

Application Note Rexam/Mikrotron

Process optimisation with high-speed video

Effective sustainability strategy

Optimising production processes requires the smooth and seamless interaction of precision and speed. The aim is often to make the best possible utilisation of unused potential in company resources. Focussed optimisation of production processes increases output and quality, and reduces costs throughout the added-value chain. Rexam Pharma GmbH in Neuenburg am Rhein has been achieving remarkable results with its high-speed video system.

Within six months of acquiring the MotionBLITZ® Cube high-speed video system – a powerful, state-of-the-art analysis tool – the company has carried out around 25 analyses and subsequently optimised systems in various areas of production. This modern and efficient optimisation tool is now used on average twice a week for analysing production processes.

This means that they now have time truly under control at the Neuenburg plant. The high-speed image sequences can clearly demonstrate dynamic occurrences that are too fast for the human eye to register. Rexam in Neuenburg mainly uses video sequences of 500 to 3000 frames per second.

One practical example is the movement analysis of grippers and the associated valve switching times. With this partially image-based time measurement, the actual switching cycles of the valves are shown accurately to the millisecond on the individual frames of the video sequence. Dynamic processes can be very precisely tracked, and the cam movement can be converted to degrees. This allows the dynamic events to be exactly delimited.

One striking result from the first 25 uses of high-speed video is that precise time-based conclusions could be made from around 80 % of the analyses. Based on these results, the production machinery could be optimally adjusted. The benefit thus achieved proved to be very great.

Martin Back, head of production at Rexam in Neuenburg, says, "Anyone who finds a fault sets the optimisation chain in motion – from the machine operator to the installer to the process optimisation engineer. We hadn't planned that at first. The results were even better than we expected."

Manufacturing complex parts quickly and reliably

The production plant in Neuenburg near Freiburg is part of the pharmaceutical division of the Rexam group and is one of eight manufacturing plants around the world. The main activity of this plant is manufacturing complex dispenser systems which consist of many individual components and undergo a series of improvement stages. The customer is supplied with the assemblies, adds the medicine and puts them together. The products include a pocket-sized asthma inhaler and re-usable insulin injectors with regulated dosage. Another activity is the production of modules such as sweetener dispensers for customers with very varied product concepts. The quality and safety of the products take top priority.

For economic reasons, production and assembly plants must increasingly work smoothly in multiple-shift operation. If assembly is learned in a slow procedure, problems may occur later during rapid production that are difficult to locate. This made it necessary to find an effective tool for precisely analysing rapid assembly and injection processes. Only if the causes of problems can be clearly recognised can the machine settings be optimised.

Tests using normal camcorders soon reached the limits of their potential. The maximum picture frequencies and quality, as well as other necessary functions, soon revealed themselves to be completely insufficient. Therefore, Rexam Pharma GmbH searched the market for high-speed video systems and invited tenders. Three system providers made the shortlist. They demonstrated their high-speed video systems in three identical use cases. These took into account performance, image quality and resolution, as well as the important aspect of user-friendliness. On

the basis of these practical use cases, it was possible to make meaningful comparisons. In early 2007, a clear decision was made in favour of the MotionBLITZ® Cube3 from Mikrotron GmbH. This system stood out because of its performance, compactness and mobility, its modular software architecture, ease of use and not least, its very favourable frame of investment. Its functions of simple internal triggering and external control by machine signals were particularly important. The unique integrated "ImageBlitz®" auto-trigger – with the live image as a very fast and sensitive sensor – guarantees reliable recording even of sporadically occurring events. Within the recording area, sensor fields of any size and position can be defined, and adjusted with high sensitivity.

Easy to learn

The staff quickly became familiar with this state-of-the-art analysis tool, thanks to its self-explanatory operation and "learning by doing". They achieved impressive results from the very first times they used it. This knowledge and experience was then reinforced in advanced training provided by Mikrotron. The strategy of training three employees with this analysis tool right from the start proved to be a wise one. Each time the MotionBLITZ® Cube was used, the entire analysis procedure and the results were explained in detail to the other staff. This meant that continuous in-house training took place using practical case examples.

The heads of all three production units, as well as the process optimisers, learned how to use the high-speed video system and to utilise its analysis options. The same applied to the production service department and the engineering department for assembly plants. Because this camera system is so easy to use, the staff had

no trepidation in using this state-of-the-art analysis technology. The broad base of application expertise they have acquired now provides a wide range of important impulses for eliminating faults and disruptions from the quality and function flow processes, so that they can ultimately be significantly better designed.

When setting up new machines and plants, it is now standard practice to use the MotionBLITZ® Cube. However, the aim is already set higher. The earlier problems and sources of malfunctions can be discovered, the faster production can start. Therefore, when machines are purchased in future, the plan is to go directly to the supplier with the high-speed camera and analyse problems during acceptance testing. This clearly demonstrates problems to the suppliers, so that they are obliged to develop solutions at an early stage.

Fast return on investment

In the pharmaceutical industry, quality is of overriding importance for the image and success of a company. Therefore, quality is given higher priority at the Neuenburg plant, rather than the output of the production systems. Nevertheless, both aspects are closely intertwined.

For example, problems repeatedly occurred during the production of insulin injectors at a rate of 200 pieces per minute. Components were damaged during production, causing malfunctions and machine downtime. The machine configuration for slower production was perfectly in order. However, at normal production speed, errors frequently occurred, the cause of which could not be identified. Evidently, the components were not being accurately positioned. This led to a mixture of impaired performance and defective quality. The ingenious high-speed video tool produced clear results regarding the cause and effects.

The control signal of the machine was stored simultaneously with each video frame. Thus, the number of milliseconds by which the gripper opened too early could be precisely determined. The machine could then be reprogrammed with the supplier in attendance. A 10 % increase in efficiency was achieved.

With the large numbers of items produced during each shift, it is clear that any machine downtime during the entire process will have significant consequences in terms of costs. Huge improvements were achieved in this respect.

In addition, the important aspect of quality cannot be ignored, since the rejection rate was significantly reduced. Naturally, the reliable handling of processes and the much more demonstrable quality of the Rexam products were noted with approval by the customers. This is an important aspect in ensuring the competitiveness of this manufacturer of pharmaceutical products.

Based on the fact that around 25 process improvements were made within six months of purchasing the cameras and using video analysis with the MotionBLITZ® Cube, it is certainly no exaggeration when Martin Back says that "the system has paid for itself faster than the two years we had originally planned".

He continues, "We have also told the other Rexam plants around the world about our experiences. Our worldwide directors of quality and industrialisation are both based at the Neuenburg plant. This means we will be transferring our experiences throughout the company, around the world."

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MIKROTRON GmbH of Unterschleissheim (near Munich) develops, manufactures and distributes systems and components for industrial image processing. Our core competence lies in the production of high-speed video systems, vision cameras and analogue/digital frame grabbers for production, research and development, as well as turn-key systems for industrial electronics.



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