Made for Motion KTR

PRESS RELEASE

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Precision, safety, efficiency-

Coupling performance today

With the operation of modern machine tools accuracy and a high level of productivity, combined with energy efficiency, is state of the art. Indispensable with machine tools and their peripheral equipment such as feed units and handling units is reliability and safety of the direct drive systems. The coupling systems of the leading coupling manufacturer KTR make an essential contribution to realizing this condition.

Upgrade with CNC machine tools

A manufacturer of CNC machine tools located in Baden-Württemberg has carefully examined the different application ranges of shaft couplings during the development stage to improve their machines. In order to optimize the efficiency of the machine tools considerably, KTR as a competent supplier of couplings for precision drives was involved in upgrading the machine tools.

Specifically with machine tools it is not easy to decide between a torsionally stiff and a flexible coupling merely based on the figures mentioned in the catalogue tables. Coupling systems which are too stiff cause vibrations in the drive, whereas positioning with coupling systems that are too flexible is not sufficiently accurate. Considering the drive unit as a whole allows to choose the optimum coupling for the feed unit in order to realize high dy-

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namics combined with accurate positioning. Three coupling parameters are decisive: stiffness, damping and mass inertia. The different coupling systems which are available in KTR enable KTR's application consultants to calculate and propose the optimum solution for the individual application.

Apart from that KTR make a significant contribution to the subject of energy efficiency in machine tools and general positioning by having developed the ROTEX® GS light. In particular with direct drives on the fast-rotating axis the reduction of the mass inertia is a vital benefit.

Reducing mass moments of inertia by light weight

Energy efficiency means to focus on light weight without reducing the stiffness in the machine tool industry, too. In many cases the ROTEX® GS light couplings allow to dimension the motor one size smaller than with the use of an all-steel coupling. This option does not only save production costs, but the customer is allowed to reduce the energy or operating expenses, respectively. The main application ranges of ROTEX® GS light are, for example, feed screws/main spindles, drives of machine tools, handling units, etc. The low weight and the low mass moment of inertia are realized by the design fully made of aluminum. Anyway, it has to be emphasized that KTR use only highly stiff aluminum alloys with this design, too, while assuring highly smooth running with the use up to a peripheral speed of 50 m/s along with high friction torques. In addition the coupling ROTEX® GS light is characterized by an easy assembly by means of an internal clamping screw and mani-

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fold mounting. The transmittable torques of the spiders remain analogous with the steel design of the clamping ring hubs. These benefits have caused the Swabian machine tool manufacturers to modify their machines in a way that they are allowed to transfer the manufacturing costs profitably to the machine operator in the form of reducing the operating expenses.

Main spindle drives

With high torques in the range of machine tools, e. g. direct spindle drives, the ROTEX® GS initially obtains low twisting (under prestress) and as a result damping the amount of which depends on the elastomer hardness. Peak stresses and shock loads are reduced or the resonance range is shifted to uncritical speed ranges. For peripheral speeds up to 50 m/s (referring to the outside diameter of the coupling) KTR have included the ROTEX® GS with clamping ring hub in the catalogue. With peripheral speeds exceeding 50 m/s ROTEX® GS...P should be used. Experiences with industrial applications were made up to peripheral speeds of 80 m/s.

Compactness with short dimensions

Another new design of the approved KTR coupling is ROTEX® GS Compact. Its dimensions are shorter than those of the standard ROTEX® GS by 1/3. As a result it is specifically suitable for constricted mounting spaces due to its high power density. In addition the ROTEX® GS Compact has an excellent balancing quality combined with a high concentricity. Just like all

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types of ROTEX® GS the Compact is available with the five well-known kinds of Shore hardness of the spiders. This allows to easily adapt the ROTEX® GS each to the individual conditions of the application with regard to torsional stiffness and vibration characteristics.

Definitely no collision damage

Collision damages in machine tools cause enormous expenses. That is why the positioning axes are additionally protected when overload arises. KTR being a full-liner are in a position to provide the right overload coupling for the machine tool industry, too. The approved SYNTEX® series was extended by type SYNTEX®-NC particularly for up-to-date machine tools. However, it is furthermore used in positioning technology, packaging machines and special purpose machinery.

SYNTEX®-NC is a backlash-free overload system with low weight and mass moment of inertia. Large bore diameters and a clamping ring design easy to install are further characteristics of the extremely compact overload system. The backlash-free, positive locking ball-ratchet-principle allows for a high repeating accuracy and short reaction times over the entire service life. The SYNTEX®-NC does not only avoid damages by the prompt separation in the overall system, but the low mass inertia allows to operate the drive with higher dynamics. This safety clutch has a positive impact on the energy consumption. SYNTEX®-NC is a sturdy system which can be continued to be used after several times of release without hesitation. Numerous tests in

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KTR's in-house test bench have proven the reliability of the SYNTEX®-NC sizes. In order to reduce the mass inertia on shaft-to-shaft connections as well, KTR provide the weight-optimised SYNTEX®-NC combined with one of the light-weight types of ROTEX® GS. In this way mounting space and weight are saved. This means efficiency at all levels up to an easy axial assembly.

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The quality of the coupling decides on the quality of the workpiece

The machine tool – no matter if it is a CNC machining centre or a linearly linked processing plant – operates with several driving axes. Every axis is controlled directly via latest servo technology and needs to achieve a long service life while being backlash-free, accurate, free from vibrations with in part high rotating speeds up to 35 000 min^{-1} or more. Everything needs to be reproducible for one hundred per cent. At the same time energy efficiency, i. e. lower energy consumption like with the previous machine, is to be put emphasis on. A machine is only as good as all the components assembled taken together. In the market KTR cover a wide product portfolio of couplings for servo technology on precision drives throughout the world: including the backlash-free flexibly damping ROTEX® GS and the numerous TOOLFLEX® metal bellow-type coupling series including the plug-in type PI easy to assembly up to the RADEX®-NC servo lamina coupling which is also torsionally stiff. For high dynamics the torque limiters in an all-aluminum design are also suitable, while they assure a high safety standard within the

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framework of the new machinery directive. With three coupling types having individual characteristics KTR provide for the suitable solution for each application. In order to achieve the optimum solution, KTR's project engineers along with their experience are available for advice to the design engineers throughout the world.

-07/2013-

Words: 1.223
Characters: 7.763

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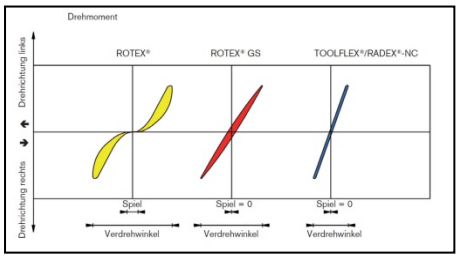
Captions

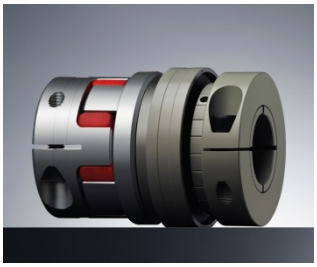


The diagramme on the left explains the influence of the couplings ROTEX®, ROTEX® GS, TOOLFLEX® and RADEX®-NC with regard to backlash and twisting angle. Subject to the high torsional stiffness of RADEX®-NC and TOOLFLEX® the twisting angle is very small under torque. In contrast to the flexible ROTEX® and the backlash-free ROTEX® GS damping cannot be recognized.

ROTEX® GS

TOOLFLEX®

RADEX®-NC



SYNTEX®-NC with ROTEX® GS

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