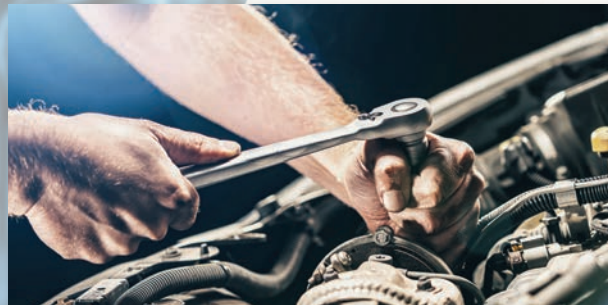


walter+bai

w+b

Rotary Bending Fatigue Testing Machines Series UBM



w+b Materials Testing Systems

Welcome by

walter+bai

Dear Customer

Mechanical testing plays a major role in research and education, product development, design and quality control. In this Overview Prospect we present the summary of our solutions for static & dynamic testing on materials and components which are globally employed by engineers and scientists to achieve the best results.

By selecting our equipment you benefit from our extensive experience in development and production of materials testing systems to suit numerous applications.

Should you require a very specific and customized testing system, we are able to design, develop and produce such system for you. We deliver customized solutions and complete installations for physical and mechanical testing laboratories world-wide.

Our prior goal is to supply advanced and up-to-date testing equip-

ment designed for standard and severe conditions, coupled with long-lasting and reliable operation. To ensure that you obtain the maximum rewards from your investment, our accredited calibration laboratory guarantees an excellent after-sale service and verification facilities are always available for your installation. Our world-wide network of experienced representatives and qualified engineers provide you with optimum after sale support so that you thoroughly benefit from your testing system.

Please do not hesitate to inform us how we can make this catalogue better for you in the future. Your feedback and suggestions will be gladly received on info@walterbai.com.

Sincerely yours,

Ralph Walter
Managing Director, walter+bai ag

walter+bai Testing Machines



walter+bai ag Testing Machines supplies a wide range of material testing machines and systems for the safety and quality of materials, industrial products and buildings.

Mechanical testing is carried out in many industrial sectors, such as the automotive and aircraft industry, metal industry, plastic and rubber industry, the chemical industry, construction industry, bio mechanics as well as at institutes and universities. Serving these sectors for more than 45 years, w+b customers benefit from the company's extensive experience in producing material testing systems and equipment to meet this wide range of applications. Due to our comprehensive know-how and considerable engineering capabilities we are able to offer not only standard testing machines but also customized solutions or complete installations for physical testing laboratories world-wide. To ensure you obtain the maximum rewards from your investment, our accredited calibration laboratory guaranties that excellent verification facilities and after-sale service are available for your testing equipment.

Profile

We are renowned for the production of high quality systems. Due to our continuous research and development policy as well as actively collaborating with our customers and suppliers we have always maintained the very high product standard ever since the company was founded in 1970 by Armin Walter and Alfred Bai in Löhningen - Switzerland. The sales, design and manufacturing divisions associated with testing machines has grown due to the constant interaction with a multitude of clients and the systematic realisation of their requirements. Our product range has been steadily expanded and our service sector activities extended to meet growing demands. The unique position of w+b in the field of material testing machines can be attributed to the fact that their specialised know-how related to materials testing is being constantly updated whilst offering custom designed products and services. A well qualified and highly motivated staff coupled with an efficient

organisational structure forms the backbone of w+b upon which you can rely for know-how, competence and reliable performance.

«Specific testing tasks demand appropriate testing equipment!»

This is our motto. Therefore, besides our standard range of testing machines, we have developed an extensive number of customized testing machines for static and dynamic material and component testing.

w+b Testing Machines are the pacemaker for trendsetting technologies. They are a prerequisite for the safety and quality of materials, industrial products and buildings.

Our Products and Services

- Manufacturing of materials testing machines and systems
- Customer specific testing systems
- Servohydraulic and electromechanical, static and dynamic testing machines
- Digital measuring and control systems and testing software
- Hydraulic power packs
- Static and dynamic actuator testing systems
- Accesories and fixtures for component testing
- Testing machines for construction materials
- Modernisation of existing testing machines
- Maintenance and calibration of material testing machines
- Project management and technical consulting

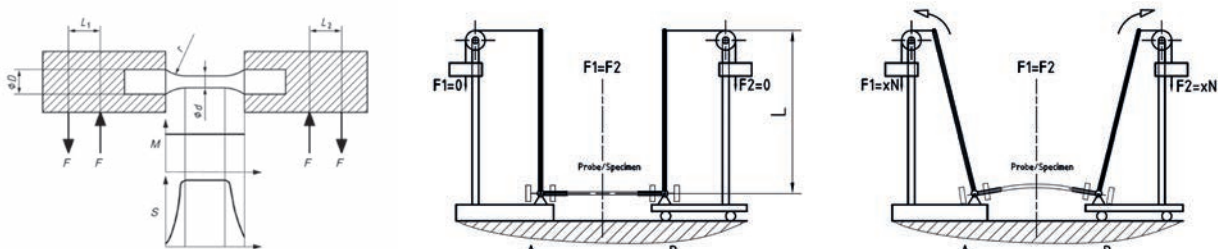


Closed-Loop Controlled Rotary Bending Fatigue Testing Machines UBM Series

w+b offers a complete series of closed-loop controlled Rotary Beam Fatigue Testing Systems designed for applying a constant rotating load and bending moment on standard rod-like specimens in accordance with ISO 1143, DIN 50113 or BS 3518-2.



The specimen has a round cross section and is subjected to dead-weight loading while swivel bearings permit rotation. The UBM series provides constant bending moment over the entire sample length with maximum stress on the circular test-section surface during each rotation.



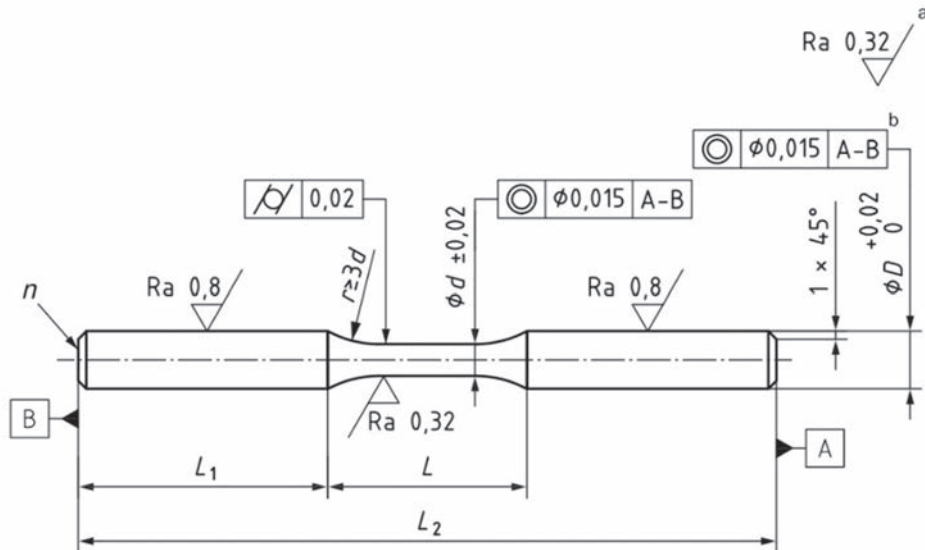
The sample is subjected to sinusoidal stress variation from tension to compression each time it undergoes a 360° rotation. A sensor detects specimen failure and switch off the system.

The UBM Series featured Collet Chuck sample clamping system for cylindrical smooth shank specimens that makes a sample preparation easy and inexpensive. The self-centring Collet Chuck System provides high accuracy over its entire clamping range combined with high vibration dampening the results in longer life time and smooth operation.

The machines are closed loop driven by a motor that provides a stable high speed, even when voltage in the line fluctuates. No voltage stabilizer is needed.

The safety device protects the operator from rotating parts. The product line includes system suitable for Rotary Bend Tests under high temperature and units with frequency range up to 15'000 RPM (250 Hz).

w+b Materials Testing Systems



Select your suitable Model

Sample ϕd in mm	Max. reachable endurance sample stress in N/mm & MPa								
	UBM-10	UBM-20	UBM-30	UBM-40	UBM-50	UBM-60	UBM-100	UBM-200	UBM-500
3	3772	7545	11317	15090	18862				
4	1581	3183	4774	6366	7957	9549	15915	31830	79577
5	814	1630	2444	3259	4074	4889	8148	16297	40743
6	471	943	1414	1886	2357	2829	4715	9431	23578
7	296	593	890	1187	1484	1781	2969	5939	14848
8	199	397	596	795	994	1193	1989	3978	9947
9	139	279	419	558	698	838	1397	2794	6986
10	101	203	305	407	509	611	1018	2037	5092
11	76	153	229	306	382	459	765	1530	3826
12	58	117	176	235	294	353	589	1178	2947
13				185	231	278	463	927	2318
14				148	185	222	371	742	1856
15						181	301	603	1509
16						149	248	497	1243
17						124	207	414	1036
18						104	174	349	873
19									742
20									636
21									549
22									478
23									418
24									368
25									325
26									289
27									258
28									232
29									208
30									188

Recommended working range

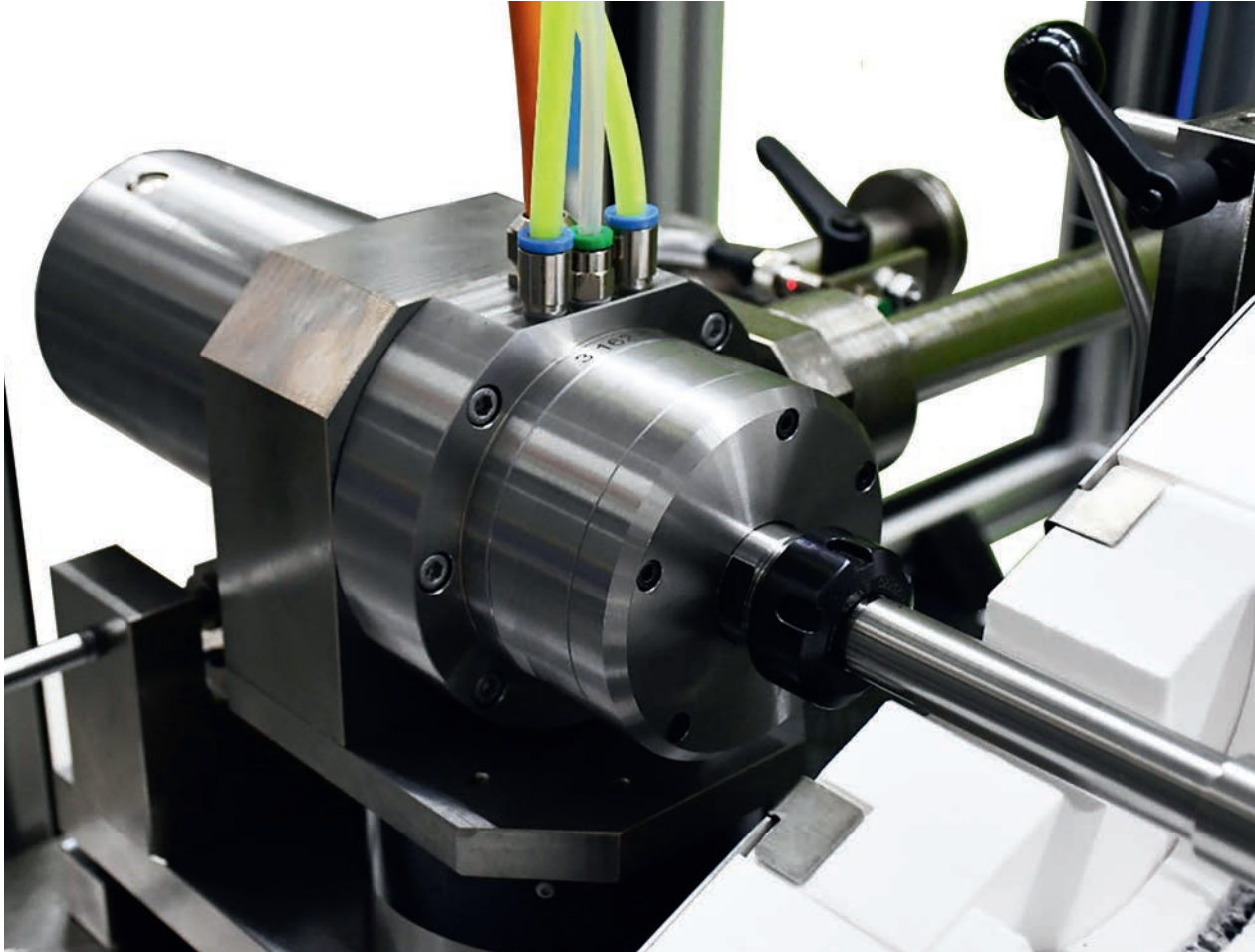
w+b Materials Testing Systems

This series of UBM's feature best in class spindle system suitable for high frequency testing. The machine is closed loop driven by a high responsive, water cooled spindle. The spindle on the opposite side is not powered and features extremely low friction so that the torque loading on the sample is minimized.

To reduce the friction, minimize the torque loading on the sample, remove the heat and to extend the lifetime, the spindle is water-cooled. When connecting additional pressurized air a small overpressure avoids dust and dirt enters into the spindle. The motor spindle is rigid built for longest lifetime.

Spindle Parts & Housing

Spindle parts and housing are hardened and grounded for a high spindle lifetime. Joining elements are inherently safe and force-fit with ground threads. The shaft and all rotating parts are balanced less G1 for best vibration results.



The rear bearing package are preloaded to increases stability and damping.

The spindle housing is cooled to provide a constant operating temperature assuring an equal quality, stable test conditions and less thermal extension of the motor spindle. The cooling goes into the spindle nose what increase efficiency and extend the lifetime. The motor heat is dissipated for less loss of power.

Ceramic Hybrid Ball Bearings guarantees high speed, long lifetime, low vibration and less lost due to friction and less thermal coefficient.

Feature:

- Suitable for high frequency
- Fast and easy test set-up
- Four-point bending type providing constant bending moment over the entire specimen length
- Introduction of low torque moment through low friction spindle
- Non hydraulic machine minimize maintenance
- Stepless adjustable frequency (rotational speed)
- Reduced bending moment through self-centring collet chuck system
- Automatic stop after specimen failure or preselected number of cycles reached

w+b Materials Testing Systems

The machines are closed loop driven / controlled by a high responsive AC motor with closed loop controller providing stable high speed even when line voltage fluctuations appears. No voltage stabilizer is needed.
The system operates on a low noise level.

To avoid any damage in the sample through torque peaks the system features a start procedure where the motor ramps slowly to its maximum speed, thus torque peaks that could invalid our test are avoided.

Specimen Gripping System



This UBM's features Collet Chuck sample clamping system for cylindrical smooth shank specimens that make sample preparation easy and inexpensive. The self-centring Collet Chuck System provides high accuracy over its entire clamping range combined with high vibration dampening resulting in longer life time and smooth operation.

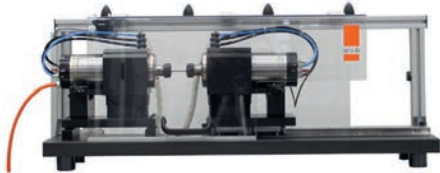
Available are collet inserts for clamping specimen with shank diameter up to 17 mm.
Each collet covers a clamping range of 1 mm.

Safety Enclosure

The UBM machines are available with two safety devices.

The standard enclosure covering the complete test room protecting the operator from rotating parts with safety switches for the front and back cover which both can be swivelled up and down for easy operation.

Test Space Safety Enclosure



Protection Device around the Machine

Alternative the UBM's are available with safety enclosure around the complete machine.

The front and back cover can be opened and are observed by electric switches.



Recooler for Spindle Cooling WRC-0.5

The re cooler provides cooling liquid to the spindle providing a constant operating temperature assuring an equal quality, stable test conditions and less thermal extension of the motor spindle. The cooling goes into the spindle nose what increase efficiency and extend the lifetime. The motor heat is dissipated for less loss of power.

The unit included: Temperature Controller with Display, Liquid Tank, Level Indicator, Main Switch, Aeration and Liquid inlet and outlet.

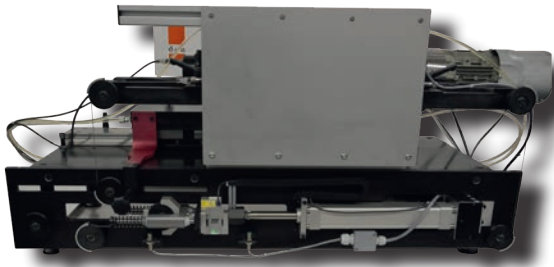


Specification		
Dimension WxDxH	mm	420x285x420
Tank Capacity	Litre	7
Pump Pressure	bar	0.75
Coolant	CFC Free	R134a
Electric	V/Hz/Ph	230/50-60/1

Technical Data

Model		UBM-10	UBM-20	UBM-30	UBM-40	UBM-50	UBM-60	UBM-100
Max. Bending Moment Grade 1	Nm	10	20	30	40	50	60	100
Minimum Bending Moment	Nm	2	2	2.5	2.5	2.5	3	5
Rotational Speed	Rpm	100-12000	100-12000	100-12000	100-12000	100-12000	100-10000	100-8000
Max. Rotational Speed (Option)	Rpm	15000	15000	15000	15000	15000	14000	
Grip-to-Grip Separation	Mm	10-430	10-430	10-430	10-430	10-430	10-430	10-430
Cycle Counter up to	Rotations	99999999	99999999	99999999	99999999	99999999	99999999	99999999
Accuracy of Weight according ISO 1143	Equal/better	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%
Accuracy Verification of Bening Moment according to DIN 50113:2018 Moment Accuracy Grade 1%	Equal/better	2-10 Nm	2-20 Nm	2.5-30 Nm	2.5-30 Nm	2.5-30 Nm	3-60 Nm	5-100 Nm

Closed-Loop Controlled Rotary Bending Fatigue Testing Machines Series UBM with Load Cell instead of Dead-Weights



The full line of rotary bending testing machines is also available with incorporated Force Transducer with digital closed loop force control and application software.

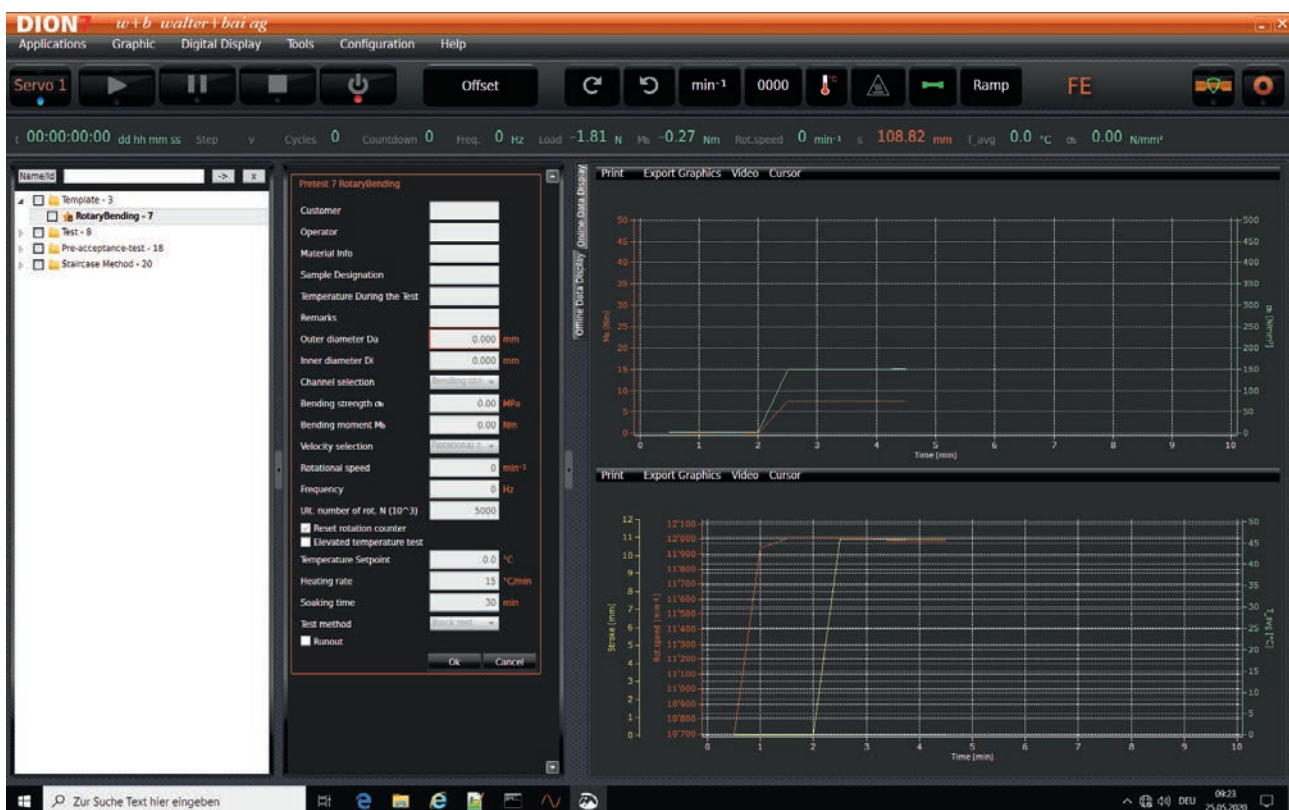
In this case the rotary bending machine is equipped with a high precision electronic load cell (instead of dead-weights) with electromechanical spindle drive and digital closed loop controller PCS8000. The spindle system and load cell are located on the rear side of the machine. The drive is fully protected by cover.

This option allows to free program (through software) the required bending moments or bending moment collectives at a programmable frequency.



The machine works with ultra-high speed and high-resolution Digital Controller PCS8000 and DION7 application module.

The applied bending moment as well as the test frequency can be freely programmed through block programming in combination with DION7.

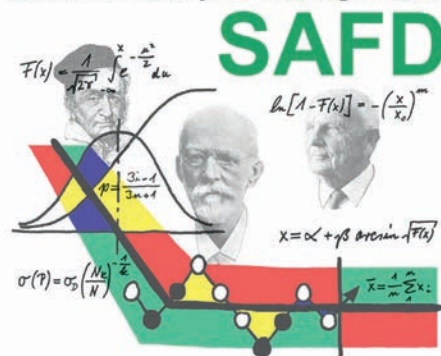


Dead-weight are not supplied when this option is selected.

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Statistical Analysis of Fatigue Data (SAFD)

Statistical Analysis of Fatigue Data



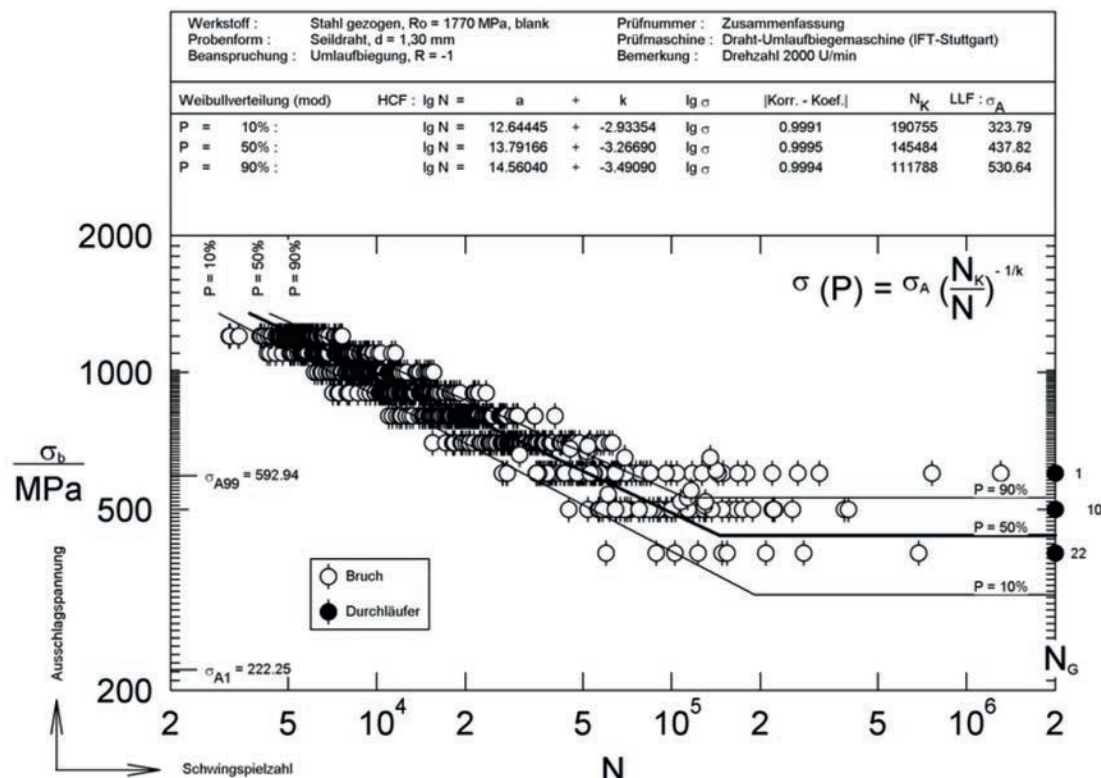
To ease the statistical evaluation of fatigue tests the software SAFD has been developed at the Institute for Materials Science (IWK) of the RWTH Aachen University.

For practical statistical evaluations of fatigue tests we are offering the software interface to the SAFT statistical evaluation software.

Fatigue Evaluation Software SAFD®5

SAFD offers:

- Universal evaluation of stress controlled fatigue tests in high cycle fatigue (HCF) and long life fatigue region (LLF)
- Presentation of the evaluation results and the test data as S-N diagram (semi-or double logarithmic) and probability graph
- Supported testing methods (practice oriented compatibility) Wöhler-/step down test, complete test matrix (block test), level tests (e.g. boundary method), staircase tests, combined test procedures (full S-N curve)
- Implemented statistical methods and probability distributions: Standards according to DIN 969 and ISO 3800, Log-/normal distribution,, sine distribution, Weibull distribution, optimisation of the correlation coefficient with variable estimator function, global (HCF-) distribution (normalization to the mean cycle number N50), combined evaluation over all test levels in the long life fatigue region, weighting evaluation (dependent on the sample size)



Picture: Example for a statistical evaluation (S-N diagram) for 877 rotation bending test with steel wires.

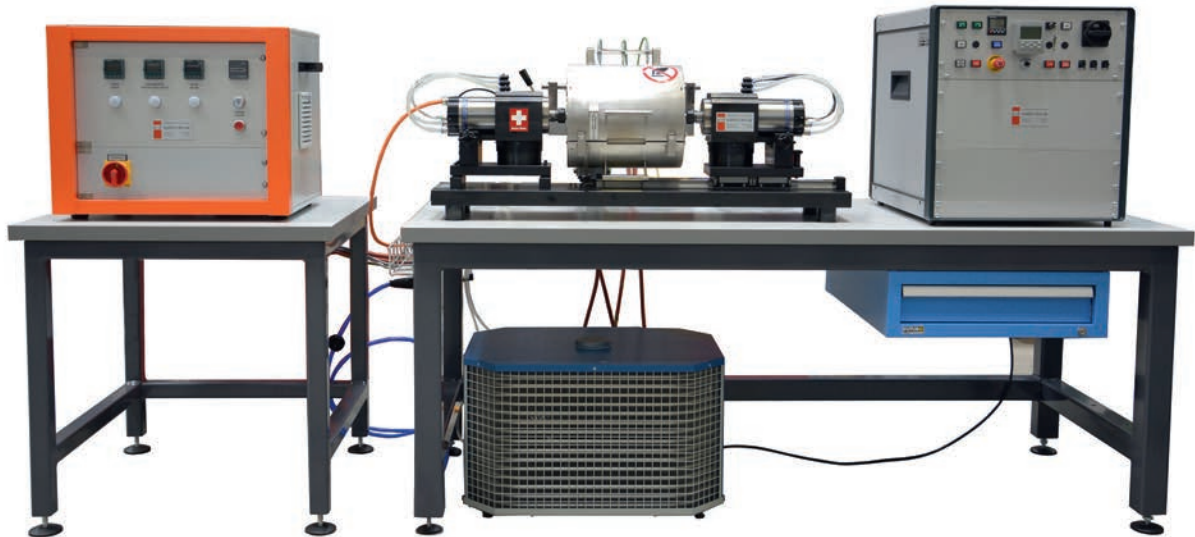
Configuration features

- Generation of „raw Data“ files in Excel, Data in ASCII format
- Online presentation (multiple arrangements), printing, export function
- Easy handling, online manual
- Application oriented user interface, menu navigation, tools
- Flexible designng (graphical S-N line comparison)
- German and English Language

High Temperature Accessories for UBM

Our Rotary Bending Fatigue Testing Machines Series UBM are beside of room temperature tests also well suited to conduct tests at elevated temperature in air.

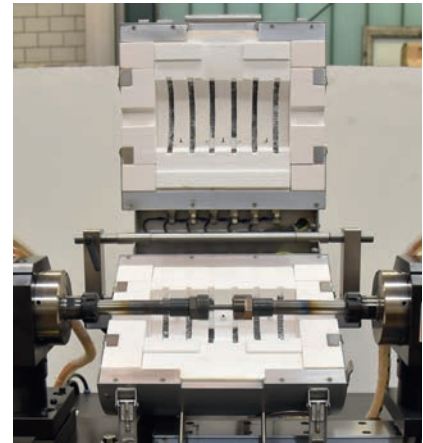
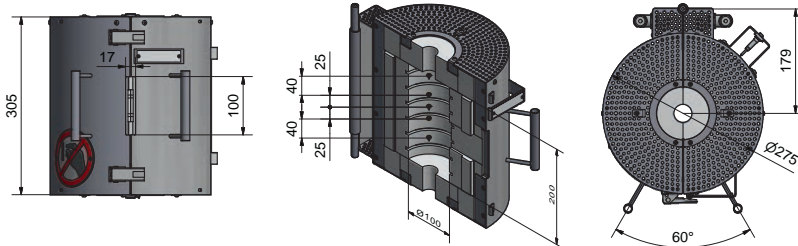
Depending on specimen dimensions and required temperature range we are offering different heating and clamping solutions



HTO-19

To archive an accurate temperature gradient along the test section of the specimen during the test a appropriate heating zone length is required. This furnace is specifically optimized for the use in combination with our rotary bending testing machines. The furnace is mounted horizontal in the test axis of the machine.

To minimize the influence of air turbulences caused by the rotating specimen and gripping part this furnace have three heated zones with independent temperature control of each zone.



Furnace Type HTO		19
Max. Heating Element Temperature	°C	1150
Max. Sample Temperature*	°C	900
Max. Heating Rate	°C/min.	20
No. of Heated Zones	No.	3
Hot Zone Height	mm	200
Heating Zone Diameter	mm	100
No. of Thermocouples included**	No.	3
Thermocouple Type***	Type	NiCr-Ni, Type K
Output Voltage for Heating Element	V	3 x 30
Outside Diameter	mm	275
Overall Furnace Length	mm	305
Weight	kg	25
Power Consumption (each Zone)	kW	0.5
Thermal Insulation	Amorphous Alumina Silicate wool	
Heat Conductor	Fibrothal-Module with A1-resistance spirals, horizontal imbedded in AL2O3 soft felt holders	

Slidable Thermocouple Arrangement

Due to the nature of rotating bar bending fatigue testing, direct temperature measurement is not possible.

For this the HTO-19 furnace comes along with a slidable thermocouple arrangement allowing to move the thermocouples close to the extension rods and the middle one close to the specimen. All thermocouples are spring loaded. Each thermocouple can be moved independently in horizontal position for adjustment purpose. Additionally all three (3) thermocouples can be moved together if further specimens are tested.

Additional clamping holes for introducing additional two thermocouples are available with a distance of 25 mm to each side from the middle one.



Option for Inert Gas-Supply

Additionally the furnace can be ordered with an inert gas supply for external connection of gas supply (e.g. Argon) and for inlet of the gas into the heating area of the furnace.



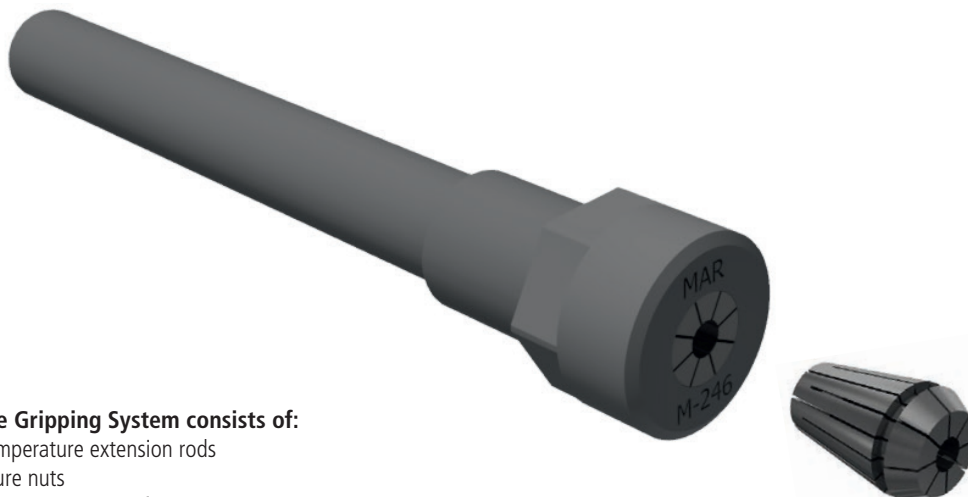
Mounting Bracket

The furnace mounting bracket allows to remove the furnace out of the test space when not used.

The furnace can easily swivelled out of the test space. For accurate test set-up the furnace is mounted on a rail system with spindle for easy position of the furnace.

High Temperature Collet Grip System

Specimen gripping at high temperature is a challenge during the rotary bending fatigue test. We have developed the high temperature collet grip system equivalent to the ambient test system. All parts are made from high temperature resistant alloys and grinded to minimize the unbalanced mass. The high temperature extension rods can be clamped direct into the collet gripping system of the UBM.



High Temperature Gripping System consists of:

One pair of high temperature extension rods

Two high temperature nuts

Two high temperature collets made from high temperature MAR M247 materials.

Calibration and Verification of Rotary Bending Fatigue Testing Machines according to ISO 1143 and / or DIN 50113

Our accredited (according to ISO 17025) calibration laboratory calibrate rotary bending fatigue testing machines according to the latest standards



Object to Calibrate	Calibration Standard	Range of Calibration	Measuring Uncertainty	Remarks
Calibration of Rotary Bending Fatigue Testing Machines according to four-point bending loading system accredited according to ISO 17025 or with Works-Calibration or ISO-Documentation.				
Calibrating of the weights (accredited according ISO 17025)	ISO 7500-1 ASTM E4 ISO 1143	1 N to 200 N		Calibration with Reference Balance
Calibration of the Load Cell (accredited according ISO 17025)	ISO 7500-1 ASTM E4 ISO 1143	1 N to 500 N		Calibration with Reference Load Cell (Grade 0.5, ISO 376 & ASTM E74-00)
Verification of the Bending Stress according to DIN 50113:2018 in positive and negative direction	ISO 7500-1 ASTM E4 ISO 1143	1 Nm to 200 Nm		Verification with Strain-Gauged reference rod

After Sales Service

The world-wide network of w+b highly qualified factory trained support staff provides customers with comprehensive after sales solutions for w+b testing systems.

We are focused on the individual customer support and the offered services include on-site installations, repairs and maintenance throughout the entire life cycle of your testing equipment. Customers of w+b know they can benefit a maximum from the acquired testing equipment, and with provided after sales service they are in good hands – now and in the future.

Over 45 Years of Experience

- Customers prefer w+b because of our individual customer approach coupled with flexibility and versatility in developing the most customized and specific testing systems.
- However there is more. By choosing a testing system from w+b you start a long-term partnership with us.
- With our world-wide network of w+b highly qualified support and maintenance engineers provides you with an optimum after sales support, to make sure you get the most from your investment.
- w+b constantly invests in hiring and training service engineers and local representatives.
- w+b provides customers with comprehensive free of charge telephone support of all specialists for the lifetime of the product.
- Our large stock of spare parts from the most w+b equipment helps you to minimize the idle time in case of problems with equipment.
- w+b test systems are designed for stable and long term operation. With the provided constant comprehensive service and support you will profit the maximum from your systems throughout their entire life cycle.

Instruction Manual

At w+b a comprehensive customer support starts with a detailed instruction manual. To each system we deliver a complete technical manual including information about safety, system installation, machine setup, technical drawings of testing system, hydraulic and electric schemes with items list, software and hardware manuals, maintenance information, a.s.o. By providing from very beginning this technical information to our clients, which is later on demand complemented by telephone support, enables us to have practically more than 90% of all shut-downs solved instantly.

Installation and Warranty

Our qualified field service engineers are available in short terms to install and to commission your testing system on site after its delivery. All our field service engineers are factory trained and complete the installation in a timely manner. Our service guarantees the reliable commission and operation of your testing system according to the technical specification. All w+b products are covered by a factory warranty.

Customer Training

It is essential that our clients use w+b testing systems to its full extent, i.e. by employing all possible features and capabilities of the acquired equipment. Additionally, as a well-known fact the comprehensive knowledge of machine operation practically reduces the instrumental setup times, also prevents possible mistakes and in turn increases your testing efficiency. Therefore, the technical instruction and extensive operation training are provided by w+b engineer at the time of system's commissioning. Further repetitive training, organized either on site or at w+b premises, ensures that new system's operators from customer side are properly instructed on the operation capabilities of the installed system, likewise the skills of already trained operators are refreshed and retained. We provide an extensive range of comprehensive training courses focused on complete machine operation, software usage, sample alignment, all types of materials tests, and many others. These courses can be scheduled with a short notice and given either at w+b or at your premises.

Hardware & Software Support

To ensure that the acquired system can be steadily employed even though your testing requirements are changing with the time, our software and hardware engineers, including w+b local representatives, will assist you with these tasks, as well as you will receive the detailed information on w+b continuous development of software and hardware. This will guarantee

that your system is maintained at peak performance. Through planned and systematic service visits of our engineers for preventive maintenance and calibration of your testing system, any potential problems can be identified beforehand and resolved immediately avoiding unnecessary machine's idle time.

Calibration

w+b calibration laboratory is accredited according to the latest ISO EN IEC 17025 (formerly EN 45001) standard. The calibration and verification of your materials testing machine is a part of our provided service. Our field



service engineers are not only trained to perform maintenance and calibration service on w+b machines, also the testing machines of other producers are successfully verified and calibrated in a daily manner. The calibration certificate will prove the verification of your system conforming to ISO 9001 and other standards.

Application Service

We consult customers concerning testing techniques and provide with necessary tools, as well as we create report templates or graphic presentations precisely suited to your specification, developed based on w+b standard software packages. Our application experts have many years of experience in development of materials testing applications and will create a product to fully meet your requirements.

Maintenance and Calibration of Materials Testing Systems

by *w+b* Accredited Calibration Laboratory

The maintenance and service works on your materials testing equipment is executed by our specialists with highest attention and precision, and with experience of over 45 years. Highly precise computer-aided calibration equipment guarantees a calibration according to the latest international standards.

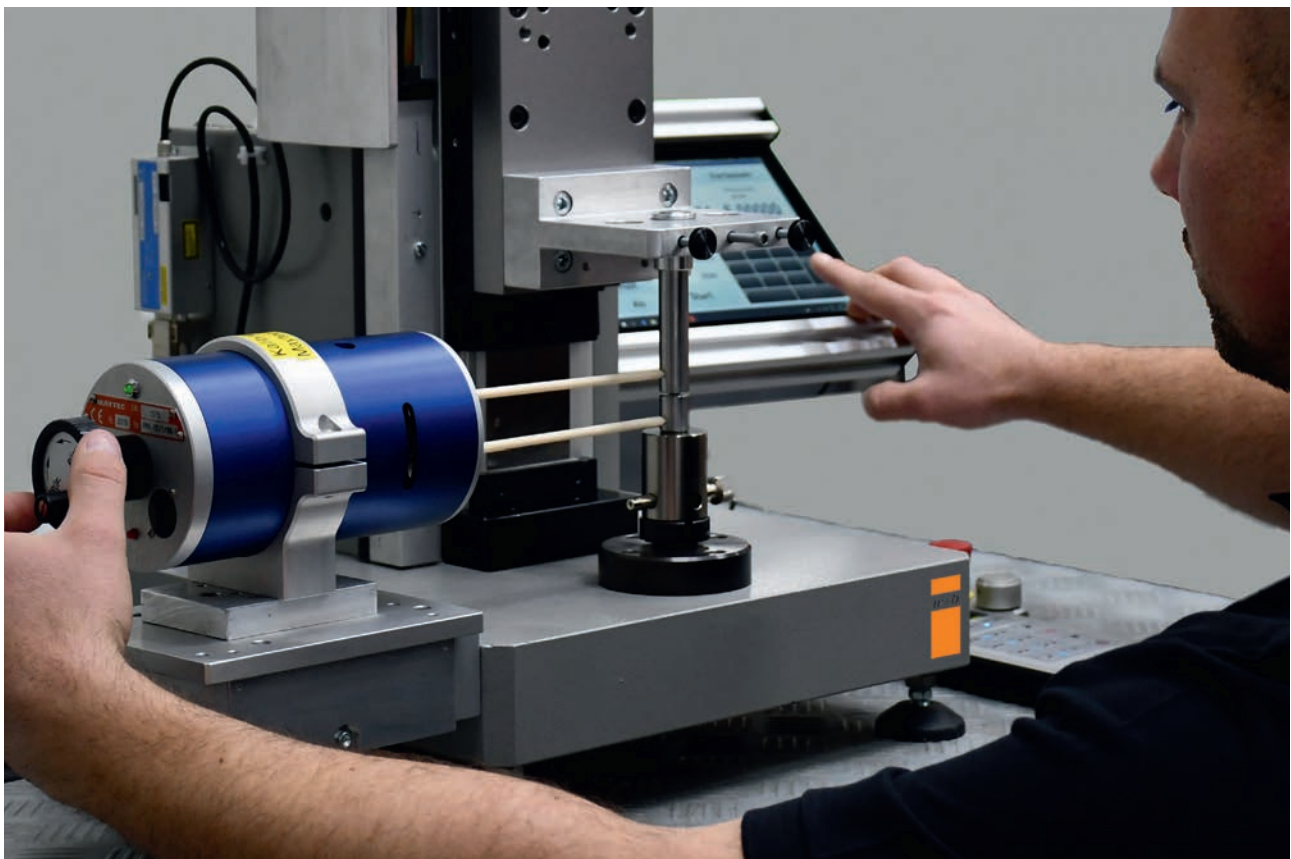


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Our calibration laboratory is certified according to ISO/IEC 17025 which is recognized through the Multilateral Agreement (MLA) for EA - European Cooperation for Accreditation. The maintenance and calibration performed by our specialists with 45 years of experience assure a reliable execution of the service. Your savings: there are no extra costs for an additional calibration by a further official calibration institute, since we are an accredited calibration laboratory. We will calibrate your test equipment independently of the type and manufacturer. We offer excellent conditions together with flexible dates. The accreditation according to ISO/IEC 17025 is recognized through all signatories of the EA (European Cooperation for Accreditation) multilateral agreement of calibration.

w+b Calibration Laboratory is accredited for:

- Force - Tension, Compression
- Pressure
- Length - Displacement, Deformation
- Hardness
- Energy - Impact Tester





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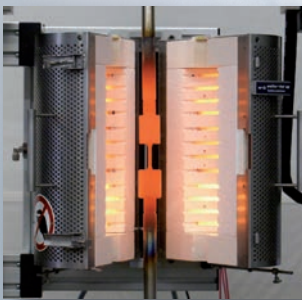
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Testing Machines**

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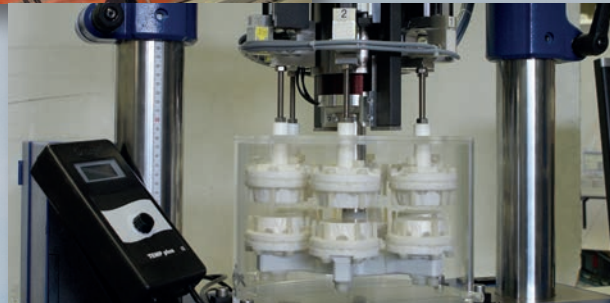
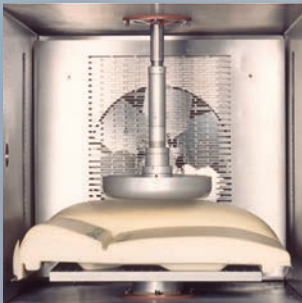
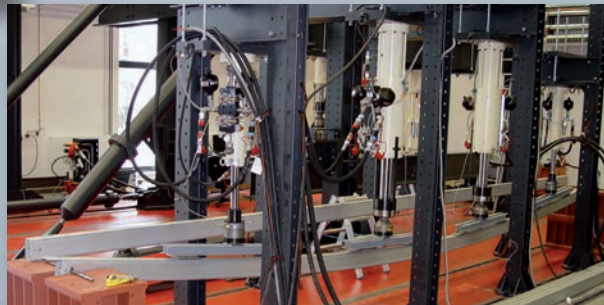
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- Static Universal Testing Machines, Electromechanically or Servohydraulically driven
- Dynamic Multipurpose Testing Systems for Advanced Material and Component Testing
- Torsion, Rotary Bending, Impact Pendulum Testing Machines
- Hydrostatic Pressure Testing Systems
- Customer Specific Testing Machines, Modernisation of Existing Testing Machines



- Accessories for Material Testing, incl... Digital Controllers, Application Software, Hydraulic Power Supply, Grips and Fixtures, Extensometers, Furnaces and Climatic Chambers, a.s.o.
- After-Sale Service at Customers Laboratory
- Calibration of Material Testing Machines