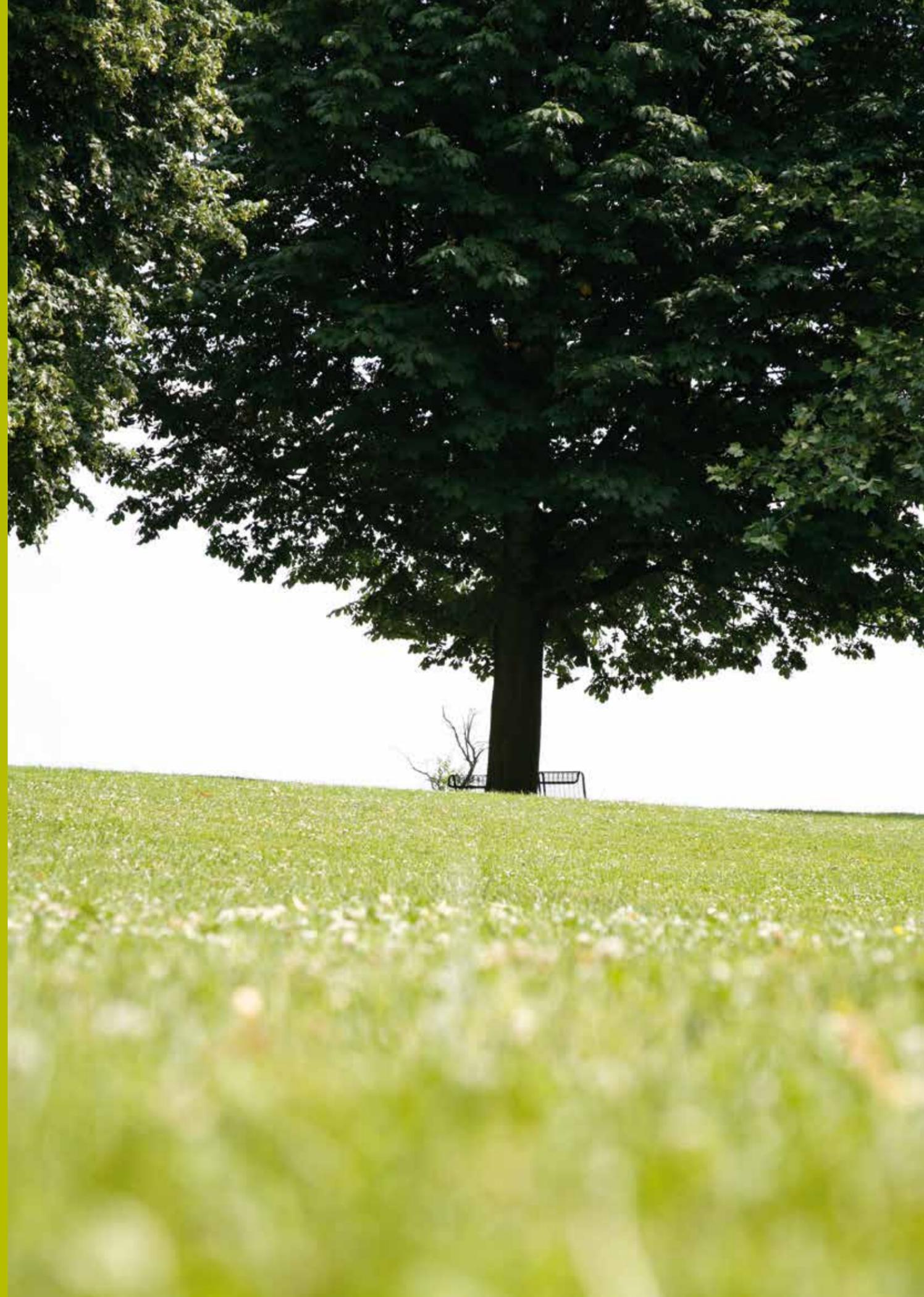


LSMR

2016

“Coming together is a beginning,
staying together is progress,
working together is success.”

Henry Ford





START WITH AN OVERVIEW. THIS IS HOW WE ALWAYS START.

SMR

SMR concept

SMR tune

SMR care

SMR qualify

| | |
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A STEADY STREAM OF GREAT IDEAS HAS LEAD TO OUR FASTENING TECHNOLOGY SOLUTION L.SP3.



reddot award 2015
honourable mention

Users and people searching for solutions have different designations for fastening systems used in areas which are difficult to access. Geared offset head, fastening tongue, special transmission or crow's foot. We call the latest generation of our fastening systems L.SP3 – Lübbering standard programme of the third generation. Often considered as special – standard for us.

There are more than 460.000 configurations possibilities with L.SP3, so we can ensure that Lübbering can also deliver a standard tool for your individual fastening application.

Look at the variety of possibilities and generate your individual fastening system with our L.SP3 configurator. Just a few clicks and you get both, the drawing and all technical, relevant data of your L.SP3 solution – from the output profile up to the angle, stick or pistol screwdriver.

Highest technology and either the design of Lübbering geared offset heads are remarkable. 2015 the product range L.SP3 won the Red Dot Award in the category "Honourable Mention" as well as the IF Award in 2016. Lübbering was honoured with these design Awards for the particularly excellent aspect of creative work.



- L MORE ACCURATE
- L MORE COMPACT
- L MORE MODULAR
- L MORE EFFICIENT

Process reliability through higher levels of accuracy

Improved ergonomics through compact design

Higher flexibility through modular construction

Cost savings due to easy maintenance



www.good-fastening.com

More about L.SP3: in our product brochure.





**DRILLING IN COMPLETELY NEW DIMENSIONS:
OUR L.ADU DRILLING TECHNOLOGY PROGRAMME.**



L.ADU electronic 255/256

An aeroplane is assembled with several hundred rivets and screws. In order to insert these connectors, it is necessary to drill through diverse material layers consisting of aluminium, titanium or CFRP. Such precise drillings of complex material mixing packages claim technically highest requirements. To be able to fulfil these, well-known aircraft manufacturers like Airbus and Boeing rely on Lübbering drilling units – intelligent, technically completed systems with the most precise drilling results, exactly tailored to the individual needs of the aerospace industry.

The standard programme of drilling systems, which is continuously extended in its functions, has been used

for different applications in the aerospace industry since 1994. From the development of mechanical and electronic components through production of all assemblies up to use and service, Lübbering offers complete systems which are exactly tailored to individual requirements.

You will benefit from the continuous research and development of the Lübbering Group and gain a huge advantage by using our drilling units.

Look at our new L.ADU generation – more modular, more ergonomic, smarter, lighter and above all: more innovative than ever before.

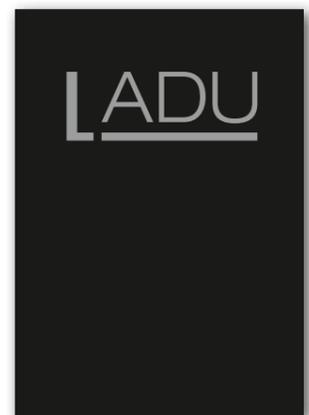


L.ADU pneumatic modular standard programme



www.good-drilling.com

More about L.ADU: in our product brochure.



GOOD SERVICE IS NOT JUST ABOUT BEING CLOSE TO THE CUSTOMER, IT ALSO MEANS BEING CLOSE TO PRODUCTION AND ASSEMBLY. SHORT COMMUNICATION LINES, RAPID PROCESSES AND SATISFIED CUSTOMERS.





L.SMR

THE INTRINSIC VALUES IN OUR SERVICES ENSURE THAT OUR CUSTOMERS RECEIVE GREATER VALUE.

Lübbeling products enjoy a worldwide reputation for excellence and provide the highest levels of quality and precision. In order to sustain this throughout the entire product lifecycle, the Lübbeling Group also offers a wide range of services. We are your partner, from the first design idea through to the service contract. In workshops

which cover every topic from the product itself to maintenance, we guide and train our customers and partners in the selection of the product as well as applications. Our experienced and highly-qualified team is always ready to provide professional support.



"I have worked for the Lübbeling Group in Herzebrock for more than twenty years, and I am responsible for the L.SMR product range and its various product categories. Our aim is the consistent improvement of your processes."

Ulrich Johannsmann, Manager Lübbeling Service Centre

FOUR PRODUCT CATEGORIES. FOR UNRIVALLED INDIVIDUAL SERVICE.

L.SMR concept

- FEASIBILITY STUDY
- PROTOTYPING
- LIFE CYCLE SIMULATION

L.SMR tune

- RUNNING-IN
- TRIMMING
- MACHINE CAPABILITY ANALYSIS

L.SMR care

- MAINTENANCE AGREEMENT
- EXPRESS REPAIR

L.SMR qualify

- PRODUCT WORKSHOP
- APPLICATION WORKSHOP
- MAINTENANCE WORKSHOP

FEASIBILITY STUDY: YOU HAVE THE IDEA – AND WE EXPLORE ITS POTENTIAL.

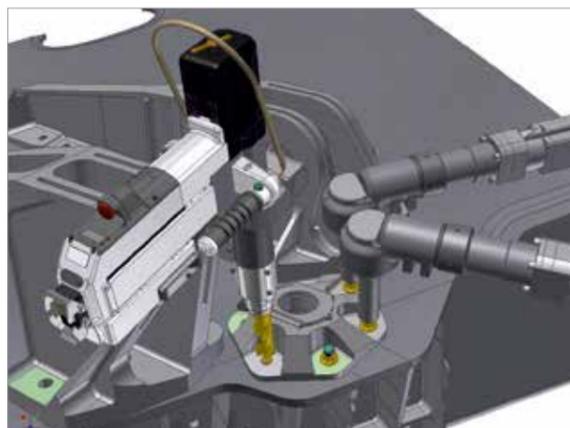
Ever shorter development times and rapidly changing product requirements are the driving forces in virtual product development. In order to ensure fast production, assembly processes are examined virtually through the use of CAD programmes prototypes. As an expert in fastening technology, LÜBBERING offers feasibility studies for creating precision fastening in demanding environments. In this way the entire fastening process is monitored and documented: From access to the working area to consideration of external data such as the drive technology of the assembly tool to the exact modelling of the motion sequence throughout the fastening process.

We also do feasibility studies for drilling applications where we assess the access of an L.ADU to the working area and in most cases can then optimise the drilling process together with our customers. The tests are then documented and the results presented as a CAD model so that each assembly step or drilling cycle can be reviewed in detail.

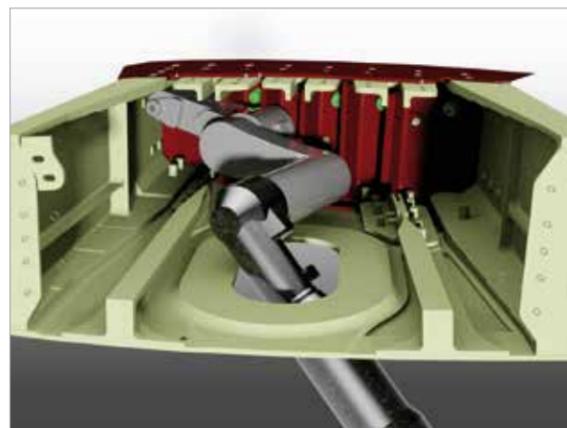
The LÜBBERING feasibility study is designed to be an interactive process between our customers and the LÜBBERING fastening and drilling experts in order to generate added value for our customers.

This is the information we need for a feasibility study:

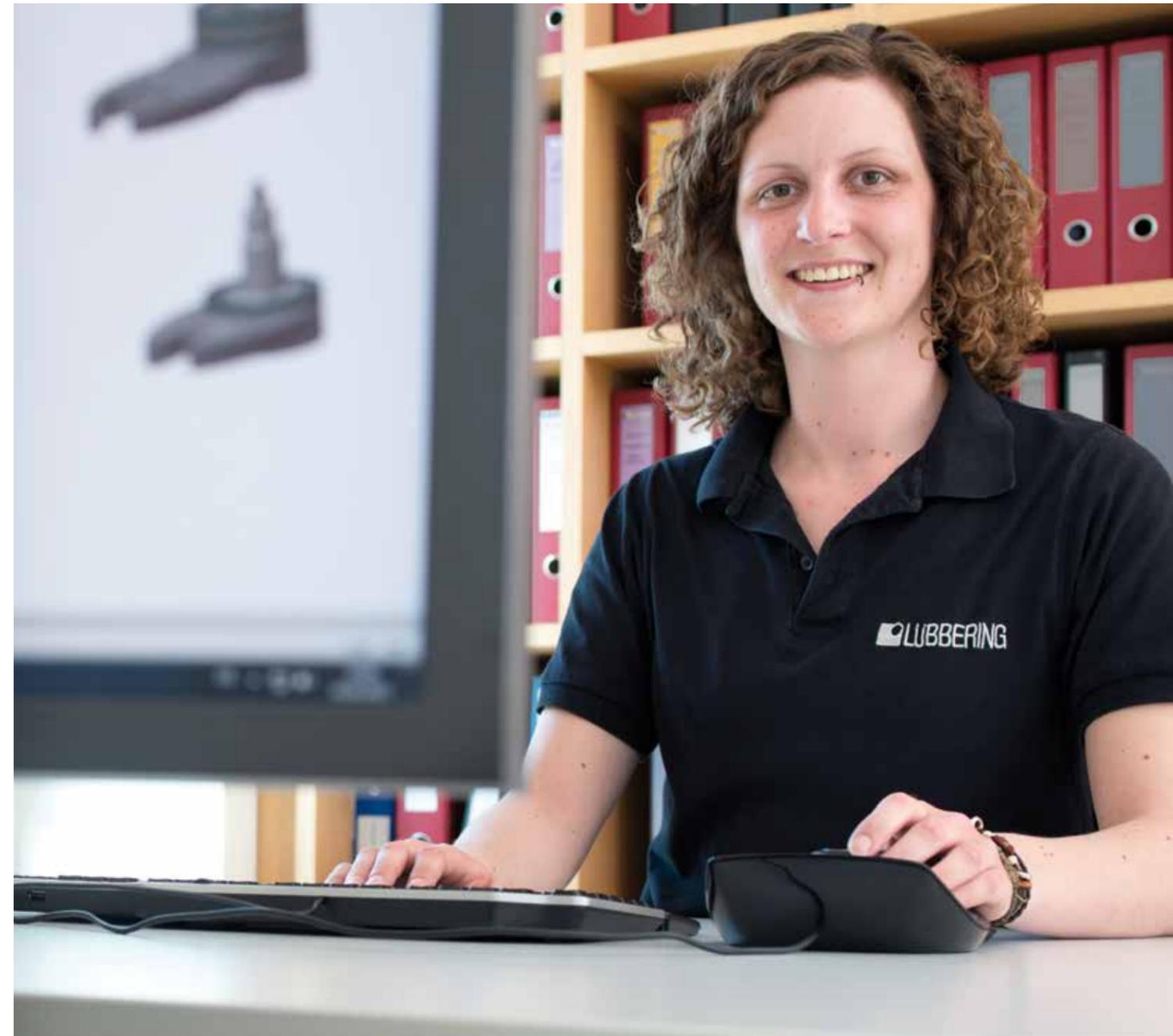
- + CAD data of the working area
- + Samples of the product to be fastened
- + Requirements for fastening precision
- + Fastening torques
- + Required drive technology



Drilling and fastening. Entire overview of the production process in a CAD programme.



Virtual examination of a Sharklet assembly. Accessibility through a manhole.



PROTOTYPING: WE GIVE SHAPE TO IDEAS SO THEY REMAIN REAL.

Feasibility is ensured through the use of realistic models which represent a link between a purely virtual view of the working area and reality. Lübbering provides 3D printed functional prototypes, which our customers can use in order to assess the results of the virtual tests, in realistic assembly or drilling processes.

At this stage of development, Lübbering prototypes can be modified easily and without excessive expense or time. It is easy to ensure feasibility with the help of Lübbering prototypes, particularly in applications with a high degree of

variance. In addition to purely functional examination of the process, Lübbering prototypes can also be used for investigating workplace ergonomics or even the required peripherals.

Your advantages:

- + Flexibly adaptable prototypes
- + Fast feasibility verification
- + Low costs compared with incorrectly planned systems
- + Early incorporation of additional requirements



The 3D printed model can be assembled with the drive unit, which will be used later. So access of the entire system to the working area can be ensured.



LIFE CYCLE SIMULATION: KNOW TODAY WHAT THE FUTURE WILL HOLD.

The general trend in the automotive industry can be summed up very simply: More functionality in smaller spaces with less weight. The joining technology used in these vehicles must therefore be lighter in order to meet emissions requirements. This has the following effect on assembly technology: Screws and nuts which are already pretightened to their load limits must be capable of being fastened within ever decreasing tolerances. At the same time, installation space is being taken up with more and more components and is so becoming ever smaller.

This high-precision fastening is possible with Lübbing products. In order to achieve this, we sometimes have to push beyond the physical limits of the materials used. In order to ensure that we provide reliable information about service life and offer our customers calculable availability,

we prepare individual service life analyses of our geared offset heads upon request for our customers. Here, torque and efficiency are documented and evaluated cyclically. This is followed by an inspection of the components, and the life cycle simulation is completed with a detailed description and evaluation.

Your advantages:

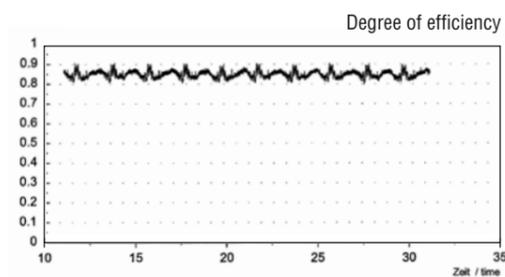
- + Reduced risk of unforeseen failure
- + Optimisation of the fastening process
- + Creation of new areas of application

Right: Results of an endurance test.

Below: Test rig in order to monitor product life, efficiency as well as precision.



Open geared offset head with helical gearing in a endurance test after more than 1.2 million cycles:

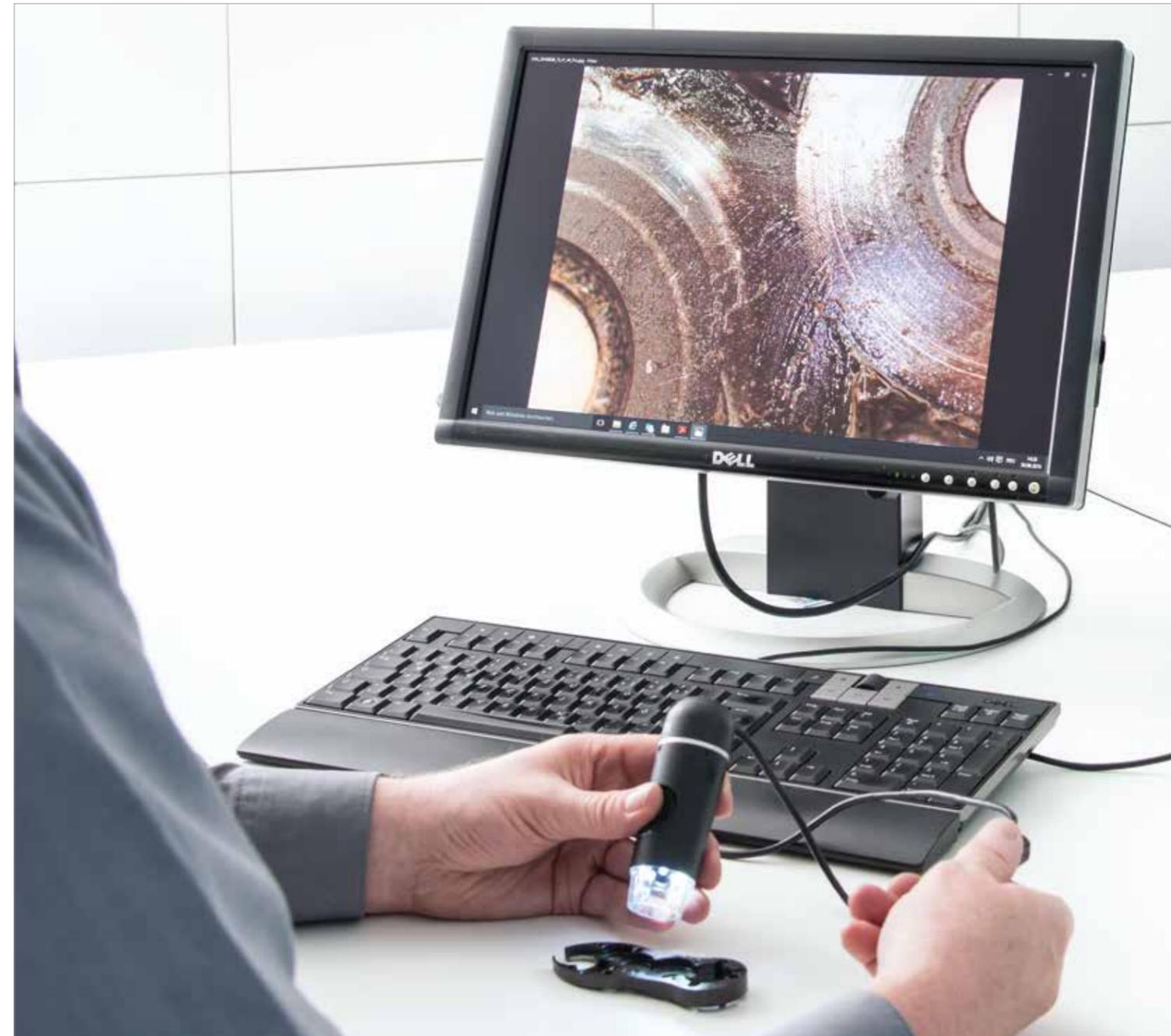


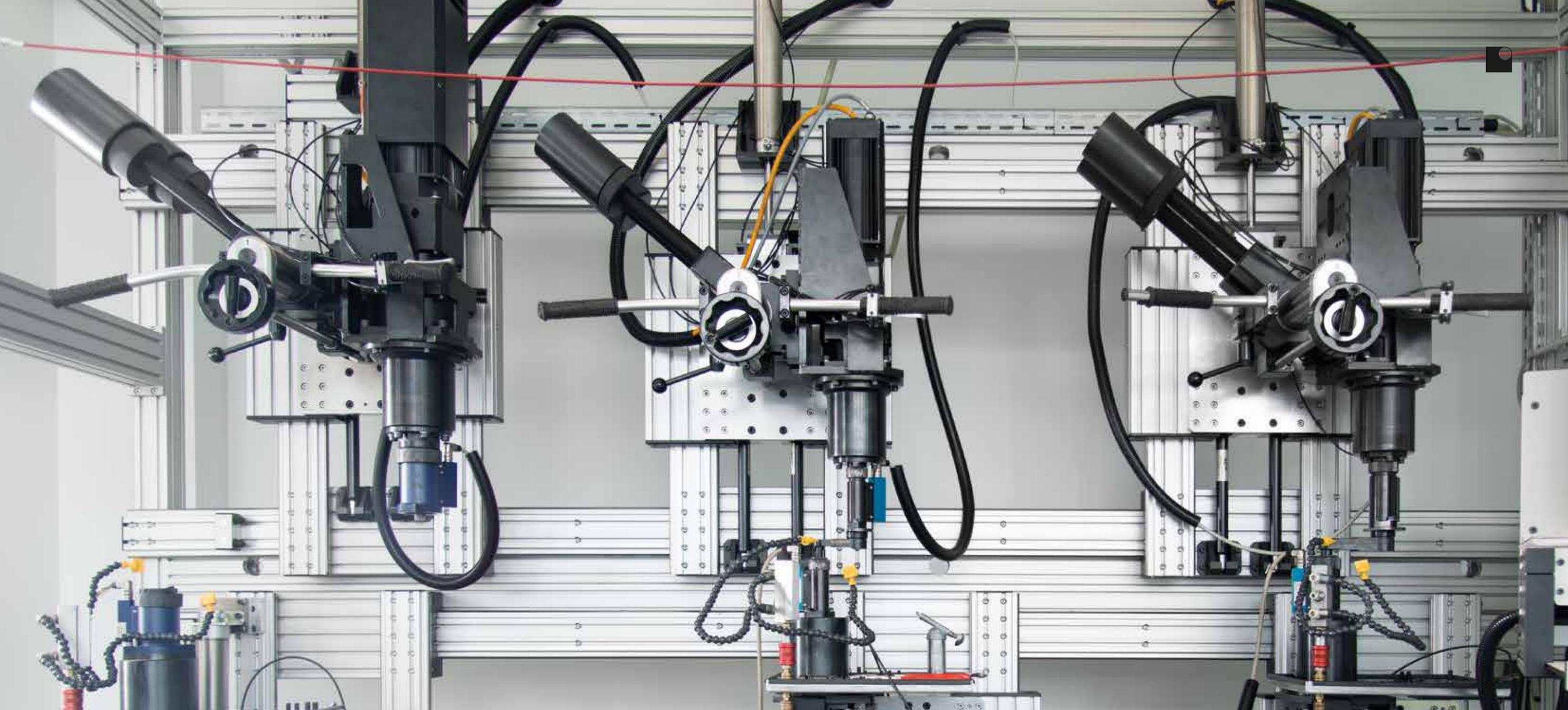
Test criteria:

Max. torque: 30 Nm
 Test after: 1,263,223 cycles
 Speed: 30 rpm

Test results:

Degree of efficiency 0.85
 Accuracy +/- 5.45 %





OUR TEST RIG IS THE ONLY ONE OF ITS KIND IN THE WORLD. AND IT CAN BE SET TO ANY REQUIREMENT.

RUNNING-IN: EXCEPTIONAL PREPARATION FOR EXCEPTIONAL EFFICIENCY.

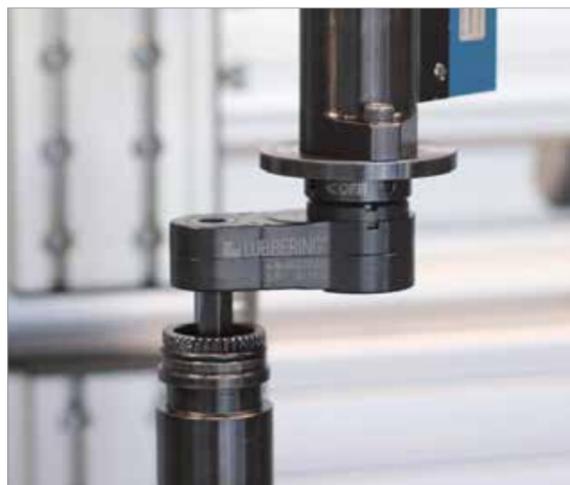
Repeatable quality, consistent performance and total precision – these are the essential requirements for any fastening tool. The running-in of geared offset heads on our specifically designed test rig, satisfies precisely these requirements.

This unique LÜBBERING Service thus enables even better interplay between the tool and the drive machine and delivers consistent quality throughout the entire product life cycle of the geared offset head.

Before final acceptance, the geared offset head is subjected to 3,000 fastening cycles at the maximum permissible torque. The running-in certificate issued at the end of this test documents constant efficiency and serves as the basis for calibrating the entire tool.

Your advantages:

- + Constant efficiency
- + Individual running-in certificate
- + Traceability via serial number



Above: The geared offset head during the running-in process on the test stand.



Right: The quality certificate with all relevant data for the later calibration of the fastening system.

**TRIMMING: PEOPLE SAY “YOU CAN’T BEAT OPTIMAL”.
WELL, WE CAN.**

Trimmed open geared offset heads enable absolute precision in torques on threaded pipe or hose unions in the smallest spaces. Because of their shape and the open output gearwheel, which is what makes this fastening technique possible in the first place, the precision values achievable with open geared offset heads are lower than those of their closed counterparts. In order to be able to perform precise, repeatable fastening operations in these cases. LÜBBERING offers trimming of the geared offset heads as well as running-in.

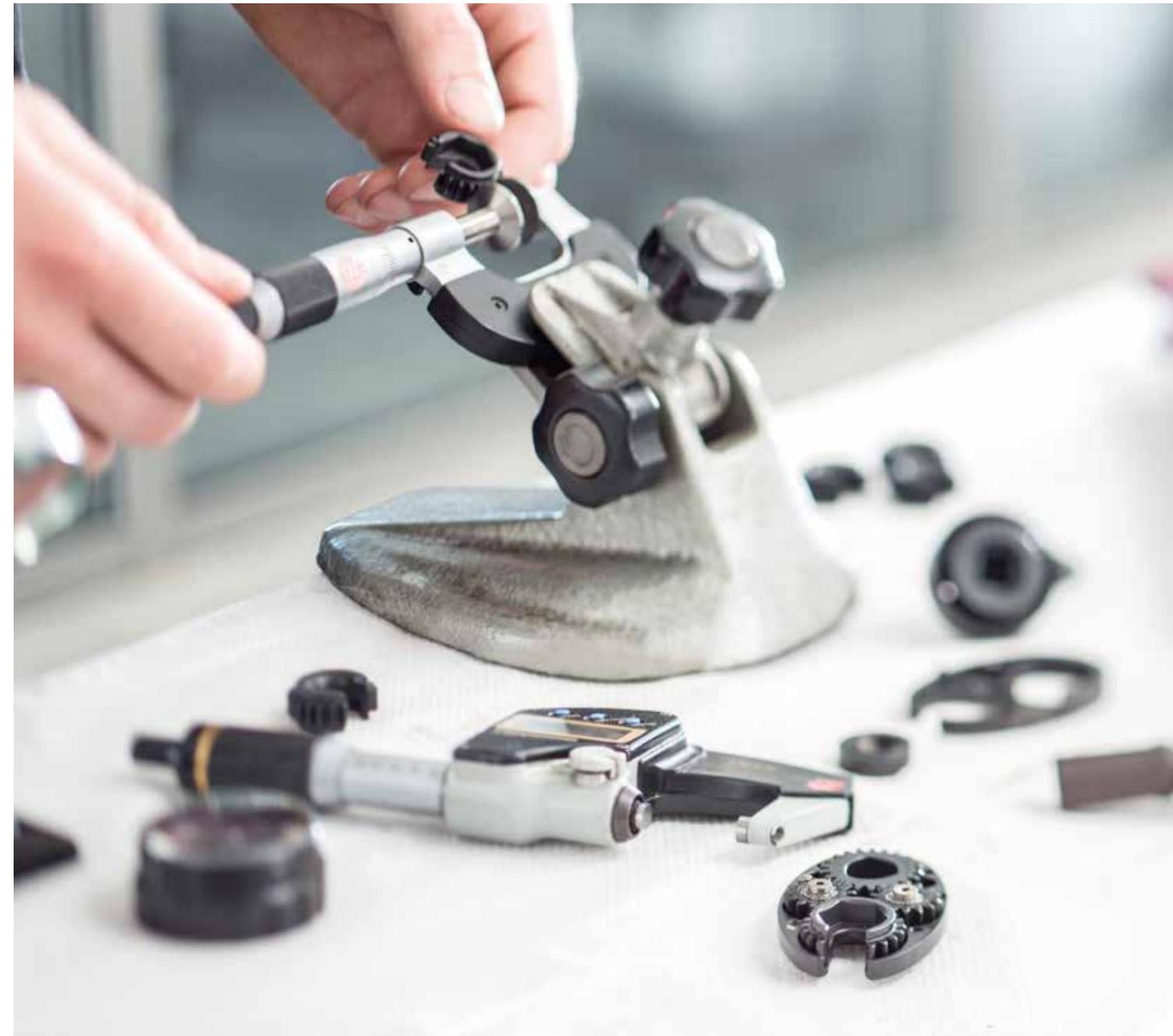
With this process, LÜBBERING is able to optimise open geared offset heads for your individual application, and trim the torque range which is needed to the highest possible degree of precision.

Optimising open geared offset heads by trimming is always combined with the running-in.

Your advantages:

- + Maximum precision for open geared offset heads
- + Consistent fastening quality
- + Individual quality certificate

Manual optimisation of relevant components in order to achieve highest precision.



MACHINE CAPABILITY ANALYSIS: A LONG PHRASE BUT A SHORT PROCESS AND EXCELLENT RELIABILITY.

A comprehensive consideration of a fastening process must not only include a test of the individual components, but also an analysis of the interplay between them. We are able to analyse the machine capability of fastening systems in different variations.

In this statistical procedure, our experts analyse the tolerance consumption and tolerance situation of the fastening system. By the determination of the machine capability indicator (Cm, Cmk) you are able to decide whether the fastening system is suitable for your particular application.

Your advantages:

- + Test certificate with measurement results
- + Free choice of drive technology
- + Test torques from 2 - 1,000 Nm
- + Consistent quality

Different controllers for operation of the customer's drive units.





TRANSPARENCY IS IMPORTANT TO US.
CONSISTENT SHARING OF KNOW-HOW BRINGS
BENEFIT FOR EVERY PROJECT AND PROCESS.



MAINTENANCE AGREEMENT: MORE PLANNING CONFIDENCE. MORE DURABILITY. MORE SATISFACTION.

Making existing risk calculable. With a LÜBBERING service agreement, our customers are able to minimise the risk of breakdown and fully benefit from the service life of LÜBBERING products.

Quick supply and installation of wear parts, followed by a quality test, are just a few of the services we offer in order to extend product life and increase process reliability. At the beginning, there is always a personal consultation to determine your individual needs for a service agreement. Just talk to us.

Your advantages:

- + Guaranteed availability of wear parts
- + Calculable downtimes
- + Process reliability
- + Consistent quality
- + Long product life



Left: Assembly of a Quick Change Indexing adapter to an L.ADU pneumatic.

Below: Replacement of wearing parts in an open geared offset head.





EXPRESS REPAIR: GET BACK TO WORK FASTER AND SAVE MORE THAN JUST TIME.

Unscheduled downtimes are among the most unpleasant scenarios in a production process. In order to minimise these downtimes and the associated costs to you, Lübbering offers its Express Repair service. For this, most replacement parts are held in stock for our customers, so we can respond rapidly in the event of a breakdown. After previous agreement, the damage will be repaired and your system will be ready for use within 48 hours.

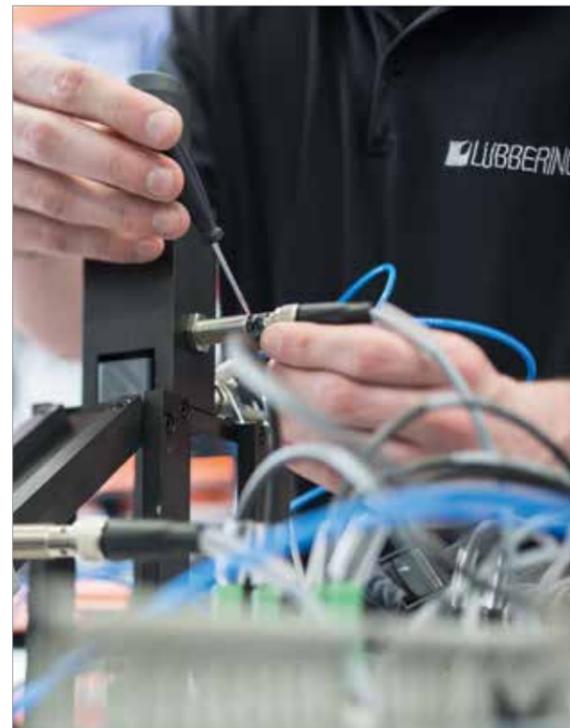
Your advantages:

- + Shorter downtimes
- + Quick availability of spare parts
- + Fastening systems are quickly back in use

48h
EXPRESS
SERVICE

Right: Assembly of a sensor on a Lübbering fastening unit.

Below: Assembly of a Quick Index Adapter at an L.ADU pneumatic.





KNOWLEDGE IS THE ONLY RAW MATERIAL THAT INCREASES WHEN IT IS USED. WELCOME TO THE LÜBBERING SERVICE CENTRE.



OUR EXPERTS KNOW WHAT USERS NEED: THEIR OWN SOURCE OF EXPERTISE.

In LÜBBERING Workshops we provide our customers not only with the basic information about our wide product range – we make experts out of them too, in using our geared offset heads and drills. At our LÜBBERING Service Centre, you will learn all about the different variations and capabilities, the individual operation and maintenance of LÜBBERING products.

In our workshops you will learn how to extend the service life of your LÜBBERING products through regular maintenance and proper operation and repair.

With specialist knowledge tailored precisely to your needs – straight from the manufacturer – you will become an expert in drilling and fastening technology.

Your advantages:

- + Expert knowledge directly from the manufacturer
- + Well-trained users
- + Workshops tailored to your needs
- + LÜBBERING certificate
- + Shorter downtimes
- + Extended service life





PRODUCT WORKSHOPS: TAKE CONTROL OF YOUR OWN PROGRESS.

The Lübbeling product lines offer many possibilities for addressing the increasingly complex demands of the automotive and aerospace industries. The basis for this is a modular product concept which can be adapted to an enormous range of processes.

Familiarise yourself with the modular nature of our L.SP3 and L.ADU product lines, and become an expert in Lübbeling products yourself. Our product workshops will provide the answers to all of your questions about individual use in your field of application.



L.SP3 Product Workshop

With the largest range of standardised geared offset heads in the world, Lübbeling can offer you solutions for practically any fastening application. In order for you to make the right selection, we will give you an overview of our entire range of standard geared offset heads, angle heads and nuts. We will show you how to choose from the enormous range of possibilities to put together the fastening system that matches your requirements exactly. You will also learn about the L.SP3 configurator, which you can use to find the right solution for your application from among 460,000 possibilities in just a few steps.

Your Product Workshop:

- + Individual product training for users
- + Find out about L.SP3 options
- + Expertise straight from the manufacturer
- + Training on the L.SP3 configurator
- + Lübbeling certificate

L.ADU Product Workshop

With our L.ADU Product Workshops, we give you a glimpse into the development and functional capabilities of our high-precision tools for drilling technology. Discover our individually configurable pneumatic and electronic drill feed units and be impressed by the precision, ergonomic design and versatility of the L.ADU product series. At the same time, use our expertise from countless examples of drilling technology – and find out how to choose the optimum combination of drive machine, interlocking system and optional components for your drilling application.

Your Product Workshop:

- + Individual product training for users
- + Find out about L.ADU options
- + Expertise straight from the manufacturer
- + Training in the L.ADU smart interface (if required)
- + Lübbeling certificate





APPLICATION WORKSHOP: SEE FOR YOURSELF ALL THAT IS POSSIBLE WITH LÜBBERING.

Understand what is possible and find the optimum solution for your unique application – with the Application Workshops, we offer you the chance to consider processes from a completely different perspective. Many years of experience as a problem-solver in drilling and fastening

technology, means that we can proudly claim proven record of successfully implementing countless projects. Take advantage of this experience and put it to work for your own particular operation.



L.SP3 Application Workshop

Poor accessibility to fastenings and complex assembly sequences with stringent quality requirements are a daily challenge for us. With our expert team of developers and design engineers, we are well-qualified to work out a solution for you even for seemingly impossible situations. You will also be introduced to the L.SP3 configurator, with which you can find exactly the right solution for your application in just a few steps. And you will learn all about the running-in and trimming of our geared offset heads.

Your Application Workshop:

- + Benefit from our experience
- + Solution for your individual fastening situation
- + Expertise straight from the manufacturer
- + Training on the L.SP3 configurator
- + Lübberring certificate

L.ADU Application Workshop

Drilling isn't just drilling different materials, drills and conditions in production plants regularly pose new challenges when selecting the right machine. What is the right machine type for my application? Which machine configuration must I choose for my type of drill? These and many other questions concern our customers while they are planning an L.ADU. The Lübberring Application Workshop will help you to make the right choices, and our experts will be happy to explain to you what options you have for optimising your drilling process at the same time as increasing your productivity.

Your Application Workshop:

- + Proven reliable processes
- + Individual problem-solving
- + Optimised workflows



MAINTENANCE WORKSHOP: OUR SPECIALISTS WILL SHOW YOU HOW YOU CAN BECOME A SPECIALIST.

The primary focus of this workshop is on the professional maintenance and independent repair of our products. In particular, this direct contact with our fastening and drilling technology experts provides users with the opportunity to have all their questions answered.

A training programme tailored to the way Lübbeling products are used in your company, ensures that you will be able to carry out repairs and maintenance on our products independently. This will in turn lengthen the service and shelf life of your Lübbeling products substantially.



L.SP3 Maintenance Workshop

Reliable fastening in the tightest of spaces needs geared offset heads with consistent efficiency and ultra-high precision. In these situations, it is imperative to know when wearing parts need to be replaced and what must be considered when removing and assembling the L.SP3 systems. Our customers and we know that correct maintenance can extend the shelf life of Lübbeling geared offset heads far beyond the guarantee period. Let our quality standards inspire you.

Your Maintenance Workshop:

- + Learn correct maintenance
- + Maintain precision
- + Prolong the product lifetime
- + Lübbeling certificate

L.ADU Maintenance Workshop

L.ADU is the name we have given to our high performance machines which can alter entire manufacturing strategies and significantly increase productivity. They are able to perform complex motion sequences at extremely high speeds and simultaneously make precise drillings. In order to ensure long term availability, our workshops will show you in detail how to operate the L.ADU for maximum performance and long life. Improve the durability of your L.ADU with our help.

Your Maintenance Workshop:

- + Perform professional maintenance
- + Maintain maximum L.ADU performance
- + Lübbeling certificate





PROFOUND TECHNICAL AND MATERIAL UNDERSTANDING: OUR SERVICES IN DRILLING TECHNOLOGY.

As a long-standing partner of the aerospace industry, we have expert knowledge of the complexity of drilling processes. Whether aluminium, titanium, CFRP or complex material stacks – with L.ADU every drilling is exactly like the other.

In order to meet all the demands of customers, we inspect all parameters in our own laboratory. This also ensures precise drillings. On our different test rigs, every machine including the designated locking system, is made ready for use by the customer. Speeds, feed speed, engine performance and all functions are inspected and the results are documented in a test log by our experts.

No matter whether before first delivery or after maintenance: Every machine's performance and functions are checked and a test log is made. So you can always rely on the precision and efficiency of your drilling unit.

Your advantages:

- + **Function and performance tests for all machines**
- + **A team of experts with long-standing experience**
- + **Test log documenting rotation speed, feed speed and engine performance**



Left: The Quick Change System allows a quick changeover of locking systems.

Below: Drilling tests according to customer specifications using a supplied cutting tool and supplied drilling material.





ARE CERTIFIED QUALITY AND ENVIRONMENTAL AWARENESS IMPORTANT TO YOU? THEN GET IN TOUCH WITH US.

The reasons why our products and services are so successful is both their high quality and our tireless endeavours to meet our customers' demands.

Our ISO 9001 quality management system has been in place for many years and contributes to improving our quality assurance and processes on a continuous basis. In 2014, we introduced the environmental management system according to ISO 14001 for the first time and successfully passed the certification.

- + **High quality and environment awareness**
- + **Certificate ISO 9001:2008**
- + **Certificate ISO 14001:2004**



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MEHR ALS EINE IDEE MEHR