



acs Attendorn
Digitalised press
monitoring



Maximum transparency during the pressing process

How development and series production benefit from stroke monitoring with “ifm SmartStamp”

Automotive Center Südwestfalen in Attendorn, Germany has been advancing efficient, sustainable and technologically advanced production processes for more than a decade as a research facility and service provider for the supplier industry and OEM. “ifm SmartStamp” press monitoring software from the automation specialist ifm, is used on a servo press.

Automotive Center Südwestfalen (acs) aims to support customers with bundled development expertise, to harness synergies and thereby relieve the individual companies of financial and time burdens. acs provides comprehensive capacities in various areas such as virtual development, joining technology, plastics technology, forming technology and component testing.

Different forming shapes in quick succession

“For forming technology, we can use our servo press with its pressing force of 1,000 tons to carry out all the forming tests relevant to the automotive sector, as well as process development, prototyping and small series production,” says Jan Böcking, who heads the forming technology department at acs.

“In addition to cold and hot forming of steel and aluminium, we can also form fibre composites. The advantage of servo technology is the high flexibility with which we can carry out the forming processes. This enables us to carry out forming processes using force or displacement control. This allows us to precisely adapt the speed profile to the different forming processes.”

Precise analysis for efficient development

To further increase the precision of the results and to gain an even better insight into the force progression of a test, in 2023 acs equipped its servo press with additional sensors and the “ifm SmartStamp” software.

“At acs, we generally do not carry out series production but prototype runs with a few strokes. To efficiently advance the development of the component and the forming process, the tested component and the pressing process itself are evaluated after each stroke,” says Böcking. “We previously lacked the appropriate sensors and software to give us a comprehensive view that would enable us to precisely analyse and evaluate each individual stroke. ifm’s press monitoring software now enables us to do exactly this.”

Minimal integration effort, high ROI

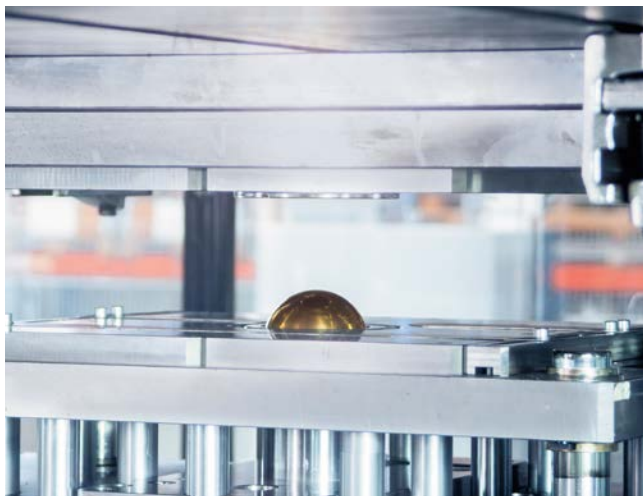
With “ifm SmartStamp”, the automation specialist ifm offers a software tool that detects tilting, eccentricity and the resulting tilting moment on forming presses within milliseconds. The plant operator is promptly alerted if the press moves outside the target range.

“If the ram is tilted too far, the press guides are subjected to excessive strain and are damaged in the long term,” says Christoph Schneider, Vice President Product Management Applications at the automation specialist ifm.



The test specimen shows the crack formation typical of the Nakajima test. The targeted overloading of the material provides information about whether it can be formed into an automobile part, for example.

The formability of metal sheets is investigated at acs using the standardised Nakajima test. Standardised samples are deformed using a hemispherical punch until the sample cracks.



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“Damage to the bearings or gears and cracks, for example in the head of the press, can also result. Due to design reasons or misalignment during a tool change, the press may also be subjected to an off-centre load, which increases the tilt torque. With ifm SmartStamp, this incorrect loading and its costly consequences can be prevented with minimal effort. To use the software effectively, just four high-precision position sensors need to be retrofitted to all four press stands to detect the tilting.”

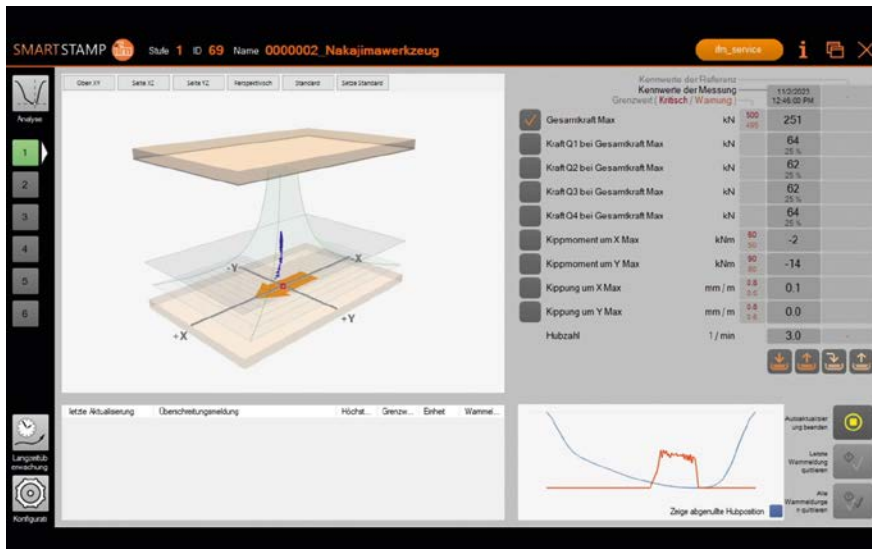
Existing sensor data is included in the calculation

Data from the force sensors that are usually already installed, and information on the tool number and stroke rate, which can be read via the control system, are also incorporated into the software.

“In ifm SmartStamp, all this data and values are processed into clear, meaningful information. This means that the machine operator can see during the first stroke cycle whether, for example, the tool is correctly mounted or whether adjustments need to be made,” says Schneider.

Precise analysis, stroke for stroke

acs also makes use of these precise readings for each individual stroke, as Böcking explains: “This exact data helps us



The force curve during the pressing process can be precisely tracked in the ifm SmartStamp software. The software can be easily and seamlessly integrated into ifm's moneo IIoT platform.

to precisely analyse the actual pressing process and how the material and tool behave in the prototype tests. This allows us to make changes for each stroke and immediately understand the effects on the tool and workpiece. We can also reuse the recorded data in a virtual simulation, which brings the real process and IT-supported simulation closer together."

Seamless integration into the moneo IIoT platform

Data analysis is simplified by ifm's moneo IIoT platform, into which ifm SmartStamp is seamlessly integrated.

"The advantage of moneo is that we have access to the process data and status data of the press from every single workplace," says Jan Böcking. "moneo's alarm function allows us to react in real time if the defined limits are exceeded and, in an emergency, stop the press. Therefore, we can effectively prevent serious damage to the press and tools."

Eleven modules for the complete, digital overview of the press

In addition to the software for analysing the actual pressing process, ifm offers ten additional software modules that can be seamlessly integrated into the company's moneo IIoT platform.

"We offer modules for monitoring hydraulics, compressed air and the lubricant circuit," says Christoph Schneider. The main drive – whether servo drive, hydraulic drive or conventional drive – can also be monitored using a software module. "The user can integrate the existing sensors into the software to generate the data; alternatively, we offer the appropriate complete hardware and software solutions. This gives the operator of the press the option to easily monitor all the system components directly and indirectly involved in the pressing process through a centralised, meaningful complete overview and to have them evaluated independently or automatically by our AI tools," says Christoph Schneider.

acs aims to create a digital twin

Automotive Center Südwestfalen is also aiming to create a full digital map of the press, as Jan Böcking emphasises: "Our goal is to make more and more use of the advantages of digitalisation and to map out process-related digital twins. With the SmartStamp software, we have now taken the first step in precisely recording the press kinematics and pressing forces. In the future, we would like to record all process-relevant variables in real time and use them to actually validate the processes and accompany each product with a digital twin from the

very first moment of development, to be able to make assertions about the limits of the forming and the sustainability of moulded parts even more precisely and by using fewer materials. We expect many benefits to come from this for us and our customers – both in terms of development speed and in terms of saving resources."

Conclusion

The ifm SmartStamp software enables Automotive Center Südwestfalen to analyse pressing processes even more precisely. As a result, the competence centre is taking a significant step towards its goal of carrying out forming processes for material research and product development even more efficiently. The software is also an essential building block on the path to creating a digital twin.