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## PRESS RELEASE – ThinKing October 2020

### Bringing products to market faster and with more individuality

The ThinKing Award for October 2020 goes to a “facilitator” of lightweighting. Producing workholding fixtures and jigs for laser welding through an additive process noticeably reduces the time-to-market for sheet metal components. Thanks to the 3D-printed, custom-fit jigs, H.P. Kaysser can offer increasingly complex sheet metal components which have been precisely laser-welded by robot, thus requiring less reworking and making them suitable for small batch sizes.

*The Development Agency for Lightweighting Baden-Württemberg presents this innovation in its October 2020 edition of ThinKing. Under this label, Leichtbau BW GmbH provides a platform every month for new innovative lightweighting products or services from Baden-Württemberg.*

#### At a glance:

- ▼ **Faster: Reduced time-to-market** thanks to additively manufactured, **individual clamping concepts**
- ▼ **Increased complexity** of sheet metal components thanks to **design freedom** for the jig
- ▼ **Improved quality** through **automated robot welding** instead of manual welding
- ▼ **Cost-efficient:** No need to rework the weld joints

As a longstanding, competent metal construction specialist, H.P. Kaysser GmbH + Co. KG has been working with customers from various industries since 1998 to develop innovative sheet metal applications in the field of laser welding. More recently, the company has also experienced an increase in demands for lightweighting solutions. In order to shorten the production process and thus reduce time-to-market, which is important for its customers, the company itself uses additive manufacturing to develop individual solutions.

One example is the company's laser-welding jig, which has now won the October 2020 ThinKing Award. To develop the jig, H.P. Kaysser used a needs-based design and 3D-printed it in 1.4404 stainless steel.

“We use metal 3D-printing to generate long-term manufacturing solutions, because additive manufacturing is an excellent supplement to the process chain for laser-welded sheet metal components. It offers our customers, and us, many new solutions to tricky tasks,” says Tobias Scheffel from the Sales department at H.P. Kaysser GmbH + Co. KG.

The company's in-house jig-construction department manufactures jigs for laser welding as well as cutting applications for customer-specific components. Normally, these jigs are machined from solid metal. This, however, means that there are limits in terms of geometry.

#### Shorter process chain through integration of functions

However, lightweighting requires new ways of thinking and thus often complex component designs. Individual clamping concepts are often needed for challenging sheet metal applications. With its fleet of state-of-the-art TRUMPF 3D printers, H.P. Kaysser GmbH can now produce complex jigs for this purpose in the shortest possible time and based on its own ideas.

When constructing the laser-welding jig, the company also took into consideration the aspect of integrating functions, which is one of the characteristics of lightweighting. This was done even though the weight of the component was not a decisive factor in this case, due to the fact that the jig is mounted on a tilting rotary table.

The design integrates internal gas supply lines that individually feed the shielding gas toward the laser weld joint. Thus, the quality of the lap joint is significantly improved during laser welding. As a result, one process step in the manufacture of the sheet metal component can be omitted, as there is no need for subsequent reworking of the weld joint.

### **Projects can be significantly sped up**

On the one hand, thanks to the in-house design and timely production (24/7), metal 3D printing for jig manufacturing allows H.P. Kaysser GmbH to significantly speed up its frequently changing projects. The reason for this is that the custom-fit additive manufacturing process makes it possible to omit the iterative optimisations required by conventionally manufactured jigs.

On the other hand, the user, too, can begin production of the sheet metal components more quickly, and the manufacturing process itself can be considerably accelerated.

“Let us assume that a component that, up until now, has been produced by manual welding has a processing time of about eight to ten minutes per piece. Robot welding reduces that time to about three minutes,” Tobias Scheffel explains.

### **Several layers of added value visible at second glance**

However, the jig itself is a large cost factor in the unit cost calculation for sheet metal components. This is why the time advantage gained during the production of the parts only really becomes significant above a certain production quantity.

Nevertheless, the cost of an additively manufactured laser-welding jig can be recouped more quickly, as it becomes possible to produce laser-welded sheet metal components for demanding applications – even such with complex geometries and lower quantities.

Tobias Scheffel explains: “The generative design also allows us to create the jig in a way that takes into consideration the accessibility for the robotic welding optics, while at the same time facilitating the removal of the component through a wide opening. The key here is the near-net-shape design of the clamping concept.”

The clamps make it possible to easily fix the individual sheet metal parts to the additively manufactured jig, allowing them to be ideally positioned in relation to each other for the laser welding process.

Regarding another special feature of the jig, Tobias Scheffel points out that, “during laser welding, the joining gap must remain just under a tenth of a millimetre, which is why the exact positioning of the sheet metal parts to each other is an important prerequisite for a high-quality weld joint.”

At the same time, there is sufficient space for the welding robot to cleanly join even filigree areas as well as small corners and edges. This becomes particularly important as the complexity of the component increases, which is often the case in lightweighting.

The laser-welding jig can also be set up in a very compact way. This allows for a space-saving, lighter design, which results in significantly lower follow-up costs for storage.

The added value that can be achieved in this way ultimately pays off in reduced production costs, because the professionally manufactured jigs and automated robot welding process

mean that the laser-welded parts can be produced with greater repeatability, more economically and in higher quality.

*(approx. 6,500 characters including spaces)*

### **About H.P. Kaysser GmbH & Co. KG**

As a medium-sized supplier of components and systems in the area of sheet metal machining and processing, H.P. Kaysser GmbH produces a wide variety of metal components – from simple sheet metal parts to highly complex assembly units equipped with electronics. As a system partner, the company's aim is to support and supplement the economic efficiency and recoverability of its customers' service portfolios through quality-oriented production.

### **ThinKing videos**

Our new video series, “**Lightweighting made simple**”, presents our ThinKing newsletter in just a few seconds:

<https://www.youtube.com/watch?v=ialhfmOu7TQ>

### **Images**



#### **Image 1:**

Caption: Kaysser's laser-welding jig offers reduced time-to-market and precision fit, while also requiring less reworking.

Photo credit: H.P. Kaysser GmbH & Co. KG



#### **Image 2:**

Caption: Kaysser's additively manufactured laser-welding jig and workholding fixture considerably reduce time-to-market for sheet metal components.

Photo credit: H.P. Kaysser GmbH & Co. KG



**Image 3:**

Caption: Kaysser's laser-welding jig is faster, more cost-efficient, and offers improved quality.  
Photo credit: H.P. Kaysser GmbH & Co. KG

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