

## **In Rio every gram counts**

On the way to the finish line at the Olympic Games, for cyclists every gram counts. Because, the less weight that has to be set in motion, the better the acceleration. An important weight-saver on the high-tech bikes for this year's competitions in Rio de Janeiro comes from the printers of the Reutlingen company, 3D-Laserdruck, in collaboration with the Institute for Research and Development of Sports Equipment (FES). The engineers print out the so-called stems of the racing bikes; i.e. the connection between handlebars and the frame. These aluminium components are particularly lightweight and especially tailored to suit the needs of each of the individual German track cyclists. This is made possible by the new design potential of additive manufacturing.

Optimised structurally in 3D printing, the part weighs just over half of the original weight. In absolute terms about 160 grams have been saved. At first glance that doesn't seem like much – but in actual fact in professional sports ultimately every hundredth of a second makes a difference, so every gram counts.

The weight savings were achieved by using a honeycomb-shaped structure inside the stem. The stems are produced by a 3D printer and made of an aluminium alloy. They act as torsion-resistant connection between the handlebars and fork, and the lightweight carbon frame. The tool-free SLM process is ideal for manufacturing metal parts with complex geometries. Only by using the 3D printing process is it possible to achieve the excellent reduction in weight while still maintaining the part's load-bearing capacity, for example by reducing the thickness of the walls and using intelligent interior geometries.

Additive processes also make it possible to adapt the stems to suit the individual physical (e.g. body size, sitting position, and general ergonomics) and technical (e.g. bike geometry, frame height) needs of all eighteen German cyclists. That produces significant advantages in the transfer of physical effort to speed.

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