



Shift housings for automatic transmissions are typically cast on casting line 2

## Process-integrated blast cleaning of die castings

Die casting of aluminium is an extremely productive method for the manufacture of large-series components which can be controlled at a high level. In order to achieve a maximum degree of reliability and quality, casting lines at the ae group in Gerstungen are laid out to ensure that as many process steps as possible are linked and fully automated, thus dispensing with manual interventions. A blasting concept was therefore realised with parts lying flat on conveyor belts and being treated in a continuous process. This eliminates the unavoidable manual suspension and removal tasks associated with hanger-type blast machines.

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**W**e supply the automotive industry with our die-cast aluminium parts and face the toughest international competition in this respect", says Tino Kunkel, manager of one of the production lines at the ae foundry in Gerstungen. Automation of

as many processes as possible is the recipe employed here for lowering costs and, simultaneously, enhancing quality. The fundamental maxim governing the complete process chain is that castings should only be physically touched by hand where absolutely necessary. Ope-

ration of die-casting machinery (cold-chamber machines with die clamping forces ranging from 12,500 to 14,000 kN) and its peripheral units is completely automated. Castings which have already been deburred on the die-casting machines are fed onto a



Discharge side of one of the shot blast machines installed at ae in Gerstungen

Casting line 2 encompasses seven cold-chamber die-casting machines for aluminium in the final expansion stage.



Castings which have already been deburred on the die-casting machines are fed onto a common conveyor route at half the height of the facility where they are forwarded to fine blanking.

common conveyor route at half the height of the facility where they then travel on for fine blanking. The process continues into the next hall where the parts are first blasted for cleaning and surface pretreatment before being forwarded to laser systems by conveyor belt where they each receive an individual QR code and are packaged. Very strict quality criteria apply along the entire process chain, which is why every step is carefully monitored and documented.

Similarly strict criteria apply to the machines employed. These must be designed or modified and installed so that they correspond to the process management and quality philosophy of the company. In addition to reliable engineering, human dependability and the support and service of manufacturers also play a significant role. Immediate assistance is expected where problems arise.

**Fully automated continuous shot blast machines**

ae opted for AGTOS Type BS 08-05-3.6-08-11.0 machines for cleaning and surface preparation of castings from cas-

ting line 2 in Gerstungen. Use of a hanger-type blast machine was dispensed with, given that relatively flat, strongly structured parts with a large surface (but not bulky geometries) are mainly involved, such as shift housings for automatic transmissions. This also had the advantage of permitting selection of a direct continuous process without manual interventions. The solution chosen involves the continuous transportation of the parts through the plant with the aid of a wide-meshed wire conveyor belt. They are blasted with special abrasive from above and below during this with the aid of a total of eight shot blasting turbines, ensuring all-round cleaning and surface treatment.

The belt is divided into two tracks through a central "guide rail" consisting of plates, meaning that two different, but typical components (e.g. the upper and lower parts of a shift housing) can be processed simultaneously. As the parts only have minor indentations, residual abrasive material can be removed with comparative ease through a blower unit in the blast machine outlet.

**Treatment of abrasive ensures stable process parameters**

When it comes to treatment of castings through shot blasting, the condition of the abrasive employed plays a significant role. This moves continually in a cycle, whereby its consistency and composition are altered during use through two main interfering factors. These are soiling of the abrasive through fine non-metallic and metallic dust and dirt particles and contamination through flash and flakes parted during the blasting process. The abrasive moving in the cycle therefore needs to be carefully treated during each passage to maintain the consistency of its composition with regard to granular size and impurities within narrow limits. This occurs during the return of the abrasive from the machine abrasive collection hopper trough to the storage bunker located on top. Transportation is realised via a bucket elevator. On reaching the top, the abrasive passes through a screening section to remove coarse impurities such as flash and flakes. This is followed by wind sifting which sorts out dirt and dust particles and the finest abrasive fragments (so-called fines). The abrasive



cleaned in this manner is conveyed to the storage bunker for the blasting turbines.

### Support from the machine manufacturer

As aluminium is a comparatively soft material, it can be damaged by excessively hard blasting. It was therefore important to evaluate the effect of the machines prior to deciding on their purchase. AGTOS was more than willing to conduct these preliminary trials on its own machinery. Initial blasting trials were first conducted on an AGTOS machine in Emsdetten with four turbines. Following the positive results of these tests, further trials were conducted on a large machine with eight turbines at the AGTOS plant in Konin. This machine was of the same design as the model being offered. Notable features here were a modification of the blasting turbine layout to optimise the effect of the blasting abrasive. A special abrasive consisting of non-ferrous metals which was recommended by AGTOS was also used during the trials. Flakes from burrs were removed with this and the surface of the components roughened slightly while maintaining the smoothness of the bore holes which had been already punched.



The wide-meshed wire conveyor also facilitates blasting of the castings from below.

The castings receive an individual laser marking following the shot blasting process.

at an earlier stage of the reliability of AGTOS engineering and service. Shot blast machines are exposed to extremely severe stress during use, meaning that breakdowns are practically unavoidable. Fortunately, the response speed of the manufacturer's service department and proactive maintenance realised in advance mean that extremely few faults have been encountered during machine operation. Following an initial procurement in 2013 and in the following years, this operating record led to the installation of two further systems.

### Engineering, consulting and service satisfaction

In addition to the quality of the machines themselves, consultation and service competence proved significant criteria in the decision to purchase the machinery. The former was favourably evaluated during the prior test phase, and ae had already gained positive experience

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