FORMING THE FUTURE

PRESS RELEASE

Equipment for mass manufacturing of carbon parts

Schuler presents economic solutions at JEC trade show / RTM presses offer short cycle times and high part quality

Göppingen, March 12, 2013 – Carbon fiber-reinforced plastics (CFRPs or simply carbon) have been used for the manufacturing of cars for several years now. As the ultra-light and extremely rigid material is much more expensive than steel or aluminum, however, it is rarely used in mass manufacturing processes. Schuler now offers lines which can economically produce CFRP parts – even in large volumes. At the "JEC Europe" trade show in Paris from March 12 to 14, the press manufacturer will be unveiling these new solutions (stand Y64).

For the manufacturing of carbon parts, Schuler uses the RTM (Resin Transfer Molding) process in which woven carbon fiber mats are placed in a die, filled with resin and hardened by applying heat and the pressure of the press. "High-pressure RTM presses not only enable shorter cycle times for complex parts with high requirements regarding geometry and rigidity, but also deliver consistently high part and surface quality," says Product Manager Raimund Zirn. This virtually eliminates so-called voids, i.e. resin-free vacuum pores or gaps within the part or along its edges.

In the high-pressure RTM process, resin is injected as quickly and smoothly as possible into the vacuum mold which is opened by just a few tenths of a millimeter. This gap injection process enables the resin to spread over the mat with far less flow resistance and thus with low injection pressure. It then quickly infiltrates the mat before polymerization is started by heat induction.

The curing process begins with the wetting of the last fibers

"The vacuumizing, fast resin injection, high resin pressures and tempered dies mean that the gelling process virtually begins with the wetting of the last fiber," explains Raimund Zirn. Curing takes four to eight minutes – the thicker the part, the longer, as the reaction heat cannot be led as easily into the die. Depending on the part, the necessary resin pressures also vary between 30 and 150 bar. Large-surface exterior panels with clamping areas of 3,600 x 2,400 mm require total press forces of 36,000 kN or more.

Due to the geometry of the part or cavity surface, the die's center of loading is not necessarily in the middle of the press. There are also off-center forces from the injection positions. "The parallelism control prevents the slide or upper die from tilting during gap injection and thus ensures smooth and even injection over the entire surface," explains the Product Manager. With a positioning speed of 1 mm/s, the Schuler presses achieve parallelism values of 0.05 mm in absolute terms with diagonal clamping surfaces of 4 m.

The preform and part handling processes, as well as the necessary die cleaning, account for a considerable part of the RTM cycle lasting two to three minutes. “This largely involves the removal of plastic residues, which mainly stick to the polymer seal located in the lower die,” adds Raimund Zirn. On request, however, Schuler can fit the RTM presses with two shuttle moving bolsters so that a common upper die can be operated with two alternating and movable lower dies. This reduces downtime to the period it takes to replace the lower dies, e.g. with a distance of 4.5 m per moving bolster approximately 20 s.

Upstroke short-stroke presses offer more benefits

RTM presses are available in two designs: conventional downstroke machines work with a fixed bed and moving bolster, and a slide whose press force is transmitted via cylinders in the press crown. Parallelism is ensured by four servo-controlled counterpressure cylinders located at the bed corners. These are also responsible for the breakout force needed to counter the adhesive forces and open the die.

In the upstroke short-stroke press, the slide only acts as support during the pressing process. From top dead center, the slide is moved by a drive cylinder to its support position and locked there. The actual working stroke is performed by the bed plate, driven by several short-stroke cylinders. Parallelism is ensured by the servo controlling of these cylinders. The breakout force in upstroke

presses is achieved by the withdrawal of the bed plate. “The benefits of the upstroke short-stroke press compared to downstroke designs are the high closing speeds of 1000 mm/s, the shorter pressure build-up times of under 0.3 s and the significantly lower construction height,” states Raimund Zirn.

Order from British National Composites Centre

These benefits coupled with Schuler’s expertise in the field of forming technology also led the National Composites Centre in Bristol, UK, to place an order with the press manufacturer for a line to manufacture composite materials. The order is for an upstroke short-stroke press with 36,000 kN of press force and a clamping surface of 3.6 x 2.4 m. With its various process modes, the press covers all common press methods for composite materials, including CFRPs.

Captions

	Bild1.jpg: Schuler composite press (CHAP line) with a press force of 3600 metric tons for mass manufacturing of materials such as CFRPs.
	Bild2.jpg: The benefits of the upstroke short-stroke press are high closing speeds, shorter pressure build-up times, and a lower height.

Please name Schuler as the photo source.

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About the Schuler Group – www.schulergroup.com

As the technological and global market leader in metalforming, Schuler supplies machines, production lines, dies, process know-how and services for the entire metal-working industry. Its clients include car manufacturers and their suppliers, as well as companies in the forging, household equipment, packaging, energy and electrical industries. Schuler is also the market leader in coin minting technology and supplies systems solutions for the aerospace and railway industries. The company employs around 5,500 people and is represented by its own facilities and sales offices in 40 nations around the world. In fiscal year 2011/12 (ending Sep. 30), Schuler posted sales of € 1,226.1 million with an Ebitda margin of 9.6 percent.

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