Face grinding redefined

DISKUS WERKE Schleiftechnik is innovating new face grinding technology including the respective machine platform

With the pioneering new development of the face grinding technology “DISKUS Defined Grinding” as well as the associated “DISKUS DFine” machine concept, DISKUS WERKE Schleiftechnik is extending its portfolio by a high-precision and flexible solution for a versatile range of grinding tasks and numerous different workpiece types. This allows users to produce exactly defined dimensions, shapes, positions, roughness and grinding surface patterns on both shouldered and non-shouldered faces, and opens up new potential related to the perpendicularity of machined faces. Axial step dimensions of shouldered faces are also produced with a defined material removal. The DVS face grinding specialist is thus tapping a whole new market segment and stepping up the course of expansion already begun.

The most important and most complex requirements in the field of hard-fine machining of flat surfaces are the precise incorporation of defined step dimensions and evenness as well as the exact production of running qualities and perpendicularity. The reliable parallelism of two faces down to the last µm is also required in most application cases. DISKUS WERKE Schleiftechnik GmbH, the DVS company with the most extensive expertise in the field of face and

Highlights
- Defined production of dimension, shape, position, roughness and microsection of the workpiece
- Efficient grinding of stepped surfaces
- Easy adjustment of the angle of inclination of the workpiece carriers for the production of crowned or flat surfaces
double-sided face grinding, has developed the high-performance face grinding technology DISKUS Defined Grinding especially to meet these demanding requirements. The technology is being used in the machine platform DISKUS DFine, which is a new creation specifically for this purpose. Thanks to the modular design concept and the resulting possibilities for flexible integration of various types of spindles, workpiece holders, automation solutions and machining processes, the innovation by the DVS face grinding pioneer permits the realisation of highly efficient grinding solutions for plane-parallel components with widely differing specifications. Image 1 illustrates the unusually wide spectrum of machining options made possible by the DISKUS innovation.

Defined one- and two-sided face grinding in one machine

The extremely compact DISKUS DFine platform with a footprint of only 3 m² is based on a pillar-shaped, vibration-damping natural granite bed that guarantees a maximum of thermal and dynamic machine stability and thus ensures constant reproducibility of the required manufacturing quality standards. The heart of the machine, the planetary table, can be designed with two, four or eight workpiece spindles, depending on customer wishes and workpiece dimensions. These spindles are fitted with workpiece carriers which either hold the components floating or clamp these in place. In the clamped state in particular, extremely demanding shape and position tolerances for e.g. running properties, evenness, perpendicularity and parallelism can be manufactured economically and in a reliable process. Both the angle of inclination and entanglement of the workpiece holder can be freely adjusted for the specific incorporation of a defined grinding surface pattern – cross-hatch or straight finish – or the high-precision single- or double-sided machining of concave or crowned surfaces. In addition, the new DISKUS technology permits users both the defined production of axial step dimensions on the shouldered faces of symmetrical and non-symmetrical components as well as outer and inner diameters within a single clamping without tool change. An integrated lifting swivel loader, which has single, double or multiple grippers with optional component turning function depending on the workpiece size and corresponding machine design, loads and unloads the workpiece holders in optimised cycles and also guarantees the efficient turning of workpieces which are to be machined from both sides. This gives users the opportunity to carry out process steps OP10 and OP20 in one single machine.

Tailor-made machine configurations for different machining tasks

In the original machine configuration with one tool spindle and – depending on the application-specific necessity and workpiece diameter – two, four or eight workpiece carriers, the high-precision machining of all the components in the carriers is carried out simultaneously using a grinding wheel made by the DVS grinding tool specialists NAXOS-DISKUS Schleifmittelwerke that perfectly matches the component characteristics. The feeding movement of the tool, which is driven in one of two grinding spindles of different capacities provided by the DVS sister company Werkzeugmaschinenbau Ziegenhain, is via the Z-axis. In the course of the machining process, the individual workpiece carriers are rotated. The rotation of the workpieces overlays the rotational movement of the entire planetary table, which guarantees that optimum surface removals are achieved. As an alternative to a single grinding spindle, the platform concept of the DISKUS DFine offers the possibility of integrating four high-frequency grinding spindles with individual axial feed. With the aid of this 4-4 design, comprising four tool spindles and four workpiece carriers, users not only realise the extremely precise combined machining of inner and outer diameters and faces in one clamping, but also the defined production of axial step dimensions on recessed faces. In the first case, the planetary table carries out a radial feed movement while the workpiece carriers rotate about their own axis. During the production of axial step dimensions of shouldered faces, an oscillating
movement of the planetary table overlies the workpieces’ own rotation.

An efficient dressing process of the grinding tools is guaranteed by workpiece-specific diamond-charged dressing wheels from the DVS company DVS TOOLING which are transported into the work chamber by the lifting swivel loader grippers. The modular system also provides the option of equipping the workpiece spindles, whether one or four, with high-performance brushes rather than grinding wheels. This way, efficient brush machining centres can be implemented on the same machine basis for specific optimisation of surface quality and downstream deburring processes.

**Integrated IONIC measuring system for constant high machining qualities**

For maximum customer benefit, all the machines in the DISKUS DFine series are equipped with the tried-and-trusted DISKUS measuring system IONIC, which stands out thanks to maximum precision and speed, to guarantee consistently high manufacturing qualities and short cycle times. The system measures machined workpieces 100% and communicates continually with the machine control during standard operation. Measured results transmitted this way are analysed for deviations in tolerance which can be due to factors such as grinding tool wear, and used directly for specific process compensations.

The DISKUS DFine platform concept also demonstrates extraordinary variability in terms of supplementing application- and customer-related automation and concatenation solutions for highly productive series production. One option is all-round conveyor belts which can be linked flexibly with various feeding systems such as rotary indexing or plane storage solutions. The grippers of the integrated lifting swivel loader guarantee direct workpiece feed and removal. Efficient concatenations of machines that are positioned next to or opposite of each other can take place in series or adjacently using circulating belts, for example, depending on requirements. One further superior advantage provided by the modularity of the machine concept for the user is simple,

**Fine adjustment of inclination and entanglement of the workpiece carrier for incorporation of defined grinding surface patterns as well as crowned and concave surfaces.**
cost-reducing reconfigurability in the case of changing general conditions related to production, not only with a view to suitable automation and concatenation options, but also with regard to adequate workpiece carrier and tool spindle designs.

With its latest technology and machine innovation, DISKUS Defined Grinding and DISKUS DFine, DISKUS WERKE Schleiftechnik is concentrating its comprehensive face grinding expertise in one pioneering manufacturing solution, which permits the flexible and highly precise implementation of various grinding tasks in the context of a wide range of plane-parallel components – and makes it possible for users to produce exactly defined dimensions, shapes, positions, roughness and grinding patterns on both shouldered and non-shouldered faces.

Please contact us for more information.

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