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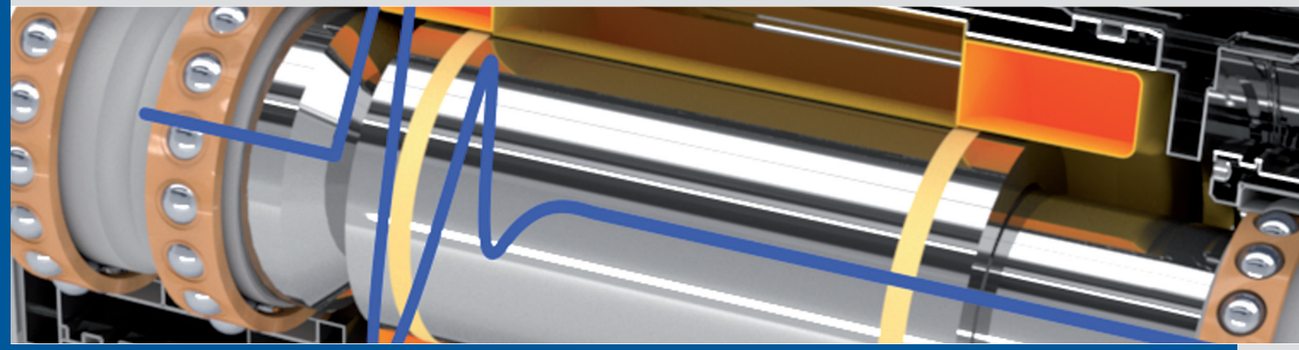

# Hydroviscous Damping and Changeable Bearing Preload

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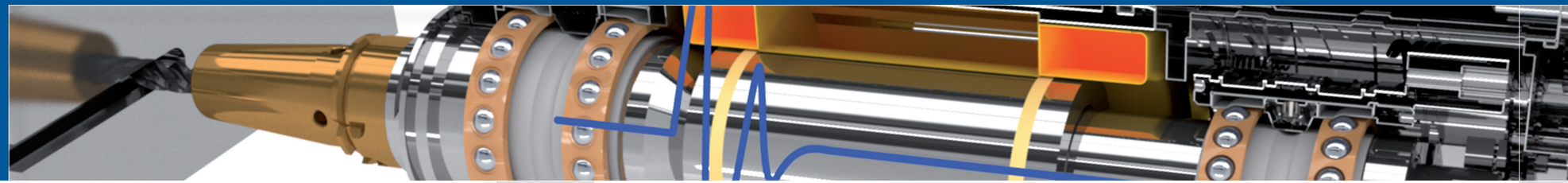
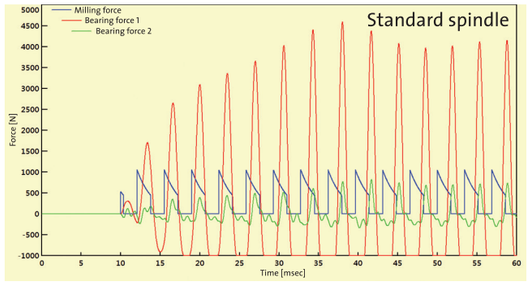
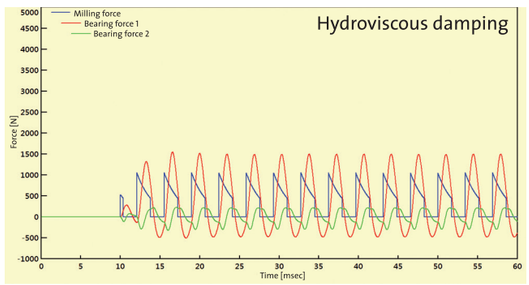
# Hydroviscous damping and changeable bearing preload



## More machining productivity: higher cutting depths, larger material-removal rates, better surface quality

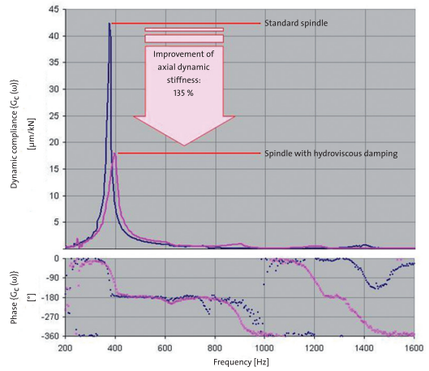
The GMN developed highly efficient hydroviscous damping enables a more cost-effective workpiece machining. Components can be worked consistently with higher cutting depths and therefore larger material-removal rates, because natural vibrations are reduced by up to 65 % in comparison with standard spindles. Improved surface quality is obtained at all speeds – not only for rough-machining, but also during the finishing process and grinding.



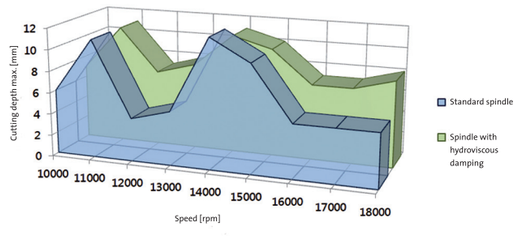

## Improved dynamic stiffness

Due to the hydroviscous system, damping of natural vibrations is enhanced considerably. In the axial direction, an improvement in dynamic stiffness of up to 135 % is achieved. This results in significantly reduced natural vibrations in the machining process, enabling a very good surface quality.



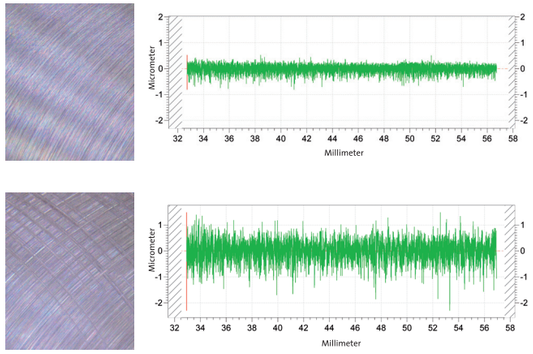

## Stable cutting depth doubled

An investigation by the Laboratory of Machine Tools and Production Engineering (WZL) at the Rhine-Westphalia Institute of Technology Aachen concluded that it was possible to double the minimum stable cutting depth at speeds between of 10,000 and 18,000 rpm with the GMN high-speed spindle HCS 280 - 18000/60 with HSK-100. That means, when using a GMN spindle with hydroviscous damping, consistently good surface results were obtained up to a plunge depth of 6 mm - at stable production process. Conversely, a depth of only 3 mm was achieved using a standard spindle under the same conditions.




## Improvement of the average roughness $R_z$: 62%

Under production conditions at GMN's own manufacturing facility, GMN grinding spindles have been tested at internal cylindrical grinding and surface grinding. For example, a hydroviscously damped spindle produced a roughness of only 0.89 µm – compared with 2.36 µm using standard models.




## Special energy-efficient hydraulic power unit for oil supply

The hydroviscously damped GMN high-speed spindles are supplied with oil by a special developed energy-saving hydraulic power unit. The bearing preload of the spindle can be controlled via the oil pressure. In this way, the rigidity of the spindle can be modified and therefore its behaviour optimized depending on machining task, speed, and tool. Increased preload can, for example, be used to significantly improve spindle performance at lower speeds.


## New spindles are structurally identical to standard models and easy to retrofit in already existing machines

The new spindle models are available for grinding machines as well as machining centres for use in milling and drilling operations. Since they are structurally identical to the standard models, they can also be easily retrofitted to existing machines.

| High-speed spindles for manual tool change (according to catalogue 2508) | | |
|---|---|---|
| Spindle type | HV-X | HV-P |
| Spindle housing Ø | ≥ 120 mm | ≥ 120 mm |
| Speed | ≤ 75,000 rpm | ≤ 60,000 rpm |
| Tool interface | GMN grinding quill interface | HSK-C25 ... C100 |

| Customized spindles for large grinding wheels | |
|---|---|
| Speed | ≤ 18,000 rpm |
| Tool interface | Customized grinding quill interface or HSK ≤ C160 |
| Option | Automatic balancing system and AE sensor |

| High-speed spindles for automatic tool change with customized housing design (please see also catalogue 2505) | |
|---|---|
| Speed | ≤ 75,000 rpm |
| Tool interface | HSK-25 ... HSK-125 or PSC 32 ... 100 |
| Power | ≤ 150 kW |
| Torque | ≤ 850 Nm |
| Option | Shaft lock for turning applications |