

Experts amongst themselves

Why a world renowned manufacturer of crankshafts relies on the CBN technology of the Junker group.

Fortunately there are also "Hidden Champions" in our country. These are enterprises which are almost unknown outside their clientele, however, in their field of expertise, they absolutely belong to the world's technology leaders. Enterprises like the machine manufacturer Alfing Keßler. There, besides other things, concentrated efforts have been undertaken to manufacture high quality crankshafts and internationally an excellent reputation has been achieved. Without the "correct" machine tools and the best suited manufacturing technology this feature would not have been possible. Example: CBN crankshaft grinding machines by Junker in connection with the Junker developed pin chasing grinding method.

Mr. Alexis Boemcke, PhD, CEO of the machine manufacturer Alfing Kessler GmbH, is not completely serious about it, however, there is definitely some underlying truth: "Wasseraffingen is known better in Detroit than Detroit is in Wasseraffingen". Naturally geographical knowledge by Swabian citizens is not concerned here, but the degree of being known for crankshafts "made by Alfing" – and this degree is very high in Detroit, the center of the USA's automotive manufacturing.

The machine manufacturer Alfing Keßler with around 1000 employees is the largest single enterprise of the Alfing group of firms and concentrates mainly on the production of crankshafts in passenger car engines up to crankshafts in large gas and diesel engines for the stationary and mobile power generation, block heating works, construction machinery, locomotive or ship drives. Besides this enterprise founded in 1911, with the main production features of crankshafts, heat treatment machinery, and cast parts, the Alfing Keßler special machine company (founded in 1938) and the company AMT Alfing Montagetechnik (since 1980) belong to the group of firms. A total of 1700 employees work here and generate an annual sales volume of approx. 250 million Euro. The enterprise group is entirely privately owned and has – this being the justified pride of the enterprise – undertaken all investments from their own resources. These investments are everything else but small: The machine manufacturer Alfing Keßler for instance invests a considerable 8-10% of sales a year in alternating main areas of technology, cost reduction and expansion. In 2003/2004 they focus in expanding the passenger car crankshaft production with an additional production floor space of 7000 m² in connection with considerable machinery investments.

In the scope of crankshaft production the main focus has been motors with higher performance requirements. The Formula 1 is a customer too. Mr. Bömcke, PhD: "We do not only care for the cast shafts - meaning we do not only care for the mass business of three or four cylinder engines. We concentrate on forged crank shafts for motors of the higher and highest performance class with six, eight, ten twelve and more cylinders." This shows in our reference list. The entire internationally known automobile industry is represented here. There is hardly any name which does not show. Per year 250000 to 300000 crank shafts can be produced for this clientele and very soon more due to the extension investments. There are enough independent crankshaft suppliers, however, the competition is shaped very clearly in the specific spectrum where Alfing is doing business. Alfing considers itself in a significant position. Why? Mr. Bömcke, PhD, explains: "Tradition and long time experience have led to a vast know-how which is more and more in demand nowadays. This is the reason why we have almost doubled our sales in this area in the past 3 ½ years." And continuing: "It is an important part of our know-how, how the various production processes developed by us are executed and coordinated." The CEO continues: "We offer the engine manufacturers a production technology which is of utmost interest for most of them, especially if the outputs are small and are demanding special requirements - typically series of up to 100000 crank shafts per year." Further he explains: "The demanded precision has such a narrow tolerance that the smallest technical or material dependent flaw immediately leads to problems. Nowadays we must – and this with absolute process safety – hold a tolerance of 4µm. Process-safe means that we only have half of this tolerance taking a C_{pk}-value of 2 for granted. Today we have an accuracy range of approx. 1,5 µm for our processes." Manufacturing engineer Mr. Bernt Söllner, production manager 'Automotive', explains: "Especially in the area of high engine performances for which we are producing there are permanent efforts to, for instance, transfer more power via higher torques at the crank shaft. This means to us that we have to manufacture more and more complex shafts with always higher degrees of precision and mechanical properties. Additionally a very high degree of flexibility is required by means of the variety of smaller and medium size series." Bernt Söllner: "These increasing requirements are hardly incorporated in the prices since the clientele is continuously expecting and demanding cost reduction in the production processes. We only can stand this pressure by settling for a highly modern and highly productive machinery park besides organizational improvements." This means such a task can be solved more easily if the support of the machine manufacturers can be counted on. An enterprise which deserves special bravado is the company of Erwin Junker Maschinenfabrik GmbH in Nordrach. This is especially the case because of their custom made development of the machine

type Jucrank. Manufacturing engineer Mr. Manfred Wegner, responsible Junker area sales manager, adds: "The machine concept of series Jucrank was developed for the complete grinding of crankshafts in one clamping. The grinding method is high speed CBN. Both the plunge cut and the oscillating grinding method – with cylindrical pin and main bearings – are standard here. Additionally the concept adapts to the fully automatic production run." In the meantime Alfing uses three machine systems just of this machine type (and machine manufacturer). Bernt Söllner explains why: "Despite our relatively small batch sizes achievable cycle times and high flexibility and especially repeatability are of importance. Additionally the Junker machines are capable to fulfill the more and more demanding requirements concerning accuracy." Even if the costs are more and more an important factor – they are not the only factor of decision making, as Mr. Bömcke, PhD, explains: "We are winning orders by our technical competency connected with acceptable, fair pricing. Our customers naturally know that there are limitations with such complicated and complex products. Experience is what counts here. We cooperate with the machine manufacturers concerning developmental projects and can already recommend features how to in due time consider the production technology which is later applied." Bernt Söllner: "It is also not unusual that here and then the large series crank shaft manufacturers of the automotive industry ask us how we technically approach the various tasks." Pin chasing grinding is also an essential component of Alfing's production process. Manfred Wegner explains in special reference to the already discussed Junker machines the potential options: "Basically main bearings – and here it doesn't matter if cylindrical, concave or convex – and pin bearings can be produced with the Jucrank machines in one clamping. By means of this principle deviations are theoretically close to zero." Bernt Söllner: "Concerning the CBN technology we have to stay on top of things. Since only with the CBN technology we can conquer the always increasing stock removals without damaging the surface structure. And when it comes to CBN Junker does not only belong to its pioneers but is even today its absolute technology leader." Another compliment can be extended to the machines from Nordrach for their concept related flexibility: "We deliver just-in-time on a day to day basis to the conveyor belts, one day's worth of reserve space can be allocated at the automotive manufacturers. By means of the fast and simple change over capacity of the Junker machines we are able to quickly react to customers' demands."

There is one more positive decision factor towards Junker: "Employees' acceptance is mainly dependent on the control. Junker has also adapted to customer requirements and has equipped the Fanuc control with an operator panel which adjusts to the usual operator software." Manfred Wegner adds: "We have developed a concept which offers a unified operating environment largely independent of the control's hardware. It has been important to us that we now have an identical environment to the other tasks besides the pin chasing grinding method where exclusively Fanuc controls are employed." Junker's control specialists have also incorporated other noteworthy solutions. Manfred Wegner states an example: "By means of our remote diagnostic module we have CNC access to all areas via Profibus and not as previously only to operating or programming software locations. Previously you could not see where, for instance, the approach sensor unit was located or what the status of the balancing was. This means that all additional aggregates were not accessible. Our new system transfers everything via Profibus to a subsection which can be accessed entirely." Manufacturing engineer Bernt Söllner adds a last pro (Junker) item: "Up to today, we have also made very good experience with customer service. This is very important to us since we cannot afford machine downtime." But as already said Alfing is in good hands in this case, as well as in all the others.

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