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THE RIGHT TIME FOR RHEOCASTING - FACTORY VISIT TO THE TECHNOLOGY LEADER


SAG - STEFAN GRIESEBNER ON THE ADVANTAGES OF A SPECIAL PROCESS

Innovative technologies for processing light metal alloys have experienced enormous development in recent years. One of these is rheocasting - a special casting process in which aluminium in a semi-solid state (semi-solid) is processed into lightweight components with special material properties. SAG has made this process ready for series production and is the technology leader in this field.

During our visit to the plant in Lend, Austria, the Development Engineer R&D and future team leader of production, Stefan Griesebner, was able to present the advantages of rheocasting to us.

Rheocasting

The principle underlying the rheocasting process, the thixotropy of molten light metals, was discovered in the 1970s at the Massachusetts Institute of Technology.

In contrast to conventional die casting, round grains, the so-called globulites, form in rheocasting due to an upstream controlled cooling of the melt and a stirring movement. These favour the flow time and the solidification with significant advantages

Advantage of rheocasting

The flowability during the mould filling and the replenishment during the solidification are favoured. Since the aluminium melt to be processed has already solidified to a large extent before the mould is filled, solidification shrinkage and distortion can be minimised. The high viscosity of the melt also prevents turbulence and thus gas

inclusions, which, as pores in conventional casting processes, account for the largest and most damaging proportion of casting defects.

Due to the good mould filling as well as solidification properties, both thin-walled and thick-walled structures can be realised in one component, means the material only has to be used where it is important for the functionality of the component. Together with the good mechanical properties, a considerable lightweight construction potential can thus be realised.

Processing is done in cold-chamber die-casting machines and ensures better casting quality, better mechanical properties such as strength and elongation at break, similar to iron casting or aluminium forgings with gentler operation, as the casting temperature is lower and this benefits the tool.

The high strength and ductility, very good weldability and conductivity of rheocasting components enable efficient lightweight construction in many areas.

Less weight leads to more range and lower energy consumption. Rheocasting can thus contribute to CO2 emission reduction with considerable weight savings.

More efficiency in the production process: Rheocasting can avoid costly reworking of castings.

As examples, Griesebner mentions safety-relevant chassis parts for cars and trucks and some examples of complicated designs in light metal casting that are currently in the test phase.

The equipment required for rheocasting corresponds to the basic equipment for die casting, but it is possible to produce larger parts on smaller machines, because the process can cope with lower piston speeds.

At SAG, casting is done on Bühler Carat, while the starting system for semi-melting is a Meltec system. Here, the globulites are made to grow by electromagnetic stirring and tempering in the crucible.

For the mould used, the rule is: as few sprues as possible, if necessary a thicker sprue is preferred. Otherwise, the usual freedom in die casting applies.

The right time for rheocasting

SAG is the technology leader in rheocasting - this so-called semi-solid process that offers so many advantages.

For example, SAG is the leading manufacturer of rheocasting components, such as safety cabin suspensions for trucks or air reservoirs for the automotive industry. In Lend, € 3.6 million were invested and expanded, because lightweight construction is becoming increasingly important, especially with regard to the electrification of passenger cars.

Electrification, extensive special and safety equipment lead to considerable additional weight of a passenger car, which has to be reduced elsewhere, for example in the chassis, body or drive train.

In order to achieve the CO2 emission limits with combustion engines, lightweight construction is essential.

The demand for the lightweight and particularly robust components is therefore increasing strongly and is moving towards the substitution of forged parts and parts that are welded and have integrated high functionality. The target group for all rheocasting activities at SAG is clear: all OEMs, but also Tier 1 and engineering and R&D.

Stefan Griesebner also talks about completely new projects that are not yet publicly presented; it almost seems that it is the right time for rheocasting.

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