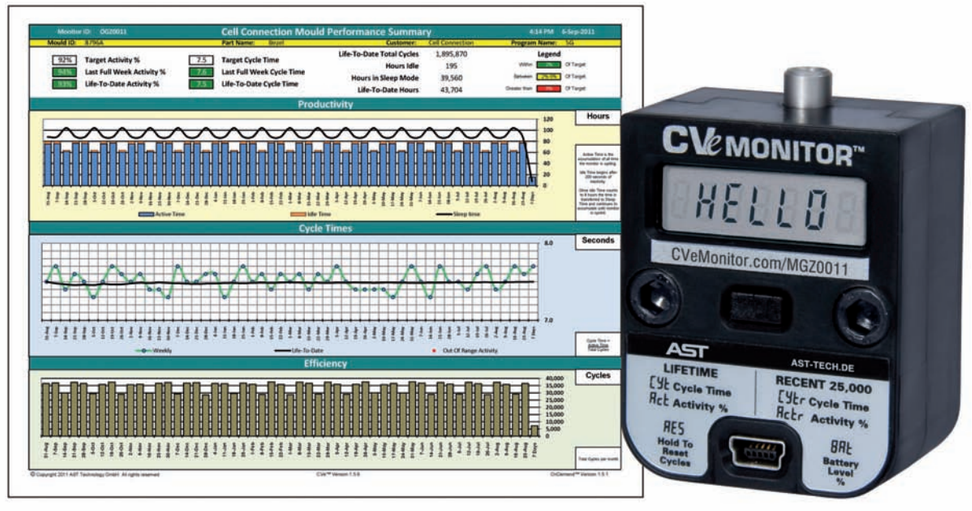
Toward Implementation of the Optimal Moulding Process

The general manager of AST Technology discusses ways manufacturers can get more from their capital equipment investment.



André Eichhorn is general manager of AST Technology GmbH, maker of the CVe Monitor.

AST Technology GmbH offers client manufacturers tool process engineering and innovative mould-monitoring systems. The CVe Monitor, for example, connects with CVe OnDemand software to form the company's system-monitoring platform.

ETMM spoke with André Eichhorn, the service provider's general manager, to find out how AST Technology helps its customers in the manufacturing industry. A topic of particular interest was component design for manufacturing (DFM) in connection with injection moulding.

***ETMM:** What is the most frequent scenario in which AST is called upon to assist a customer?*

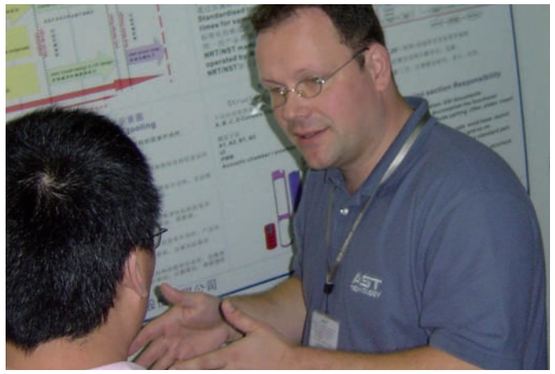
Eichhorn: Most of the time, AST Technology's first contact with customers comes when emergencies occur during production. The issues usually centre on long cycle times and quality issues that delay the release of a product to market. When this happens, AST initiates what we call front-end service by assessing such things as component design, tool performance and the injection moulding process.

How can an OEM or contract manufacturer prevent such issues arising?

The OEM can take a proactive approach by ensuring that development of the product and the production tools, and also of the production process itself, is well controlled. AST assists in this by training the customer's product designers first of all, and then we train the production staff as well. And with AST's CVe Monitoring system in place, data from previous tools can drive improvements for future programmes.

What factors have an influence on the success and cost efficiency of an injection-moulded product?

The success of a product is determined by a combination of several influential factors, such as component design, injection mould tool design, the injection moulding process, and production control. If even one of these line items is a bad performer, the whole product is at risk in terms of quality, quantity, timelines and cost.



AST Technology provides custom-designed on-site training at the customer's facility or at a designated location.

What can be done to support the overall process, from design for manufacturing to serial production?

A product is conceived as an industrial design, and then, normally, it is handed over to a mechanical design team that is responsible for making the product work, keeping production costs low, and overseeing manufacturability on several levels. Using a structured DFM approach during the project's concept and design phase involves analyzing the component structure with regard to demoulding, filling, material usage, visual appearance and more. DFM determines how the tool will look and how robustly, safely and cost-efficiently it will run in production.

Very important predictions can be made accurately during this phase, including estimates of cycle time and the number and sizes of necessary tools. The size of the injection moulding machine required, as well as needs for robots, end-of-arm tooling, material dryers and other production equipment, also can be sorted out.

By doing these things during the DFM stage, important details—gating, demoulding, split lines and surface structures, for example—are agreed upon by all involved parties, and it becomes easier for the toolmaker to do his job. This tool specification results in a defined checklist that will ease the tool design review and approval process.

Once the tool is built, it should be qualified before it is put into production. This means that it will be debugged and that a stable, consistent injection moulding process will be set up via Cpk runs and tolerance studies. Setting sheets resulting from this optimization work then make it possible to transfer the settings to repeat and copy tooling. This process can now be controlled through the CVe Monitor platform.

Because toolmaking activity may rise and fall throughout the year, OEMs often do not maintain the in-house resources to cover all of these steps at all times. AST's key competency is to provide this broad range of expertise when it is needed.

What benefits can be expected from following these procedures correctly?

Reliable and high-quality mould tools that run in a consistent and repeatable fashion, ensuring a highly profitable outcome.

Why is DFM so important?

DFM is the up-front theoretical phase in the design-to-production process. Using very precise tools such as flow-analysis programmes and good 3D CAD software, as well as engaging an experienced DFM engineer in part design, tooling, and processing, will result in the best possible part design. The component design will govern the tool design and also the injection moulding process settings.

What can be done to ensure efficient production runs?

AST developed the CVe Monitor, an electronic device that gathers specific mould data and allows focused efforts to be directed toward improvements in mould cycle times and maintenance actions. Predictions from DFM are followed. Also, cycle time and efficiency is monitored remotely; access to mould-related information is available to the OEM wherever in the world the moulders may be located.

What have been the experiences of AST customers following this system?

In one case involving a cosmetic cover component, we were able to implement immediate cycle-time and part-quality improvements with an existing production mould. These resulted in a 28% shorter cycle and a consequential improvement in output. The process was also more stable, and part quality was improved, with much lower scrap levels.

By then following up with a programme of DFM work to improve part and mould designs, we achieved further improvements. The component's weight was reduced 8% without affecting its performance, providing a direct material cost savings and helping with the customer's "green" initiative. Improved mould construction and a part design optimized through DFM together shortened the cycle time.

In this case, our work resulted in a cycle time reduced by 74% from the original production cycle. Also, the customer could significantly reduce capital investment in duplicate mould tools.

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