handtmann
Ideen mit Zukunft.

Megacasting has started a new era

Over 100 individual parts in a single casting: large-scale casting process significantly reduces development and procurement times and costs

Megacasting refers to the production of particularly large light metal components using the die casting process, which requires special techniques and machines. The process is used in the automotive industry, where classic sheet metal welded assemblies have dominated the production of vehicle bodies for over a century. Die casting has been used for many years in the production of powertrain housings such as crankcases and gearbox housings as well as oil pans and chassis components. Electromobility has led to the addition of further components such as engine and battery housings and even complete rear cars.

In megacasting, special alloys are used in die casting that enable high material properties in the naturally hard state. As a result, complex heat treatment and component distortion can be avoided. The process is supported by an air extraction system within the tool, which enables mold filling close to a vacuum. Thanks to its advantages, the new process puts many tried-and-tested processes in vehicle production to the test and optimizes numerous applications. Megacasting is thus revolutionizing the automotive industry.

Overwhelming functional integration and complexity reduction

The advantages of megacasting lie primarily in the fact that over 100 individual components become a single component. This reduction in complexity shortens development times, simplifies production processes and can save up to a third of total costs.

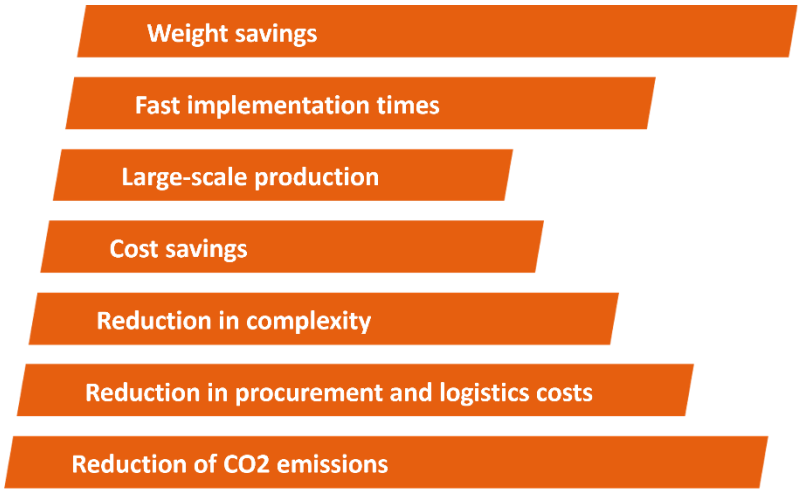
From the car manufacturer's point of view, the development effort involved in megacasting is up to 30 percent less than with previous processes. There is no need for complex and coordinated designs of individual components or extensive internal coordination regarding interfaces and joining technology. In addition, the administrative effort for individual components and assemblies is eliminated.

Design advantages and weight reductions can be achieved, which is particularly relevant in the transformation to electromobility. Another advantage is the improved recyclability of vehicles, which makes megacasting an important part of the Circular Economy.

In particular, Megacasting offers savings in terms of reduced manufacturing complexity due to the elimination of several production steps and the resulting shortened tolerance chain. Labor-intensive joining and finishing processes such as

welding and gluing are largely avoided. The throughput time for megacasting is 50 percent shorter than for assemblies joined using a multi-material mix.

By eliminating a wide range of development and production processes and joining techniques, significantly fewer specialist personnel are required.



Overall costs are also reduced by cutting the purchasing and logistics costs of hundreds of individual components. In the procurement of components, the costs are even reduced by up to 50 percent.

Assembly for the production of a front or rear end using joined individual parts in a multi-material mix:

up to 10 tool types / 30 machine types / 6 joining processes

with megacasting:

2 tool types / 5 machine & system types / 0 joining processes

Looking at the carbon footprint of the production processes, it is clear that material production is by far the biggest driver of emissions. The disadvantage of a higher CO2 footprint of aluminum compared to steel is offset by significantly reduced logistics costs for many individual components. Emissions and energy costs in production are reduced by significantly lower space requirements on both the supplier and OEM side, as fewer individual parts are produced and complex joining processes are eliminated.

Megacasting already in the second evolutionary stage

Megacasting is already in great demand internationally, and the technology has been continuously developed further in recent years, particularly in China and the USA.

Tesla, for example, was able to reduce the weight of its Megacasting rear end by 10% and halve the cycle time in its second evolutionary stage. Ford has announced that it has reduced its overall costs by 11% by cutting weight by 41% and reducing the number of components by more than two thirds. Manufacturers such as Volvo and Xiaomi also report significant weight and cost savings through the use of large castings.

Megacasting is also being implemented in Europe as an innovative technology in automotive engineering. Handtmann has started manufacturing components for batteries and tailgates. However, Megacasting is also being used in the front and rear of vehicles, for example for rear wagons, which are conventionally made of sheet steel and in a multi-material mix.

With the product experience gained to date, the first standard products are also crystallizing in Europe. The automotive industry is gaining confidence and further areas of application are already being developed. There is also growing interest from commercial vehicle manufacturers who, for example, want to obtain particularly large battery housings for electric trucks from a single source.

Handtmann has been able to significantly develop its die casting processes, which is particularly advantageous for complex megacasting components. Optimum concepts for the casting system have been developed and the sprue design has been continuously improved in order to achieve the best possible results both in the casting process and in component quality. The use of conformal cooling and micro-spraying technologies enables improved heat dissipation and thus increases the tool life and the material properties of the component.

Improved material properties reduce the wall thickness of components. In combination with a topology-optimized design, the use of material is kept to a minimum - this leads to a significant weight reduction in modern (state of the art) megacastings. Process improvements in die casting can reduce recirculated material by up to 10%, which enables relevant savings, especially for large components.

In addition to reducing the weight of the component, the sum of the measures also leads to improvements in process stability and cycle time. In addition, the quality of the megacastings could be further improved by reducing distortion and stresses.

Handtmann was the first European Tier 1

Handtmann decided to enter the megacasting market by installing a Carat 610 extended casting machine from Bühler AG. The machine has a clamping force of 61,000 kN and a shot weight of up to 128 kg of aluminum, which enables the

production of large structural parts. For outsiders, this production process looks like a body shop in a single casting: complex modules that previously consisted of 100 individual parts or more can now be produced in a single shot by die casting, resulting in overwhelming functional integration.

Handtmann is currently the only Tier 1 company in Europe that produces large castings with megacasting in series. For the Handtmann Group of Companies, the investment means long-term growth, innovative strength and increased competitiveness in Germany and Europe.

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