

Chipless into the Future

A new production line for long-shaft precision parts with complex profiles is being opened at Baier & Michels in Ober-Ramstadt. by Andreas Wollny

A 125-ton rolling machine and a specially developed forming process replace subtractive machining processes. b&m-EccoTec enables higher output volumes and considerable material and CO₂ savings. The immense main body of the world's largest flat-die rolling machine is slowly being lowered into the new Baier & Michels production workshop through a 15-by-6 meter opening in the roof – a logistical process that required careful planning. With its add-on parts installed, the machine weighs 125 tons. When it finally rests on its foundation, it becomes clear that this marks the next chapter of a project that points the way to the future of forming technology.

The centerpiece of the new production line delivers 400 kilowatts of power and a torque of up to 60 000 newton-meters. This force sets the crank drive in motion, which moves a mass of 3.5 tons. The plant is controlled with a self-learning control system that was developed in-house. The superlative plant is accompanied by the company's own b&m-EccoTec (Ecological Coldforming Technology) process.

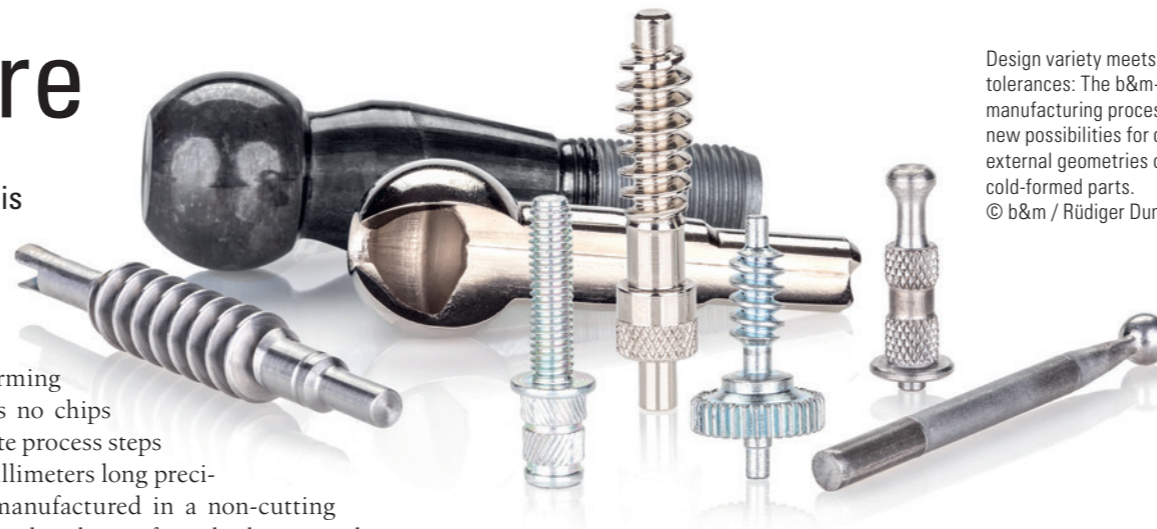
b&m-EccoTec: Forming over Machining

This process transfers the principle of cold forming to components that previously were predominantly produced with subtractive machining, such as worm shafts and adjusting

spindles, but also ball studs and piston rods. The principle here: forming instead of machining. As no chips are produced and complete process steps are omitted, up to 250 millimeters long precision parts can now be manufactured in a non-cutting process, ready to install, and with significantly shorter cycle times and better material efficiency. “Where the metalworking industry is concerned, this process brings great disruptive potential,” says Rainer Bürkert, Member of the Central Management Board of the Würth Group, of which Baier & Michels is a part. “Where traditional subtractive machining of complex parts, such as worm gear shafts, yielded around four to six parts per minute, up to 40 parts are now possible – an almost tenfold increase.” Rainer Bürkert explains that, in addition to this, the ecological footprint has also improved: Depending on the shape of the part, up to 67 percent of materials and CO₂ can be saved.

Materials Science: More Solid and Denser

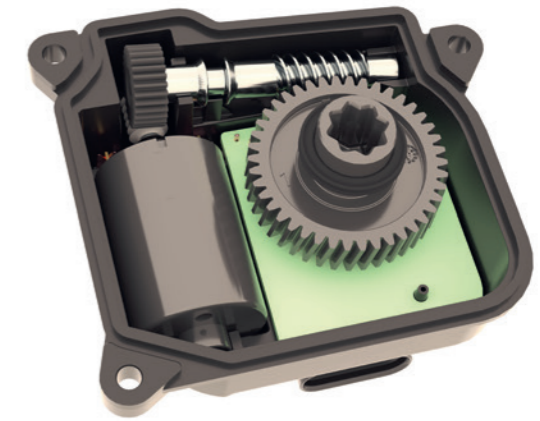
The advantages are not only process-related, but are also down to materials science. Cold forming does not sever the internal material structure. The dislocation density in the



Design variety meets tight tolerances: The b&m-EccoTec manufacturing process creates new possibilities for complex external geometries of cold-formed parts.
© b&m / Rüdiger Dunker

crystal structure increases, the part becomes more solid, and the surface becomes denser and particularly smooth. This means that energy-intensive heat treatment is no longer necessary – in particular for AFP steel, which combines high strength with good ductility. At the same time, b&m-EccoTec expands the design possibilities for external geometries: undercuts, toothing, bearing seats, and ball contours are just as feasible as functional surfaces with very tight tolerances. Today, Baier & Michels manufactures formed parts with high surface qualities and with concentricity and diameter tolerances below ten micrometers – a top figure in the industry. Gear teeth qualities up to class 5 can be produced in a stable process.

A current project from the field of drive technology shows how this performance level manifests itself in practical application. It is one of several orders and cooperations that



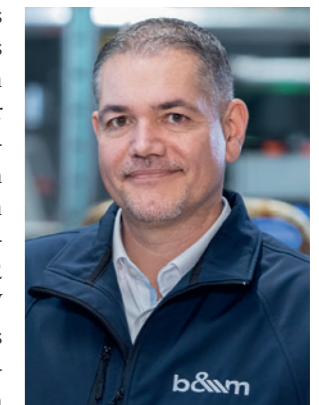
In the actuator of the Burger Group: a worm shaft manufactured by Baier & Michels in a chipless process – faster than with the conventional method and net-shape. © Burger Group

the cold forming specialist is currently implementing across several industries. The worm shafts manufactured by Baier & Michels impress in the high-torque actuators of the “High Torque” product range from the Burger Group. “The modular actuators are suitable for 12 V agricultural CAN and 24 V off-highway CAN applications – for example for precision valve control or for partial width deactivation in seed drill planters,” explains Johannes Maier, Head of Business Unit Actuators at the Burger Group.

“Thanks to b&m-EccoTec, we can manufacture off-tool parts with reproducible precision and excellent surface quality in a non-cutting process – and that in output volumes that redefine the industrial benchmark,” says Olaf Ambros, Member of Management and Director Technics and Research & Development at Baier & Michels. “For our customers, this means: The process reduces production costs as well as the carbon footprint.”

The new production line in Ober-Ramstadt in Germany provides the basis for this: machinery designed in-house and an adaptive control system configured for scalability in terms of efficient mass production. And that is why, to Olaf Ambros, the installation of the 125-ton rolling machine is much more than just a milestone for the company: “It is the starting point for a production that moves the non-cutting manufacturing of long precision parts into a wide field of industry.”

The clip with spectacular images of the delivery of the machine can be viewed on the LinkedIn channel of Baier & Michels:



Olaf Ambros, Member of Management and Director Technics and Research & Development at Baier & Michels. © b&m/Rüdiger Dunker



100 tons of steel as a special freight: The main body of the worldwide largest flat-die rolling machine is being lifted into the new Baier & Michels production site. © b&m



Disruptive factor: The machine has a footprint of over 60 square meters. Baier & Michels invested around 28 000 hours of development work in this project. © b&m / Rüdiger Dunker

Baier & Michels, Ober-Ramstadt

www.baier-michels.com