

Engineering for Additive Manufacturing as a service



Hybrid design of the PSM® roll cooling ring.

Another application of additive manufacturing is a shell junction holder from a cold pilger mill. This component is a monolithic part made from plastic. A special feature is the integrated sensor locking device, which is manufactured together with the body as one part, so there is no risk of losing it.

The PSM® roll cooling ring is used to cool the work rolls in a bar mill. The bars are rolled to shape at a temperature of around 1,000°C. The hybrid PSM® roll cooling ring consists of a conventional bent stainless steel pipe and is supplemented with additively manufactured spraying elements made of plastic. A special feature of the spraying element is the optimized-flow channel and integrated nozzle geometries, which are already perfectly adapted to the roll. Optimal cooling is ensured as a result. Furthermore, the spraying element is a cost-effective component that can be procured quickly.



Plastic shell junction holder with integrated locking device.



Additively manufactured spraying element of the PSM® roll cooling ring.

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Engineering for Additive Manufacturing as a service

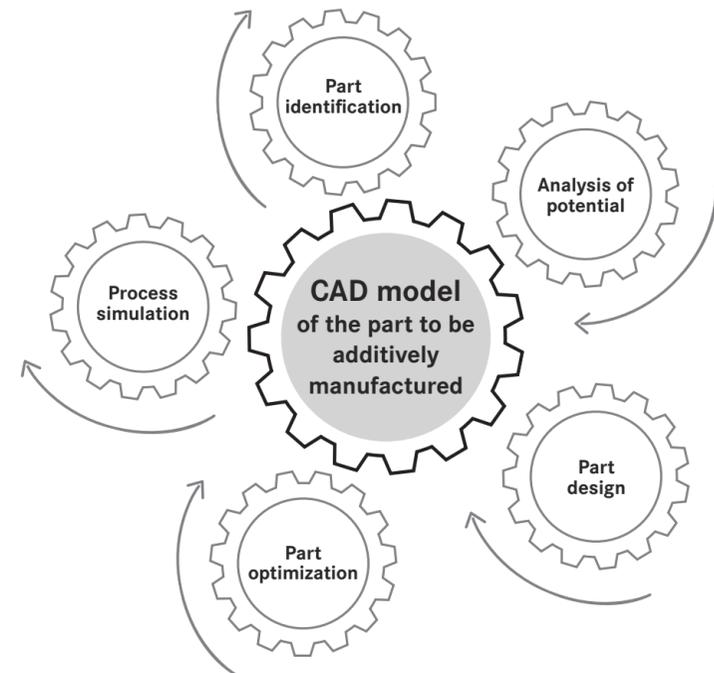
We are a young and dynamic team of experts with many years of intensive work and experience in the field of additive manufacturing at SMS group. Our activities focus not only on the question of which new and optimized components can be produced by additive manufacturing, but also how this production technology can be implemented within the company and a new way of thinking can be embedded in the various design departments.

How do you obtain an optimally designed component that is made using additive manufacturing technology? We are there to help you find the answer to this question. Our expertise in this field covers the entire process chain, from the identification of the component right up to the process simulation of the layer-based structure. At the

same time, our experience is not restricted to a specific material or process, as we always look at the bigger picture and consider all available processes and materials.

Your benefits at a glance:

- Many years of experience in machine component design and engineering
- Use of calculation and optimization software for the ideal component design
- Young and dynamic team
- Extremely well networked in the world of additive manufacturing



Part identification

What components are suitable for additive manufacturing? Our experience shows that components with reduced weight require less drive power, and the installation space can be used more efficiently by fitting a more compact design. The service life of wear parts can also be increased through improved internal cooling.

Analysis of potential

What is the cost/benefit ratio? What optimization measures or additional functions can be implemented or integrated in your components? We can help you find the answers to these questions using evaluation matrices and our extensive experience accumulated over many years.

Part design

In terms of their design, additively manufactured components differ fundamentally from those made using conventional production technology. Additive manufacturing requires a shift away from a production-oriented to a function-oriented way of thinking and designing. After all, the function is ultimately what determines which geometry the part will have after the design process.



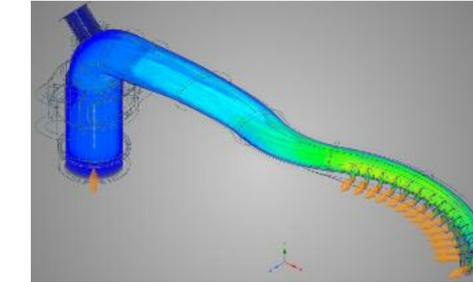
Roll cooling pipe designed for additive manufacturing.

For process-related reasons additive manufacturing is, like all production techniques, subject to certain design restrictions, which must be taken into consideration during the design process. These include, for example, minimum wall thicknesses, the smallest channel diameters, and the angles of overhanging surfaces differ depending on the process and material used, and must always be taken into account. So what we offer you are function-optimized design solutions which factor in the restrictions of additive manufacturing.

Part optimization

The design process is supported by several versatile analysis and optimization tools that we have at our disposal. For example, the flow behavior of media in channels can be examined and the design of the component(s) adapted accordingly. What's more, by optimizing the topology, the geometry of a component can also be optimized in terms of the loads present. One objective here may be to reduce the weight of a dynamically-moving part, for instance.

The component is already checked for overhangs by a software of support structure generation during the design process, then optimized to ensure as few support structures as possible need to be generated. The fewer the support structures required to manufacture the component, the less time and effort is needed for remachining. With our know-how we can offer you the perfect solution for your component.



Flow simulation for the roll cooling pipe to be additively manufactured.



Additively manufactured CONTIROD®* nozzles.

Process simulation

Process simulations for the powder bed technique is another of our areas of expertise. With the laser-based powder bed technique for metals, the component is made in layers of fine metal powder. The high melting and cooling rates result in stresses that can cause distortions on the component and ultimately lead to wastage. To reduce the amount of wastage to a minimum, or even avoid it completely, we use software to simulate the buildup process. The simulation helps to identify critical areas before production of the component has even started. This saves both time and money. The result of the simulation is a negatively pre-distorted model that compensates for the distortion and enables dimensionally precise components to be produced.

Successful applications

As a team of experts we have already realized a variety of application designs and integrated them into the relevant plants. The CONTIROD®* nozzle is one example of this. The nozzle is installed in the cooling section for the production of copper wire rod. It is used to cool, clean, and dry the wire rod. The hot copper wire rod is cooled by the nozzle in the cooling section. The additively manufactured CONTIROD®* nozzle, which is made of metal, has a monolithic design, meaning it does not require pre-assembly and adjustment before being installed in the plant, which in turn has a positive influence on the reliability and stability of the process. The nozzle is a typical wear part. With additive manufacturing, customers benefit from the fast delivery of customized spare parts.



Result of the process simulation of the CONTIROD®* nozzles.

* CONTIROD® is a registered trademark of Aurubis Belgium