

Innovative manufacturer of ultra-precise tool and workpiece motor spindles for milling, grinding, drilling and turning applications.



# LEVICRON

NON-CONTACT PRECISION MOTION

Spindle analysis and -testing systems: **ShakesBear**

**Levicron ShakesBear**

Spindle Serial: Levicron

Working Folder: Z:\Levicron

Basic Model	Customer	Comments
UASD-H40	Levicron	Dummy
Nom. Speed	Tooling System	Spindle Connectors
60.000 rpm	HSK-E40 (SLH)	Axial
Motor Type	Main Rot. Encoder	Spindle Housing Type
4, 17-100	GMR SinCos, 96 Lines	Standard, Flood Cooling
TechOpts 1.1, Backcap Color	TechOpts 1.2, Encoder Settings	TechOpts 1.3
Orange, with Lev.-Engraving	Heidenhain	w/o
TechOpts 2.1, Bearing Shape	TechOpts 2.2	TechOpts 2.3
High-Load, High-Pressure	w/o	w/o

Buttons: FFT / Impulse Response, Digital Dial Gauge and Sensor Standoff, SEA, radial, SEA, axial, Create Database Entry 100 / 110 / 140.xxx, Create Data Base Entry 120.xxx, Spindle Details, EXIT



ShakesBear

Two spindle analysis and testing systems with different modules and functions are available



About

Since no suitable technology was available on the market to qualify our spindle products on a nanometer level at speeds up to 100,000 rpm, we developed our ShakesBear system early in our spindle history. The same applies to measuring, testing, verifying, and optimizing spindle dynamics and thermal behavior.

In 2020, we merged all our test and measurement methods into a single system, including a technical and database ERP system to keep track of all spindles in our production and record those that left our facility. Because of its unique and comprehensive features on the international market, it has been developed as a product and has become a global standard. Due to the different hardware requirements, two systems - “Hamlet” and “Othello” - both use the same “ShakesBear” software but differ in terms of the available modules. The modern, user-friendly software is continuously maintained and developed internally in Levicron to meet internal or external requirements. The user can be sure to get a well-proven tool from an experienced manufacturer of ultra-precise spindle solutions used daily.



Customized spindle and machine databases



Comprehensive spindle and machine dynamics analysis like dynamic tool runout, axial shaft growth, resonance maps, reports, and raw data storage (ShakesBear, Othello)



Unique spindle error analysis according to ISO 230-7 on a nanometer level and for speeds of up to 80,000 rpm (ShakesBear, Hamlet)

Available systems

ShakesBear, Hamlet (incl. 3 modules)  
up to 80,000 rpm

ShakesBear, Othello (incl. 6 modules)  
up to 100,000 rpm

General information at a glance

		ShakesBear, Hamlet	ShakesBear, Othello
General	Power supply	240 VAC	240 VAC
	Integrated PC, touchscreen	n.a.	optional
	USB 2.0 (or higher) connection	Yes	Yes
Analog-to-digital converter	Digital resolution	16 bit	16 bit
	Number of channels	8	8
	Evaluation	differential	differential
	Sampling rate per channel	1,25 MS/s	250 ks/s
	Analog signal	+/- 10V	+/- 10V
Distance sensing	Measuring principle	capacitive	capacitive
	Working distance	50 µm	50 µm
	Measuring resolution	1,7 nm	1,7 nm
	Sampling frequency	100 kHz	100 kHz
	Number of sensors	4	1
Vibration sensing	Measuring principle	n.a.	Piezo Sensor
	Cut-off rate	n.a.	18 kHz
	Sensitivity	n.a.	1 V/g
	Number of sensors	0	1 (2 optional)
Software modules *)	Number of modules	3	6
	1. Multi-sensor spindle Error-Analysis, ISO 230-7 radial and axial	X	n.a.
	2. Dynamic tool run-out and spindle vibrations over speed	n.a.	X
	3. 2-Channel FFT with peak hold (impulse response)	n.a.	X
	4. Resonance speed maps/ Machine resonance maps	n.a.	X
	5. Axial shaft growth, temperature & speed over time	n.a.	X
	6. Spindle and machine database	X	X
	7. 4-Channel Drag-Pointer Dial Gauge	X	X

„ShakesBear, Hamlet“ is one of our leading spindle analysis and testing systems. It was specially developed to measure, report, and store spindle errors by DIN ISO 230-7 (Error-Motion) in rotating systems.

The automatic separation of the spindle synchronous and artefact shape errors includes a unique technical feature that saves the time required for a reversal measurement and provides outstanding reliability and repeatability. The system gives verified results with sub-nanometer accuracy at speeds up to 80,000 rpm.

A spindle-error measurement requires sophisticated hardware and software. Our spindle analysis system includes both. It is integrated into a portable housing that can be connected to a PC and the sensors. The same applies to all amplifiers, conditioners, and electric supplies.

- ➔ Multi-sensor spindle Error-Analysis, ISO 230-7 radial & axial
- ➔ Spindle and machine database
- ➔ 4-Channel Drag-Pointer Dial Gauge

„ShakesBear, Othello“ is a testing system primarily developed for spindle manufacturers or OEMs who frequently change spindles in their machines to record dynamic variables such as tool runout, thermal expansion, and resonance maps. The spindles can be used as a vibration source, and a vibration spectrum can be read at any point in the machining system to create a resonance map of the machine.

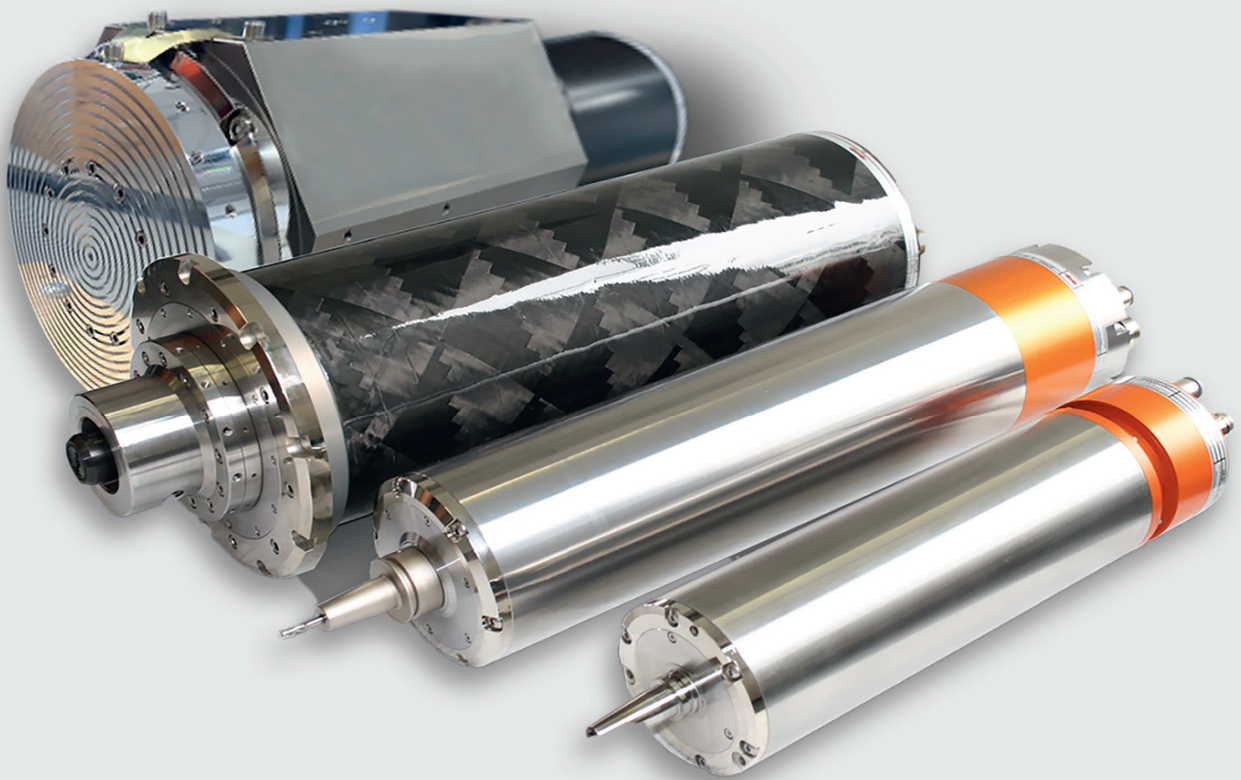
The testing system is highly flexible and can be equipped with integrated operating and computing units like the Raspberry Pi and a touchscreen. All required amplifiers, filters, and driver units are integrated into one housing, enabling the sensors to connect easily.

- ➔ Dynamic tool runout and spindle vibrations over speed
- ➔ 2-Channel FFT with peak hold (impulse response)
- ➔ Resonance speed maps/ Machine resonance maps
- ➔ Axial shaft growth, temperature & speed over time
- ➔ Spindle and machine database
- ➔ 4-Channel Drag-Pointer Dial Gauge

\*) Specific information on request

Values of: May 2024





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