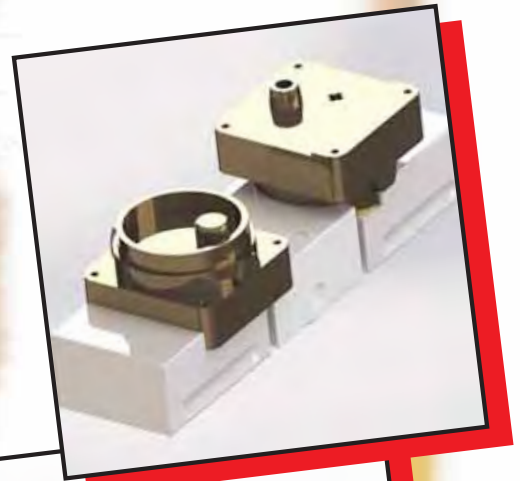


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Zero-point clamping systems from AMF support revolutionary hybrid production

With the Zero-Point clamping system from AMF, setup times can be reduced by as much as 90 percent. For MATSUURA and its revolutionary hybrid machines which combine additive and subtractive methods, the AMF Zero-Point system ensures that everything runs quickly and seamlessly and that the cost-effectiveness is right.

Additive and subtractive combined in one machine

With the hybrid additive manufacturing systems of the Lumex range, MATSUURA unifies selective laser sintering (SLS) and high-speed milling (HSM) into one machine. Through this combination of laser sintering and high-speed milling, components can be fully processed on one machine. Extra finishing work, by means of other processing methods on other machines, is only necessary where there are special requirements. The AMF Zero-Point system brings with it the best conditions for both sides of production.

In the method offered by MATSUURA in two Lumex machines, unique up until now, metal powder is turned into any three-dimensional shape desired by means of selective laser melting in the powder bed in layers. In this process, a mirror galvanometer directs fibre lasers of 500 or 1,000 watts in strength, depending on the design of the machine, to the intended point with fine precision. After every pass, the scrapers spread the metal powder out again on the machine table that has been moved downwards and away. On the face of it, this is a 3D printing process, as people would understand it. However, after ten powder layers each with a layer thickness of 50 µm, something special happens. The base or substrate plate does not move downwards another time so that the coater can apply



the next layer of powder. Instead, it stays where it is for the time being.

The milling head appears out of the void of the milling head, whose high-performance spindle accelerates the cutter to up to 45,000 rpm. It then moves along the outer contours and rough-machines a section of the allowance with an R2 ball cutter, for example. This process is repeated for all ten layers generated by the laser. A tool changer holds 20 tools at the ready for this purpose and amongst them are pre-cutters for rough-machining the machining allowance generated by the laser melting. After three times ten layers, or 1.5 mm, the final contour is created with the finishing tool at the points at which the component has cooled down somewhat. This goes down to 0.005 mm and down to Rz 3.5 µm compared with 0.05 mm and Rz 25 µm. Furthermore, everything that is made possible by the ideal design options, such as cooling ducts in tool and mouldmaking, cannot be acknowledged exhaustively here. Thus, in most cases at the end of the processes, the machine-finished component with the base plate can be approved by the AMF zero-point modules.



operations at the top area of the machine table. Meanwhile, what has been going on in the substrate remains hidden from the observer but is no less critical. The zero-point clamping modules, specially tailored by AMF for additive manufacturing, meet the specific requirements and accelerate the setup processes involved. Carefully selected materials and processes are used here so that the zero-point clamping modules can defy the sometimes-adverse conditions.

For example, very high temperatures prevail in the 3D printing process. At the melting point of the metal in the powder bed it is 1,400°C. Even if the clamping modules are underneath a 30 mm-thick plate, temperatures of up to 150° and higher still occur there. AMF therefore uses seals and media which can withstand this. In order for process reliability and repeat accuracy not to suffer from the temperature fluctuations due to the constant heating up and cooling down, the Fellbach operation

Invisible performance of the clamping technology in the substrate

So far, the attention has been on the visible



uses carefully selected materials and processes. This is the only way the zero-point clamping modules can meet the requirements. Hardened surfaces are just one example in this regard. They then have to satisfy the usual requirements of the subtractive manufacturing processes.

Direct workpiece clamping

K5.3 built-in clamping modules from AMF are used in the Lumex models from MATSUURA for additive manufacturing. They open pneumatically at an operating pressure from 5 bar, which is available in every production hall and this happens with just one connection. Five modules pick up the clamping bolts, which are housed under the 3D base plate. This is more or less direct workpiece clamping.

The K5.3 built-in clamping modules achieve draw-in forces of 1.5 kN and holding forces of 13 kN. Locking is performed through spring force so that, following the opening and insertion of the clamping bolts, the pressure pipes can be disconnected at any time. Due to the optimal contour of the clamping bolt, a tilt-free retraction and extension, ensures a secure locking of the clamping modules, even if the plate has

been put on with a slight incline. The optional, integrated blow-out mechanism of the clamping modules and a contact control mechanism for querying as part of automated processes are not installed in the Lumex systems but can be supplied by AMF from the factory at any time.

Under no circumstances does MATSUURA wish to relinquish the speed it can achieve during setting up with the AMF Zero-Point system. Before an AMF sales engineer, who has long been acquainted with MATSUURA, had suggested the zero-point solution, clamping had been performed laboriously with conventional technology. Back then, the base plate was bolted down to the machine table with four screws and aligned every time with the dial gauge and calibrated with a zero-point sensor. This cumbersome calibration process had to be performed repeatedly for every component. With the AMF Zero-Point system, the setup time can be reduced to a tenth of the time.

Clamping technology indicates an efficiency advantage

Concluding, Günter Brunn, MATSUURA



sales manager, says the equipping of the Lumex machines with the AMF Zero-Point system represents consistency: "Through the lightning-quick setup operations, we are signalling to our customers right from the clamping stage that they are in the Champions League with our Lumex systems and have an advantage in terms of efficiency."

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