

Liebherr introduces intelligent assistance system for component identification

- The Smart Klaus - new technology for component identification at Liebherr
- Increased efficiency in component remanufacturing: identification processing times reduced by over 50 percent, increased productivity and secure identification of parts

Nussbaumen (Switzerland), 11. October 2018 - Those at Liebherr with good ideas, for example on how to save costs or shorten processing times, are rewarded. Andreas Just from the Liebherr site in Ettlingen (Germany) did not need to be told this twice. Diesel engine engineers have long been frustrated by the cumbersome and time-consuming drawings that had to be used in the diagnosis of individual engine parts. Especially with the fast growth of the company, available time to identify a part with existing staff has become increasingly scarce, which significantly affects the quality of the appraisals.

"It has to be easier and faster," said Andreas Just, who then set out in search for an optical identification solution. In his search on the internet, he found the solution offered by Optimum datamanagement solutions GmbH, the Smart Klaus. "I then drove to Karlsruhe to see how the assist system works in combination with intelligent image processing. It turns out that I had found exactly the solution that I was looking for," he recalls. He immediately saw that the Smart Klaus drastically reduces processing times - by more than 50 percent -, increases productivity, provides security in identification and gives scope for highly skilled work. Andreas Just submitted the solution as an improvement suggestion and got it approved by the management - along with a bonus. On the basis of his preliminary calculation, the investment will pay for itself after just one year and will then afford the company almost five-figure savings every year.

More than 600 engine variants to be identified

Liebherr-Ettlingen GmbH specialises in the remanufacturing of drive components. "We give engines, gearboxes and hydraulic components a general overhaul, repair them or assemble

exchange components or assemblies from parts in stock. We are a remanufacturing company,” explains Andreas Just. The Ettlingen site supplies customers of the Liebherr Group in the diesel sector with exchange engines and parts worldwide. The available list now includes more than 600 engine variations developed over the decades. We always need to have these spare parts in stock for the possible assembly of an exchange engine on request. The parts of obsolete engines form the stock - for both general overhaul and repair, or for “Reman” in Liebherr parlance. “Reman” stands for “Remanufacturing”, the reprocessing of engines and other components. The ten thousandth Reman hydraulic component and the five thousandth Reman diesel engine were delivered in 2013 and 2016 respectively. The planned deliveries for 2018 include a total of 7,200 components, whereof about 1,100 are engines. And this trend continues to rise.

Every day, apart from other components, up to seven worn-out engines of excavators, wheel loaders, mobile cranes or other construction vehicles are delivered to the yard in Ettlingen. Mechanics dismantle them and the reusable items are washed, stripped, de-rusted, then diagnosed, provided with the correct identification number and finally stored systematically in a high-bay warehouse.

"This means that up to 100 parts per engine, or even more, need to be identified," says Andreas Just. Although the mechanics recognise some of them at a glance, in many cases, however, they have to examine the design drawings very closely and to compare each detail. "It sometimes takes four to five minutes," explained Just. Especially for pipes with different bends and lengths or for complex parts with different bores. This requires a careful examination and measuring to avoid any confusion, because otherwise the part will not fit when assembling an exchange engine. This is exhausting, excruciating work because any part incorrectly stored with the wrong identification number can lead to delays in assembly and endanger rapid processing times.

Only a few parameters are sufficient for optical identification

Since January 2018, the Smart Klaus has been integrated into the working process in Ettlingen. The "intelligent colleague" has been gradually trained by highly qualified professionals. By early February, more than 1,500 parts had been entered, and this number had already reached

more than 5,000 in the summer. "Weight and contour are the main features that we teach the Smart Klaus. If this is not enough to recognise a part with more than 90% certainty, we can additionally enter up to 100 special features - from the number and diameter of bores through gear wheels to reflections, typography or surface texture," explains Andreas Just. Although each additional feature slows down the identification, the Smart Klaus is still incredibly fast with many parameters. Therefore, we try to enter as few parameters as possible. A 90 percent security of identification is enough to attribute the correct identification number. "It usually recognises a part in 10 to 20 seconds," says the team leader of the diesel department in Ettlingen, Sebastian Kurpiers. The speed of the Smart Klaus increases productivity at the same time. Because the significantly faster processing time increases the number of parts in stock and, thus, offers capacity to accelerate the assembly of exchange engines and to handle more Reman jobs.

More time for highly-specialised work

For Sebastian Kurpiers, however, it is not the faster processing time that matters, but the time it saves for qualified specialists. They can now use their high level of expertise to further increase quality standards, measure parts in a more targeted manner and eliminate error sources. An engine has many large parts that still need to be manually sized and identified. Once the Smart Klaus has been intensively "trained", ultimately, an assistant can take over the work. But we are not there yet. Many small article details still need to be taught to the Smart Klaus. "Each identical part looks different optically," says Andreas Just. "There is discolouration, signs of use, rust, and this requires fine-tuning of the parameters." Sometimes it is enough to turn the corresponding part or look at it from a different angle to illuminate it differently and the Smart Klaus can then identify the part. Often, the contrast just needs to be adjusted or the weight only needs to be limited. "We gain experience with each new part, so that we can more specifically fine-tune the identification software," explains Andreas Just. The reassuring thing about the Smart Klaus is that the appraisals with intelligent image processing - once optimally set - provide one hundred percent certainty. Employees are more relaxed and do not have to look three times to see, if the correct identification number has been assigned.

Intelligent image processing ensures 100 percent correct recognition

“Incorrect classification is a thing of the past,” says Wolfgang Mahanty, a trained business administrator. The Managing Director of Optimum developed the Smart Klaus together with his team and brought it to serial production. As a specialist in industrial image processing and intelligent database systems, he has equipped the intelligent assistance system with interfaces, so that it can communicate with other customer software systems. These allow for rapid integration into production processes. The system can be configured for any customer requirements. The spectrum ranges from incoming and outgoing goods inspection to picking, final inspection, assembly and identification. In addition, the company offers add-ons such as maintenance contracts, variant control, versioning and logging. For more specialised applications, a wide range of accessories can be integrated, from barcode readers to RFID readers and over to electrical measuring devices or torque wrenches.

The Smart Klaus consists of a 21.5-inch high-resolution HD touch screen, one or more USB 3.0 industrial cameras with half-inch sensors and extremely high resolution up to 18 megapixels. It also includes energy-efficient LED panels with light intensity up to 8,000 lumens and a 4 GHz high-performance computer including up to two integrated gigabit network adapters.

The system is modular. As a standard, the identification module comes with a scale, LED under lamp and, if required, a label printer, which prints the identification numbers on a label as a barcode after identification. The core feature of the Smart Klaus is the image processing software supported by an intelligent database. “Once the master data for each individual part has been recorded, the Smart Klaus identifies parts with 100 percent correctness,” assures Wolfgang Mahanty. The Smart Klaus also indicates whether an article is to be discarded because it is no longer installed. “If, for example, a part is no longer requested for more than three years, we check whether we still have to keep it in stock at all,” explains Sebastian Kurpiers. The high-bay warehouse is currently bursting at the seams, rarely requested parts are brought to external warehouses.

Wide range of possible applications

The Smart Klaus accelerates the working process immensely and creates capacity for future challenges. “We will continue to significantly increase our sales through 2020. This is due to the fact that, on the one hand, the Liebherr components portfolio is constantly being expanded and, on the other, that Liebherr components are being used in more and more internal and third-party devices,” says Christoph Ochs, Marketing Manager in Ettlingen. As a result, the Smart Klaus will have much to learn in the future, as well. The variety of parts will double in the coming years. Between 2,000 and 2,500 new parts are added with every new generation of engines, and they will have to be captured by the software. It will no longer be possible to identify and document them without the technical support provided by the Smart Klaus and the staff. Ettlingen is, therefore, thinking about using the recognition system in other departments. “After this first experience, we have high confidence in the technology of the Smart Klaus and see opportunities for other applications,” says Christoph Ochs.

Captions

liebherr-andreas-just-at-work.jpg

Andreas Just and the Smart Klaus at work: Part successfully recognised

liebherr-schlauer-klaus-data-base 5.jpg

A look into the database of the Smart Klaus: This digital addition at Liebherr Ettlingen has already “learned” more than 5,000 parts

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