

How to Handle Staff Shortages

Short-term absences of employees in key positions pose a threat to complex production processes. Intelligent decision support systems can prevent disruptions.



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For a long time, the question of how to optimize personnel deployment in production using intelligent decision support systems was mostly a niche topic in research. In the past, it was mainly the lack of skilled workers and accelerated exchange of know-how that drove developments in this area, but with the COVID-19 pandemic, this question has taken on a new urgency. Company hygiene concepts, a rising number of cases of illness among staff, and quarantine regulations require new solutions as quickly as possible.

EXPERT KNOWLEDGE ON DEMAND

Current developments in the field of artificial intelligence are offering increasingly better methods to predict and evaluate processes or situations on the basis of data. When used as a decision support system, AI simplifies complex processes in the background and presents them to the user in a process-oriented way. Employees thus only receive relevant information and can record and evaluate processes faster and more reliably. In other words: AI methods can digitalize expert knowledge and make it accessible. If the machine learning processes required to improve the AI run parallel to the application, the AI can use the new data to understand the process better and better. This enables it to flexibly adapt the process to a changing production environment and to different users. These data-driven systems are able to react to the environment and are therefore more dynamic and powerful than conventional systems with fixed program sequences.

INCOMING INSPECTIONS AS A CHALLENGE

Such decision support systems can assist companies with processes in a wide variety of areas and thus also ensure

the quality of the results of the process. Within the value chain of operative production, they can commence right at the beginning of the goods receipt processes. If the personnel specifically trained for incoming goods are not available, this has far-reaching consequences for subsequent processes, such as processing or assembly. The high levels of qualification and experience staff need to fulfill when working with incoming goods make it almost impossible to deploy staff from other departments or areas at short notice. However, a closer look at the incoming process shows how a decision support system can increase flexibility, reducing the consequences of a lack of personnel in such cases.

In essence, an incoming goods receipt contains at least one check to determine whether the item that has been delivered corresponds to what was ordered. In the case of wholesalers for B or C components or an assembly service provider, the number of items delivered daily can quickly become extremely large. The inspection process is often carried out manually by trained employees. Not only do many components have to be visually distinguished – a damage inspection may also be part of the job. Even despite high levels of expertise, components can often not be identified directly, resulting in time-consuming manual catalog or database searches. If one or perhaps several of the trained incoming inspection experts cannot be present due to unforeseeable circumstances, this may even result in the complete breakdown of downstream production. A similar difficulty is encountered when sudden production peaks occur. Manufacturing companies are often unable to meet the increased personnel requirements for incoming goods simply by restructur-

ing or hiring new staff due to the extensive training required.

Intelligent decision support systems can help to simplify the inspection process, thus minimizing the training period. In the case of incoming inspections, image-processing recognition offers a promising approach. The user scans the component to be inspected employing a camera system. The captured images are processed using AI methods and the result is presented in the form of a suggestion list, for instance. The suggestion list contains probable matches for the components being searched for, from which the user can then make a selection. The right object only has to be determined from a small number of possibilities. The sorting provides an additional indicator, but the final decision is still being made by a human being, allowing for corrections at any given time. The detailed documentation of the processes in the decision support system also makes it easier to understand them. While employees in a classic goods receipt process require a high level of technical and methodical qualifications, the decision support system takes over the role of a second expert supervisor according to the two-man rule. It immensely reduces the requirements for methodical expertise thanks to its easy handling. Training a new employee is now limited to comparing a component to the proposed items and interacting with the decision support system. If desired, there is also the option of integrating escalation management into the decision support system.

ARTIFICIAL INTELLIGENCE AS A DECISION-MAKING AID

Current artificial intelligence technologies and methods

can thus ensure that processes remain executable under difficult conditions. The decision support system takes over the information processing in a partially automated fashion and delivers only prepared, relevant results to users. In this way, decision-making is simplified and greatly shortened. The effort required to train new personnel is reduced. Decisions are logged by the interactions with the system and are therefore reproducible. An interdisciplinary team at Fraunhofer IPK is dedicated not only to improving AI-based methods but also to the meaningful combination of different types of data for decision-making with a focus on their respective use. In the future, it will be possible to use delivery and customer data in addition to image data for incoming goods. The researchers are also investigating the combination of process and image data in quality control. Their goal is to develop an application-specific system that incorporates a holistic analysis of the existing data. ♦

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- Images:**
- 1 Detection for multiple components
 - 2 Part recognition via mobile device
 - 3 AI assistance for incoming goods

00: Reducer 6X4



01: Relief valve X5



02: Coil spring N065

