Tool and Die Diversity — One Special Surface

One of the leading manufacturers in the tool and die sector, and a leader in the production of aluminium castings, Grunewald GmbH & Co. KG in Bocholt, strives for nothing less than perfection in processing its products. How high are the demands — and more important still — how are they achieved?

Grunewald Portrait

Felix Grunewald originally founded the company that bears his name in 1963 as a pattern maker headquartered in Bocholt. The company is now in its second generation of uninterrupted family ownership and management. Grunewald began by serving customers in regional markets, but soon expanded into the international arena. Today, its most important markets are the EU and North America. The original company has become the centre of a roughly 150-employee Group with several decentralised locations that are nevertheless managed from one central location. Grunewald now has locations in Irxleben (Sachsen-Anhalt), Bochum, Bocholt (3 x) and Detroit (USA). A modern annex completed two years ago is a symbol for the Group's technology-oriented philosophy. Each location concentrates on a single specialised solution. The sum of these individual solutions is a portfolio of strongly performing products in a variety of market niches that puts Grunewald in a position to act independently in the marketplace.

From its headquarters in Bocholt, the company initially concentrated on the production of pattern-making equipment for the foundry industry and pattern- and die making. Grunewald has used state-of-the-art 3D CAD/CAM technology since the early 1980s. In addition, the company has developed its own processes for quickly manufacturing and finishing complex functional component groups from metal materials. The Group's customers hail from the automotive and aerospace industries, as well as companies active in plastics processing.

Blasting as an important surface treatment for products

Today, besides tools for making automotive and aerospace products, the company also manufactures series-production castings. Grunewald differentiates between three groups of components that require blasting. These are small-and mid-sized runs of series-production castings, structural components, and tool blanks. The first group includes engine components such as oil pans, cylinder heads, suction pipes, chassis components, etc. Customers use these parts in the tuning sector, auto racing, in niche vehicles and aerospace applications.

In addition, Grunewald manufactures structural components used in mechanical engineering applications, for example, in the semiconductor industry (Si chip manufacturing). Here, blasting is used to prepare surfaces prior to processing and nickel plating.

An important application area for blasting technology is the cleaning of casting blanks used in tool making. These castings, which have an individual weight

ranging from 250 to 800 kilograms, serve as the basis for manufacturing tools used to make, for example, carpet mouldings and insulation elements for the automobile industry.

Importance of surface preparation technology
Many components in the application areas mentioned here must meet the highest demands, not only in terms of their functionality, but also with respect to their visual and tribological characteristics. In the past, components were manually blasted in a compressed-air blasting cabin for this purpose. Because this blasting process is difficult to reproduce, and time- and cost-intensive, there was a substantial potential for optimisation. Furthermore, it had also been necessary to outsource the blasting of large workpieces to other companies.

The positive business developments at Grunewald and a subsequent increase in parts volume led in 2003/2004 to the reforming of the company as Grunewald-Guss GmbH & Co KG. Plans called for the integration of the latest blasting technology in the new company. The principle decision-makers from the company's production departments first thoroughly researched alternative processes and finally opted for an in-house turbine-wheel shot blast unit. This unit has since begun operation and amortisation is expected within the next three years.

High levels of blasting technology
Numerous tests conducted using outside blasting units, and a persuasive technical concept presented by Dipl.-Ing. Jürgen Wartemann, convinced Grunewald of the advantages provided by a hanger-type blasting unit from AGTOS, 48282 Emsdetten. According to Dr. Georg Dieckhues, a foundry engineer and member of Grunewald's technical management team, during Grunewald's consideration of manufacturers, "the relatively short history of the company was not of decisive importance. What counts are the people that make up AGTOS. And some of those people have decades of experience with blasting technology."

Grunewald was convinced from the very beginning that it had chosen the right vendor for this equipment. The visual impact made by the machine design and its execution was already one of safety and stability, an impression that has since been confirmed in actual operation. The main body of the blasting unit is made of wear-resistant manganese steel and exchangeable manganese plates provide additional anti-wear protection in the discharge area of the turbines.

The heart of this machine, a Type 3.6 high-performance turbine, is equipped with a single-disk turbine that has decisive advantages over the double-disk designs prevalent in the marketplace. For example, no spacer bolts are needed between the two turbine wheels. These bolts disturb the flow of abrasive and cause turbulence. A further reduction in the number of wear-susceptible parts was

achieved by using six instead of eight discharge blades. This cuts costs and has a positive impact on the performance of the equipment.

A wear-resistant cover protects the elaborate mounting disk for the blades. This saves on the cost of spare parts. The performance level of these turbines is approx. 20% higher than comparable double-disk equipment — although the level of power consumption is the same.

The blasting abrasive is processed in a closed-loop system. After being propelled against the workpieces by the turbines, the abrasive is collected in a hopper and fed by a screw conveyor to a bucket elevator, which transports it to the top of the machine for processing. There, an air classifier uses a current of air to remove foreign material, undersized abrasive and dust. The dust then undergoes wet processing and subsequent disposal, while cleaned abrasive is returned to the high-performance turbines.

Excess abrasive trapped by voids in the workpieces is removed by manually moving the workpieces once blasting is complete. The abrasive falls through a grate to an extended screw transporter, which also returns it to the process loop.

Grunewald uses this unit to clean unfinished castings after demoulding and — after intermediate processing steps — to later give the castings a final uniform and high-gloss surface.

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Foundry engineer Dr. Georg Dieckhues at the control panel of the AGTOS blasting unit.

Ejection slot of the AGTOS Type 3.5 high-performance turbine.

Foundry engineer Dr. Georg Dieckhues

Blasting