum of challenges that I am confronted with and that I will experience over and over again.

What do you like most about SincoTec?

I like SincoTec for several reasons. Firstly, as a group of companies, we help our customers improve their products across almost every possible technical application. In essence, we are not just specialized in, for example, helping a customer examining the quality of a supplied part for an engine or an electric motor. We may do that one day but the next day we are dealing with aerospace testing and the day after that prosthodontics testing. So, my days are always varied and it's this diversity of assignments that allows us to build exciting partnerships and relationships in many different industries where we are working together with our customers to develop the best effective solution.

What fascinates you about the Test Systems?

The Test Systems is an elementary component of the SincoTec. What makes SincoTec so special is that we not only have our test laboratories which offer tests as services and where our testing machines are used but that we also develop these testing machines. I am particularly fascinated by the continual new development of testing machines, seeing each machine go from concept to fully functional

in our production facility. From the first ideas and concepts to the point where the machine is handed over to the client and the customer is telling us "This is exactly what we were looking for." And it really is the case that customers have told me that there is no one else in the market that could successfully complete such a project. To receive such affirmations in the short time that I've worked for SincoTec makes me very proud of the team that I am happy to be a part of.

Which testing machine excites you the most?

For me, it's always the one I'm currently working on. Of course, I've already worked on some very, very large projects in the last few days. Fascinating for me was a very heavy test rig for the testing of the wheel guide of an OEM. Basically, it simulates the mass inertia of the breaking or accelerating vehicle and at the touch of a button, you can change the type of car from a compact car to an SUV. Of course, that's an 18-ton project which is, as you can guess, rather heavy. My current task is the construction of a testing machine for the development of a new norm at the cutting edge of the aforementioned prosthodontics industry. Much more delicate and difficult but certainly no less challenging.

What challenges do you see in the near future for testing technology?

A huge challenge is that we as a society are so focused on digitalization that we forget how important fatigue strength is. At the moment we are seeing this phenomenon where so many young engineers coming out of university think that any problem can be clicked away using a simulation. I believe that fatigue strength will

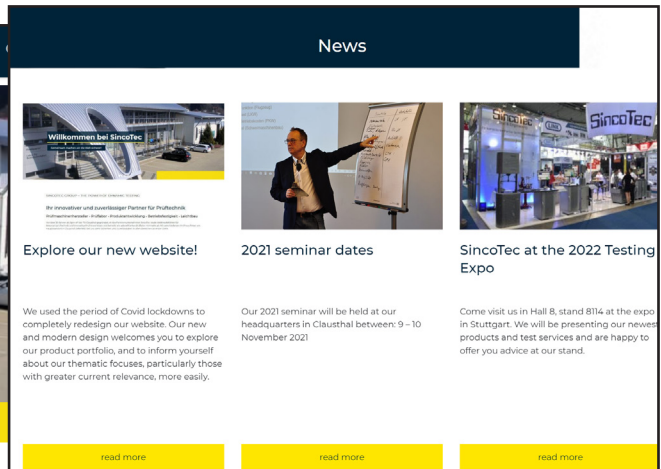
become at least as, if not even more important than before. If we want to reach the point of climate neutrality, we need to construct more efficiently and use the exact amount of materials that operating loads require rather than transporting huge quantities of steel all around the world, and that's where we come in. Digitalization will certainly create its own challenges. Components are becoming more intelligent and therefore more intelligent components need to be tested. This is an area where as classical mechanical engineers we want to develop independently and in conjunction with some of our clients, our capabilities. After all, in the future, some components will have IP addresses.

As someone who was born in Berlin, what do you appreciate about our location in the Harz?

A huge advantage is a proximity to nature. It is incredibly beautiful here. The advantage of this proximity became really a luxury during the pandemic. Honestly, I have to admit that I didn't plan on staying in the Harz after my studies. I actually came back because my wife was working here. Now, of course, I see the many advantages of this great region and am excited that my children can grow up in such a beautiful environment.



Marcel Heß (l.) and Sven Henze (r.) during a technical meeting.



Relaunching SincoTec Website Redesigned and with a detailed overview of our products and services

We used the long periods of Covid lockdowns to completely redesign our website. You can now easily access our product portfolio and inform yourself about the topics which we are currently focused on, all housed within a completely new and modern design.

What's new?

- We're discussing **current trends** with **topic-specific pages**, e. g. for **e-mobility**
- **Detailed range of the services offered in our test laboratory**, including practical examples,

measurement instrumentation, and environmental simulation equipment, as well as special testing solutions

- **Quick overview of our universal test machines**
- We are introducing our **different test laboratories** and their testing machines and applications so that you can get to know the full range of our capabilities
- Additionally, we offer a **better and more intuitive user interface** to help you find the information you are looking for more quickly:
 - The clear division between

our testing systems and our accredited test laboratory

- Sorting of our testing systems and testing services by industry and tested component
- Practical examples when which testing systems are used/test services are carried out

We look forward to your visit!

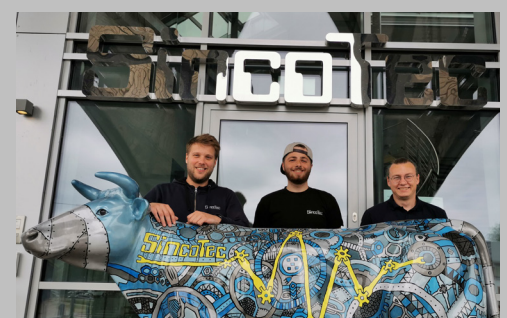
www.sincotec.de

Our apprentices get started and are entering their departments!

Having successfully completed their apprenticeships in industrial mechanics, electronics for operational technology, and computer science for systems integration, we are happy to welcome our apprentices to SincoTec as fully-fledged team members. We are very proud that they have chosen to continue being a member of our team and congratulate them on passing their exams.

What is next for the apprentices that have completed their apprenticeships:

Our newly minted industrial mechanic will get right to work in our manufacturing center, using engineering drawings to produce components for our test systems and test fixtures. Since the beginning of the year, our electronics technician has been independently building the control systems for our testing systems. Last but certainly not least, our IT specialist for systems integration will be applying the knowledge gained during his apprenticeship and gathering further experience.



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