

LEVIATRON
NON-CONTACT PRECISION MOTION

SLH-x (spring-less HSK tool clamping units)



Levicron

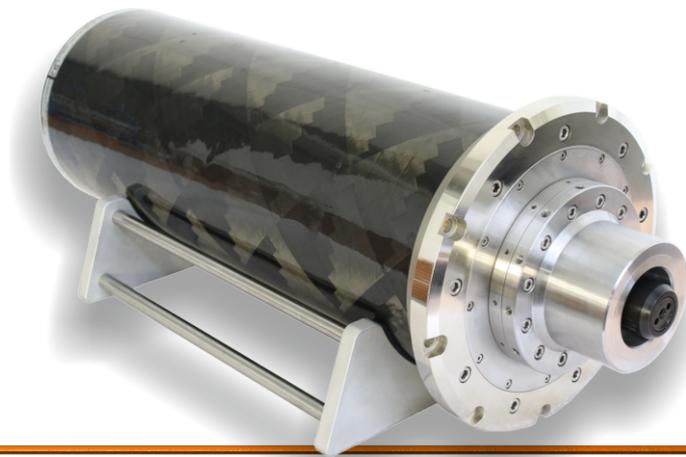
Development, manufacture and sales of motor spindle solutions with non-contact bearing technologies for ultra-precision and CNC machining are Levicron's core businesses. At Levicron bespoke analytical proven methods and simulation tools for structural analysis and fluid dynamics complement sound practical experiences in the field of spindle development and production.

Together with the first-ever aerostatic tool spindle comprising an industrial taper interfaces (HSK) and full CNC functionality, products from Levicron now are used to CNC-machine precision parts with optical surface finish all around the world.

Our very own requirements on our products and those from our customers prevent the use of off-the-shelf components. Therefore not only the patented bearing technology and patent-pending spring-free HSK taper damping systems can be found in our motor spindles, but also in-house developed motor and encoder and tool damping solutions. A vertical manufacturing integration of more than 90% incorporates CNC turning, -milling, -diamond machining, -cylindrical /bore grinding, - wire cut EDM and bespoke machining solutions. Along with our production sophisticated test and dynamic balancing methods can all be found under one roof.

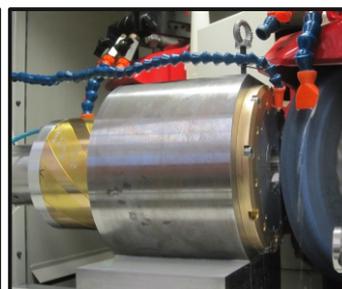
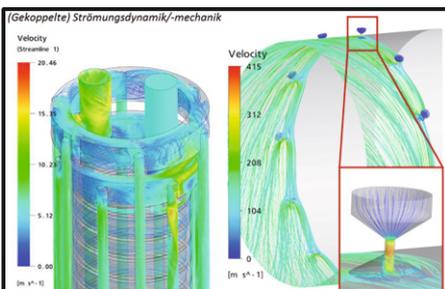
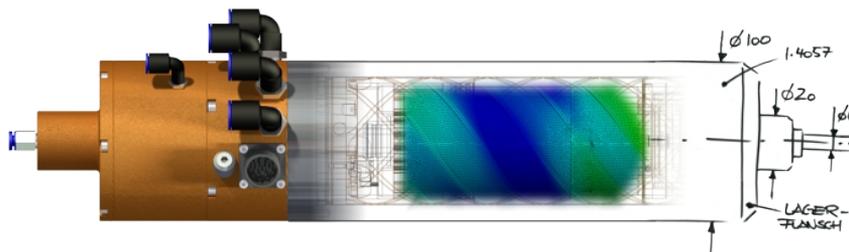
The quality, speed and accuracy of Levicron spindles and the requirements coming from the applications they are used for made it necessary to develop bespoke encoder and motor solutions as well as solutions for HSK tool clamping, HSK tool holding and others. Because of their unique performance and functionality some of these solutions have been made available for our customers as off-the-shelf items. Although Levicron had to re-invented the wheel more than once our customers can confirm that our wheels run smoother and faster than others.

As a result, tool and work-holding spindle solutions for turning, milling and grinding can be provided to the customer which provide a unique thermal stability and robustness at shaft dynamics, errors in shaft motion and speeds that have not been available so far.



Levicron

All in house developed and manufactured Ultra Precision Technology for CNC Machining



SLH-x

Patent-pending integral HSK damping units,
the spring-less simplicity for automatic HSK damping

Tool spindle manufacturers know of all of the problems that come with a spring-based taper damping system – a complex and stacked design, combined with inconsistent balancing and shaft dynamics, spring-fatigue, inconsistent clamping position and pull-in forces at excessive servicing.

Existing self-locking damping systems on the other hand appear to be too complex and show quite different problems. Due to the serial combination of taper connections these systems have not only to cover a broad travel range, but also suffer from changes in clamping position and pull-in force due to non-predictable changes in tribological conditions. Self-locking taper damping system according to the current state of the art also use a self-locking unit connected to a standard damping unit which can be used with other damping systems. This again affects the already large change in clamping position and tribological conditions.

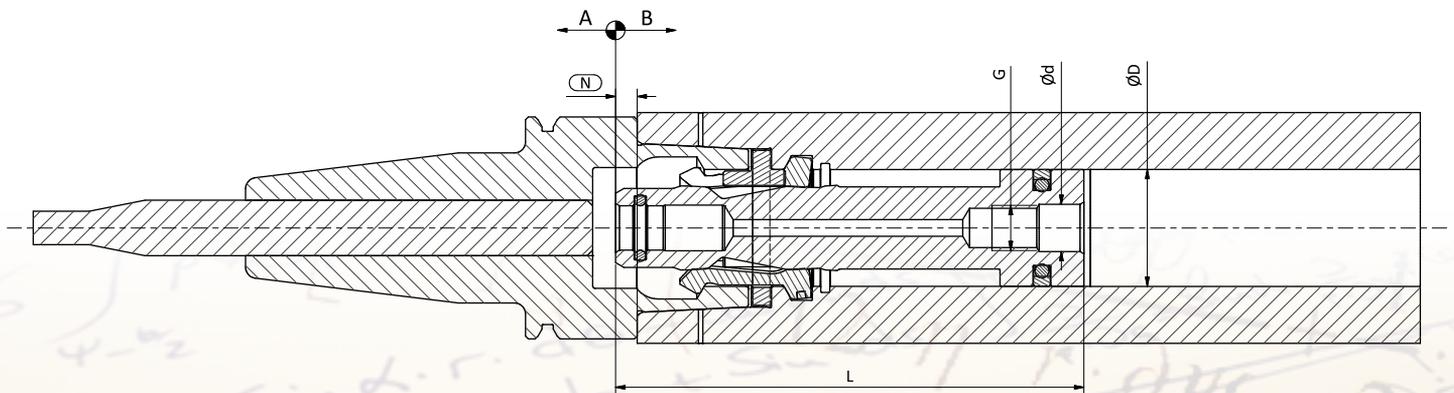
Our patented spring-less automatic damping system for Hollow-Taper-Shank (HSK) tools with optional aerostatic rotary feedthrough is based on the principle of a monolithic pre-loaded self-locking. For this the damping and the locking unit used with other spring-less damping systems are combined and reduced to only one single unit of a very simplistic design that covers the damping as well as the self-locking. Due to an intensive FEA design optimization on the change pull-in force to the tool holder from stands still to high-speed is less than 5%.

Benefits for your machining application:

- Consistent damping force and positions even over two million tool change cycles
- Consistent and excellent shaft balancing and dynamics
- Especially for spindle solutions that are meant to machine optical components
- Higher spindle speeds and increased productivity

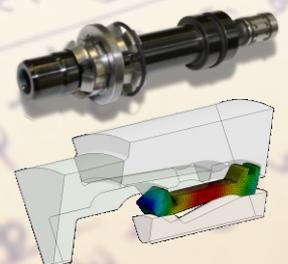
Benefits for the spindle designer and manufacturer:

- Number of parts involved reduced to the minimum
- Ultra compact, simple and light design
- damping system removable (service) from shaft without removing the shaft from the spindle
- Non-rotating drawbar (standard)
- Forces to eject a tool reduced by 60% (to protect the spindle bearings from overload)
- Optional aerostatic rotary feedthrough (not available for SLH-25)



Data Sheet, SLH-x

HSK type		HSK-E25	HSK-E32	HSK-E40
Operating Force, Clamping	[N]	700	900	2,100
Operating Force, Unclamping	[N]	≥ 700	≥ 900	≥ 2,000
Pull-In Force	[N]	3,500 - 5,000	6,500 - 8,000	7,500 - 10,000
Nominal Clamping Position (N)	[mm]	3	4	3.85
Eject Travel (A) from (N)	[mm]	3.2	4.2	4.1
Travel from (N) without Tool (B)	[mm]	1.8	2	3
Bore Diameter (D)	[mm]	13.3	16.8	21
Overall Length (L)	[mm]	54	67	83.7
Connection Thread (G)	[-/-]	M6x0.75 6H LH	M6x1 6H LH	M8x1 6H LH
Guide Bore Diameter (d)	[mm]	6.3 H5	6.4 H5	8.5 H5



SLH-x unit and coupled FEA simulation with multiple non-linear contacts



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