



WORLD WIDE WEAVE

A perfect combination of precision and profitability

The world's largest double-sided face grinding machine and the MAXFLOW compact filter system

The core requirements that critical key industries have towards grinding processes are excellent work piece geometries and efficient ablation rates. Grinding processes have to be customer-specific yet reliably reproducible while at the same time catering to increasingly shorter delivery times and fluctuating lot sizes. The precision grindery Paul Jores GmbH in Bad Sobernheim, Rhineland Palatinate, is proof that through consistent investment in cutting-edge technology and production processes high precision and cost-efficiency are not mutually exclusive. Whether they are dealing with piston and bearing rings or spacer plates with plane-parallel functional surfaces, Jores relies on absolutely reliable yet flexible processes to produce such high-quality mass-produced parts while at the same time reducing unit costs. Now, what currently ranks as the world's largest precision grinding machine has been put into operation at the Jores grindery for double-sided face grinding in batch process. The Melchiorre ELC 2000 enables the traditional family-run company to provide efficient production of high-precision work pieces with diameters up to 800 millimetres. For the processing of the cooling lubricant, Jores has once again opted to deploy the MAXFLOW compact filter system CS 1000-503, made by GKD – Gebr. Kufferath AG (GKD). In addition to a filtration fineness of $\leq 5\mu\text{m}$ at a filtration rate of over 100 litres per minute, its integrated briquetting facility and the lack of need for filter aids were once more winning arguments for the MAXFLOW concept.



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With tradition comes obligation. Paul Jores GmbH, with a company history that goes back to the 14th century, knows that securing its own sustainability means gaining shares of the market and creating appreciable added value for its customers through an unfailing commitment to innovation. Its customers all over Europe include prestigious system suppliers and component suppliers to the automotive sector, manufacturers of rolling bearings and machine manufacturers for the printing and wood-processing sectors. In addition to steel and non-ferrous metals, Jores also processes glass, rubber and ceramics. Jores even grinds material combinations of steel mantle and rubber core – as used, for example for armatures in electric motors – in a single pass. Apart from such special components, medium and large series are the main characteristic of the company's range of services. For example, each year Jores produces about 35 million cams for camshafts, and over 2 million sintered parts for the automotive sector made of sintered steel types D10, D11, D39 and D40. Each week, it produces over 20,000 plastic components with 10 µm tolerance in height that have to be polished and washed at a controlled temperature.

In the precision grinding of sintered parts, for example, the raw parts are transported in a charge carrier from the incoming goods inspection to the workplace, where they are manually placed in batches into squirrel cages and automatically fed into the machine. After grinding, they are manually removed from the cages. Then, interlayered, they are transported on a feed conveyor to the brush de-burring station. In continuous flow, they are run under a planetary head with three brush discs whose rotary motion removes the grinding burrs. After subsequent washing, the required quality is verified by visual inspection before the finished parts are packed and dispatched.



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Unattained dimensions

Regular expansion of the high-tech grinding machinery is indicative of the consistent focus on user benefit at Paul Jores GmbH. Torsten Jores, who runs the company together with his brother, Pascal, is convinced that "In terms of face grinding, no other contract grinder in Europe has production possibilities as wide-ranging and flexible as ours." In addition to surface grinding on 12,000 by 1,200 millimetre magnetic disks and double-sided face grinding machines of up to 400 millimetres in diameter for throughput treatment, this also includes double-side precision grinding. The comprehensive machine park comprises, among others, machines made by Diskus, Göckel, Melchiorre, Stähli and Peter Wolters. Now, the company has expanded it to include a new machine from Melchiorre whose dimensions set standards that have so far never been attained. The ELC 2000, developed for Jores, has grinding disks with a diameter of 2,000 millimetres on which work pieces can be ground with diameters up to 800 millimetres in series and up to 1,500 mm as individual parts – work piece formats that few other contract grinders can accommodate. Here, in batch process, axial rings or adjusting rings for stators and rotors can be produced to meet the highest accuracy values, and with an equally high degree of cost-efficiency and process reliability. The integrated feed table reduces setup times, which means that even medium-sized work pieces can be processed at particularly low cost. According to Torsten Jores, the impetus for this latest investment came from rising customer expectations regarding the flatness of parts which had previously been ground in a classic continuous flow process, along with accompanying demands for a reduction in unit costs. "Today, customers often expect not only the highest work piece quality but also compliance with certain trends," says Torsten Jores. "For example, covers for pumps are not supposed to be concave or



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convex. In a continuous flow procedure, it's very difficult to meet such expectations." But with the ELC 2000, the medium-sized enterprise can now fulfil these demands with precision and cost-efficiency thanks to a reliable fine grinding process. The size of the machine makes it possible to process more work pieces at a substantially higher speed than ever before. "We have always been a step ahead of developments," says Torsten Jores, expressing his delight with the performance of the machine. The two grinding disks, each made up of sixteen segments, are ceramic-bonded for optimal dimensional stability. While the circa four-minute grinding process is running, the satellites on the feed table are manually loaded. In this way, the process of exchanging the squirrel cages takes only 150 seconds. Without the parallel preparation on the feed table, the machine would have to be loaded and unloaded directly – a procedure that would take just as long as the grinding process itself. The largest satellites can accommodate four 800 millimetre bearing or roller rings.

Enormous volume of cooling lubricant

To ensure compliance with surface roughness (Rz) specifications of 2µm in large series production, not only the precise configuration of the machine but also the efficient processing of the cooling lubricant are both of crucial importance. Jores decided to use the MAXFLOW compact filter system 1000-503 with one filter head, a pressing unit and a lifting station. For years now, the company has been using three of these systems on other grinding machines. The size of the grinding machines and the high throughput rates at Jores produce considerably higher volumes – compared to other grinders – of cooling lubricant mixed with grinding waste that needs to be processed. In view of the thoroughly positive experience with the previous filter units, Jores decided once again in favour of the MAXFLOW solution. Made entirely of stainless steel, this patented compact filter system



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combines filtration and briquetting in a single piece of equipment. The round tank system with a capacity of 1,000 litres has a dirt tank integrated into the clean tank. The dirt tank has a tapered run-off that prevents deposits from accumulating on the tank floor. The easy-to-open filter head contains two filter packets each consisting of two vertically aligned static disc filters screened with YMAX[®] multidimensional blended filter mesh. Following the cross-flow principle, the filtrate – a mineral oil-based, low-viscosity oil contaminated with grinding waste and abraded particles – streams around the disc filters. At the required filtration fineness of $\leq 5\mu\text{m}$, the MAXFLOW compact filter – which looks so tiny and frail next to the enormous ELC 2000 – filters well over 100 litres of oil per minute, without the need for filter aids. The filter cake is detached from the disc filters through automatic backwashing. Per hour, the pressing unit integrated into the MAXFLOW compresses the residues from about 1,200 cubic centimetres of pollutant load into circa 10-kilogram dry briquettes. The pressing unit for this new system was custom configured by GKD to cater for the higher pollutant load in this particular application and, in contrast to the usual size of briquettes – 80 millimetres in diameter – it ejects briquettes with a diameter of 130 millimetres into the collection bin.

Many advantages

Apart from the reliable filtration performance, Torsten Jores also appreciates the fact that the compact filter system runs maintenance-free for weeks on end. "Nobody bothers to check the MAXFLOW, it just keeps on running." Other advantages that convinced Jores to choose this solution again include the significantly easier handling in comparison to other systems, better accessibility and ease of maintenance, something which is also evident in the residue-free tank. In addition, the fact that the system does not require filter aids substantially reduces disposal costs. In Torsten



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Jores' opinion, none of the alternative solutions that were taken into consideration for the filtration of the cooling lubricant came anywhere near the performance level of this package. For him, centrifuges were out of the question because of their high energy consumption and their heat emission. Other arguments against this solution included the cost-intensive maintenance of the machined parts required to ensure the necessary leak tightness. Although precoat filters offered even better filtration rates, they were also not a viable option for Torsten Jores because of their huge consumption of filter aids. For the same reason, multi-stage filtration processes with filter cylinders or cartridge filters were also rejected. But another factor that played a significant role in the renewed decision to opt for the MAXFLOW was its compact design. Just 1.60 metres in diameter and 2.50 metres high, it compared favourably with other solutions involving tanks of five to six metres in length, equipment footprints that were simply out of the question for Jores due to lack of space. Another winning feature of the MAXFLOW system for the company in Bad Sobernheim is its cleanliness. There is no loss of the cooling lubricant through transportation, which has a positive effect on consumption and disposal costs. Due to the high purity of the filtered oil, the components are not only more precisely dimensioned but also cleaner, which lessens the load on the washing process. This improves the overall efficiency of the downstream processes. Furthermore, the high purity of the MAXFLOW-filtered cooling lubricant prolongs the service life of the grinding disks. Finally, the closed system with its ejection of dry briquettes also improves the cleanliness of the working environment and creates more pleasant working conditions for the staff. The sum of all these advantages convinced Torsten Jores once again to make a clear decision for the GKD concept. "For me, MAXFLOW is a high-performance, compact filtration solution with a quality of service far



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beyond anything I have experienced so far," he says, summing up his arguments for choosing this GKD filter system.

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GKD – GEBR. KUFFERATH AG

The owner-run technical weaver GKD – GEBR. KUFFERATH AG is the global market leader for metal and plastic woven solutions as well as transparent media facades. Under the umbrella of GKD – WORLD WIDE WEAVE the company combines three independent business units: SOLID WEAVE (industrial meshes), WEAVE IN MOTION (process belt meshes) and CREATIVE WEAVE (architectural meshes). With its six plants – including the headquarters in Germany and other facilities in the US, South Africa, China, India and Chile – as well as its branches in France, Great Britain, Spain, Dubai, Qatar and worldwide representatives, GKD is never far from its customers.

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