

operations¹



Strengthening OEE and increasing productivity

Why preventive maintenance with a Connected
Worker Platform pays off

Executive Summary

Maintenance staff today face a variety of internal and external challenges: There is ongoing pressure to increase machine availability and productivity. This is countered by the growing shortage of qualified personnel, which increasingly increases the burden on operational workers. At the same time, there is a growing demand for flexible and transparent maintenance processes, and issues such as audit security and knowledge retention also play a key role in a company's competitiveness.

A paper-based maintenance strategy can hardly withstand all this. After all, the proportion of non-value-added activities is high, maintenance errors can occur more frequently among employees with little expert knowledge, and transparency regarding current and performed maintenance activities is low. With Operations1, companies that rely on digital preventive maintenance benefit from a software solution that covers all operational maintenance processes. As our Connected Worker Platform puts the worker at the center of maintenance and helps them achieve sustainable maintenance processes through intuitive tools, companies can increase overall equipment effectiveness (OEE) and the productivity of their staff, and agilely address external factors such as plant bottlenecks.

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I. Current risks in preventive maintenance

Production is at the heart of the manufacturing industry. That's why machine breakdowns and malfunctions, as well as unplanned maintenance, are a worst-case scenario that maintenance managers want to avoid at all costs. Preventive maintenance therefore has a special role to play in sustainably increasing effectiveness and productivity. If you take a closer look at the maintenance process, it becomes clear that in many companies it is characterized by one thing in particular: many media and system breaks and at least as many blind spots. What does this mean in concrete terms?

Let's consider the following scenario:

A maintenance operator defines and plans the complete maintenance process based on Excel or in software such as the Enterprise Resource Planning system (ERP), the Manufacturing Execution System (MES) or another maintenance tool. The created work instructions are then printed on paper, which is a media break. The maintenance operator works with the maintenance orders during his shift and spends much of his time understanding difficult-to-understand maintenance instructions and filling out the paper-based checklists in parallel. The operational process is complicated by the fact that the maintenance manager has to digitize the orders processed by his team from the paper form back via scan and then store them on a drive and ensure order tracking – yet another media break. The many media breaks throughout the entire maintenance process create blind spots. As a result, the progress of the maintenance orders is not transparent, nor is the performance of the maintenance, the documentation of the errors that have occurred, and the current status with regard to error correction.

The example illustrates that a lot of time is invested in non-value-adding activities and that the operational process is very complex due to the time-consuming document handling and the many breaks.

The overview shows the consequences of such a maintenance approach in concrete figures¹:

47%

of plants still use paper records for their maintenance reports.

21% of wasted time

for maintenance workers is due to the covering of paths on the shopfloor.

19% of wasted time

is due to waiting for instructions.

1. The figures are taken from the *Plant Engineering 2021 Maintenance Study*, the online magazine *Industry Week* and *Aberdeen*, an international marketing intelligence firm.

These figures are alarming because they inevitably raise the following question: How can preventive maintenance processes be set up in such a way that companies can use them to increase their overall equipment effectiveness (OEE) and the productivity of their maintenance staff, who are increasingly overworked due to the shortage of skilled workers?

Our white paper takes a detailed look at how a Connected Worker Platform can help you achieve this goal.

Here, we first highlight the consequences of a paper-based preventive maintenance strategy. We then explain how a Connected Worker Platform is a suitable digitization option, and finally illustrate the opportunities of digital preventive maintenance with Connected Work step by step. In the last part, we give you examples of companies that are already successfully using Connected Work in their maintenance processes.

II. Consequences of a paper-based maintenance strategy

You have probably also experienced that the breaks and blind spots in preventive maintenance described in the introduction run through the entire maintenance process: from the provision of documents and their handling, through maintenance planning, execution and monitoring, to the derivation of improvement measures and the establishment of global process standards. Topics such as maintenance costs and audit security are also affected.

Consider the following case:

The next audit is due, but you have the problem that your maintenance work is not transparently traceable due to paper-based processes. If your data lacks quality and depth and you cannot fully prove which maintenance employee performed which maintenance work when and with which result, this can, in the worst case, jeopardize the profitability of your company if traceability is a basic requirement for business relationships.

The audit example illustrates that there are far-reaching implications for a company if it relies on fragmented paper-based process landscapes for preventive maintenance.

Overall, three levels can be distinguished:

- ✓ The level of purely operational processes in preventive maintenance work
- ✓ The level of external risk factors
- ✓ The level of the entire company including all areas of activity and employees



If we take a closer look at the level of purely operational processes, we have to deal with the following risk drivers in paper-based preventive maintenance:

- ✓ A high documentation effort and media discontinuities. This is also evident in the entire planning process of maintenance activities, which is planned in different software and visualized in analog form. As a result, it is difficult to track which maintenance employee is currently responsible for which task and what the progress of the process is
- ✓ An increased susceptibility to errors arises above all with complex instructions for multi-variant machine parks. This is because maintenance work is carried out on the basis of employees' mental knowledge.
- ✓ The decentralization of processes and maintenance knowledge results in different quality standards for maintenance work performed.
- ✓ The paper-based incomplete documentation of maintenance processes leads to a lack of audit security, which can have serious consequences, as the above example shows.

These internal company conditions are compounded by external risk factors. What are these?

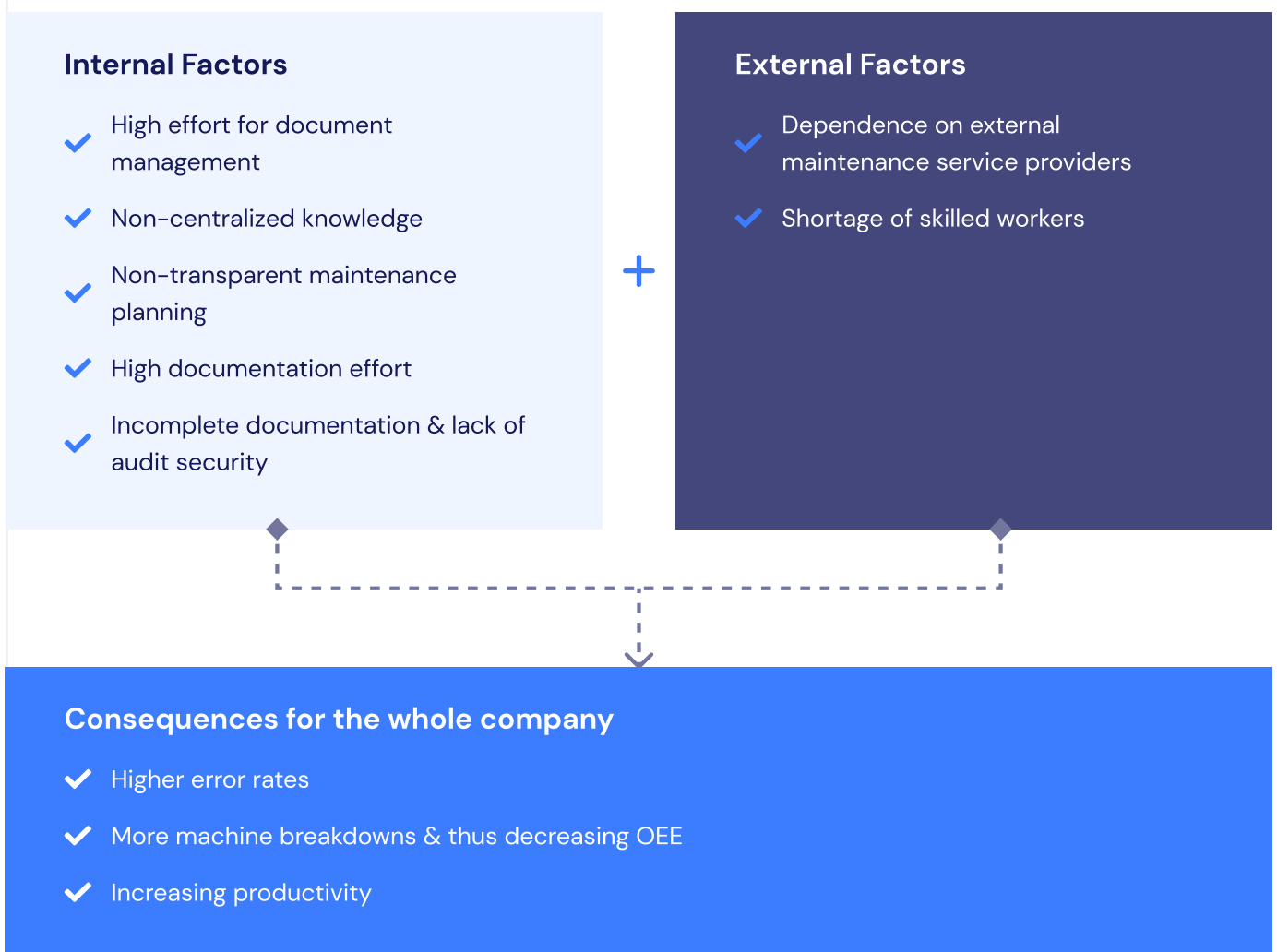
- ✓ Dependence on external maintenance service providers due to a lack of human resources or expertise.
- ✓ The increasing shortage of skilled workers, which is one of the biggest current challenges facing the manufacturing industry, is forcing companies to rely more on external maintenance personnel in the future.
- ✓ Factory shortages mean that the pressure and strain on maintenance staff is continually increasing.



As internal operational maintenance processes and external drivers collide, this has consequences for the entire company

- ✓ As internal operational maintenance processes and external drivers collide, this has consequences for the entire company.
- ✓ In the long term, this massively weakens a company's competitiveness.
- ✓ It will then no longer be possible to react agilely to external factors such as the shortage of skilled workers.

The graphic summarizes the current risks in preventive maintenance



How is it possible to close the gap described above and to cover the "last mile to the worker" – i.e. the information path from the ERP or MES to the maintenance staff – in such a way that all process and information data are fully transparent and can be accessed at any time by any maintenance employee? The answer to this is: by means of digitization.

III. Why Connected Work is the most suitable digitization option

Compared to other software systems, such as an MES or an ERP system, a Connected Worker Platform has numerous advantages. To better understand these, let's first explain what a Connected Worker Platform is.

Just like "Connected Work," which refers to the interconnectivity of operational workers, a Connected Worker Platform is understood to be the full-scale connectivity of the worker with his or her work environment. The difference between this and typical software applications is that employees are embedded in a comprehensive digital system: Information is provided contextually, employees interact in real time with each other and with management and work planning levels. In concrete terms, this can be seen, for example, in the fact that maintenance staff are provided with information digitally and are assigned tasks via a task function, as well as being able to solve problems easily in real time via a chat function with their direct supervisor.

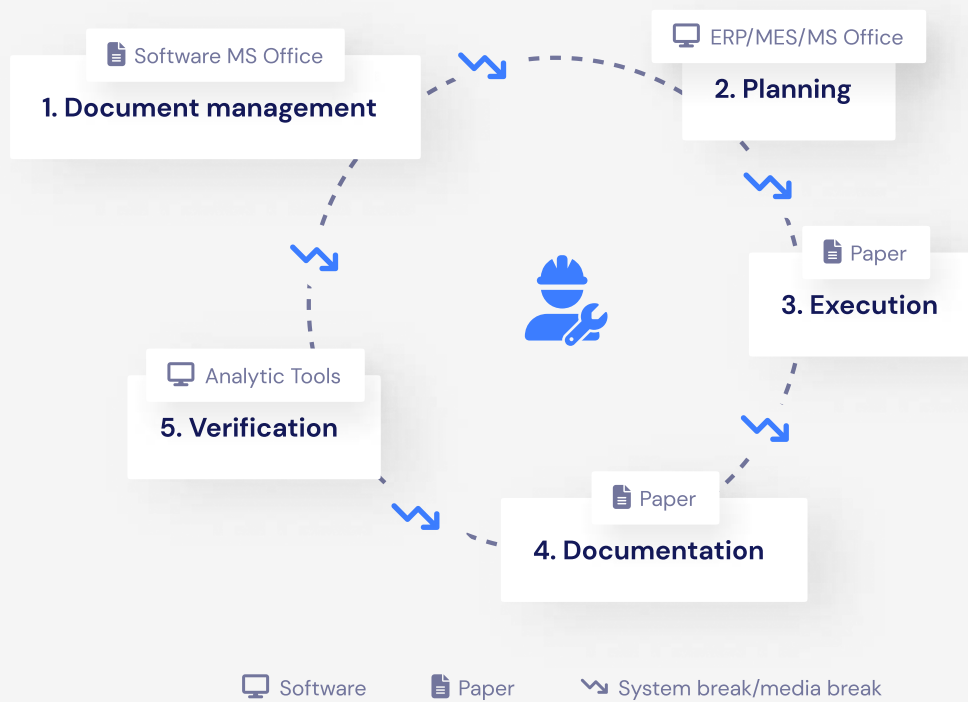
The advantage of such a software solution:

Worker gets complex information simply displayed and communicated so that he can work more efficiently, while the maintenance manager gets transparency about the complete process progress. For example, the entire maintenance process in the Connected Worker Platform is fully digitally documented in real time – a feature that is not fulfilled in classic software systems, because there process data has to be fed back from the analog to the digital and there is an overall lack of transparency and traceability between the individual process steps.

While other software solutions end with the worker, a Connected Worker Platform covers all operational processes of maintenance – with the worker at the center.



Classical Software Solution



Connected Worker Platform



On a macro level, companies gain the following benefits from using a Connected Worker Platform:

✓ **Process efficiency & consistency:**

All operational activities in preventive maintenance (and all other use cases) can be planned, executed and optimized by operational staff on a single, intuitively designed platform, and incidents can be resolved collaboratively. There is no "mental set-up time" when an employee needs to switch between systems as with a vertical software solution (e.g. CMMS)

✓ **Data-based improvement:**

Companies can continuously learn from shopfloor insights in a data-based manner. This systematically identifies problems and allows them to be solved more quickly or even in advance in future production processes.

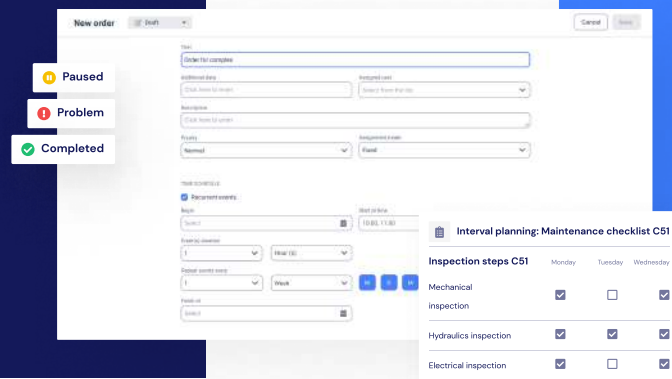
✓ **Greater resilience to external factors:**

A more agile response can be made to increasing market demands, competitive pressures, shortages of skilled workers, political crises, supply chain disruptions, etc.

The next section goes into detail about the numerous benefits of digital preventive maintenance with a Connected Worker Platform.



IV. Opportunities for a digital preventive maintenance with Operations1



The Connected Worker Platform from Operations1 can be used to circumvent the media and system discontinuities described above, as well as the numerous blindspots. Since these gaps in the operational execution of preventive maintenance run through the entire maintenance process, we address each aspect below.

Aspect 1: Planning maintenance activities

Challenge:

In paper-based preventive maintenance, maintenance planning is very time-consuming. It is first done by the maintenance manager in different software such as Excel and then provided to the maintenance staff analogously 5 on a whiteboard, magnet board or paper. The assignment of the maintenance tasks to the individual employees and also the control of this assignment prove to be very time-consuming and difficult to track due to the analog planning. The planning process for individual tasks is also time-consuming for the worker and requires a lot of self-organization if the maintenance orders are provided in document trays. As a result, a lot of work time is lost in traveling back and forth on the store floor and gathering maintenance instructions.

Solution:

Using Operations1's Connected Worker Platform, maintenance planning is centralized in the cloud through dedicated Operations1 planning functionality. This means significantly reduced effort for the maintenance manager, both in assigning jobs to the worker and in checking the progress of the work, which is tracked seamlessly in the software. For the maintenance employee, the use of the Connected Worker Platform from Operations1 has the advantage that the non-value-adding activities described above are eliminated, the task overview is transparent instead, and the worker can concentrate on the actual maintenance work.

The advantages:

- ✓ Central planning and assignment of orders in one system
- ✓ No system and media hopping
- ✓ Savings in paper costs
- ✓ Maximum utilization of resources of maintenance personnel
- ✓ Increased work safety due to regularly maintained machines

Aspect 2:

Document handling and provisioning



Challenge:

Just like maintenance planning, the paper-based provision and handling of documents for the maintenance process is also very time-consuming and complex: After being created in Excel, Word or PowerPoint, the maintenance documents are printed out and physically provided to the technician. Because it must be ensured that the maintenance staff always work with the most up-to-date document, there is an increased effort for manual visual inspection and revision, which unnecessarily delays the maintenance process. This results not only in unnecessary paper costs, but also in the media discontinuities from digital to analog media already described above. These cost unnecessary time throughout the entire maintenance process, especially in work preparation, and tie up labor resources.

Labor resources are also not used in a way that adds value if the maintenance manager has to collect the maintenance logs filled out by the maintenance staff, digitize them back at great expense, and store them on the network.

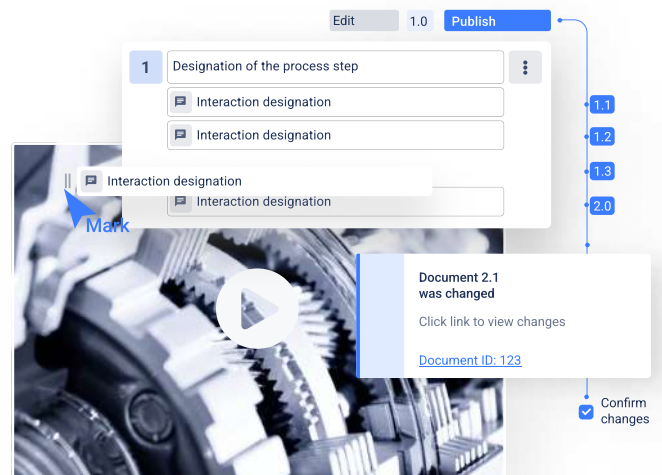


Solution:

A Connected Worker Platform reduces the effort required for the maintenance manager to create documents. Thanks to drag-and-drop editor and central organization of maintenance checklists, media disruptions are eliminated. The digital provision of the latest documents, which are directly assigned to them, also allows employees to concentrate fully on the activities to be carried out. The verification effort is also reduced, as the maintenance manager no longer needs to manually scan the maintenance logs completed by the employees, because the reports are generated automatically. Overall, the entire process is thus noticeably streamlined and made more efficient by the transparent workflow in an all-in-one platform.

The advantages:

- ✓ Effort reduction in document management and job assignment reduction by an average of 50%
- ✓ Reduced control effort through automatic revision control
- ✓ Employees are informed of changes directly in the digital checklist
- ✓ Elimination of subsequent effort for scanning and archiving documents through automatic reports



Aspect 3: Implementation and monitoring



Challenge:

Paper-based, text-heavy documents lead to a high processing and interpretation effort for complex instructions for multi-variant machinery. This is because employees have to draw on their wealth of knowledge and experience for proper processing, which always involves a potential for error and also represents a risk of danger if maintenance steps are remembered incorrectly. In addition, paper-based processes lack reliable control mechanisms that ensure consistent execution of maintenance work. Also, the progress of performed maintenance work is not transparent. All these factors reduce the productivity of maintenance personnel, process reliability and process transparency.



Solution:

With digital maintenance with Operations1, maintenance instructions can be carried out efficiently thanks to intuitive image- and video-based step-by-step instructions. For his part, the maintenance manager has a transparent overview of the progress of work orders because the data is available in real time. In addition, easy-to-understand content as well as mandatory work steps in the inspection, maintenance or repair logs eliminate the need for interpretation by the worker and significantly minimize the risk of errors. This also increases the safety of the working environment for maintenance personnel.

The advantages:

- ✓ Greater transparency thanks to automatic logging of all maintenance steps performed
- ✓ Increased employee productivity by up to 21% thanks to intuitive step-by-step instructions
- ✓ Consistent maintenance quality through mandatory work steps
- ✓ 100% process transparency through real-time data

The screenshot displays a mobile application interface for a maintenance checklist. The title bar shows '2270 Maintenance checklist'. The main section is titled 'Hydraulic test' and lists step '1 Inspection of the supply lines'. Below this is a video player showing a close-up of a hydraulic system with red arrows and numbers '1' and '2' indicating specific points of interest. To the right of the video is a 'Choose interaction' overlay menu with options: a checkmark, a target icon (selected), a list icon, a link icon, a checkmark, and a comment icon. Below the menu, the 'Read out temperature sensor' option is selected, showing a 'Value input' field with '0.0000' and a unit 'C'. It also includes 'Lower limit' (-10) and 'Upper limit' (+10) fields. A 'Comment' field with a placeholder 'Click here to enter' and a camera icon is at the bottom. The main checklist has two items: '1.) Hydraulic pipe system without visual leaks' (Mandatory) with radio buttons for 'Obvious leakage', 'Light oil trace' (selected), and 'All', and a 'Comment' field with 'No obvious leakage point'; and '2.) Cable section fixed with ties at a distance of 3 cm'. At the bottom, there are 'OK' and 'NC' buttons, and a progress indicator '3 / 4'. Navigation buttons 'BACK Perform mechanical testing' and 'NEXT Electronic testing' are at the very bottom.

Aspect 4:

Response times and problem resolution



Challenge:

A paper-based maintenance process results in delayed responses to problems. The technician travels long distances on the shopfloor or makes phone calls to co-workers and direct supervisors to describe problems and find solutions. In addition, because findings are documented on paper, it is very difficult and time-consuming to document errors and track their resolution. Both make the problem-solving process inefficient and non-transparent.

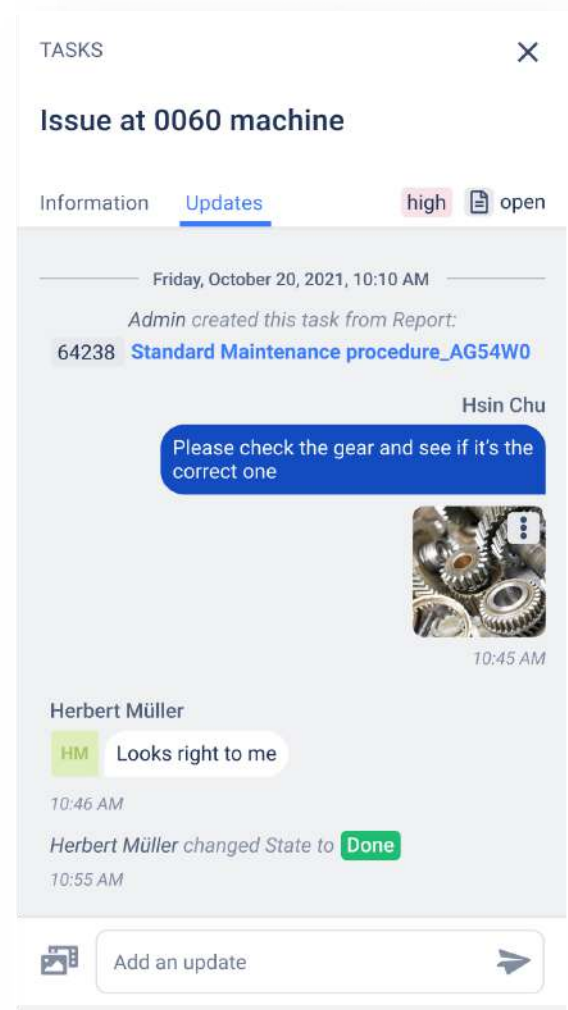


Solution:

The Connected Worker Platform from Operations1 helps maintenance staff solve problems quickly and efficiently. These can be recorded directly in a digital checklist, assigned to a colleague or supervisor via task management, or solved collaboratively through real-time chat. In this way, problem-solving processes can be initiated quickly and, thanks to an open-point list, there is transparency about open or solved task areas.

The advantages:

- ✓ Increased auditability of the open points list/punch list
- ✓ Avoidance of machine wear thanks to early error detection and timely troubleshooting
- ✓ Improved Mean-Time-To-Acknowledge (MTTA)
- ✓ Strengthening of operational responsiveness in maintenance



Aspect 5:

Analysis and derivation of improvement measures



Challenge:

With paper-based maintenance, the difficulty arises in analyzing the maintenance measures based on valid data and deriving improvement measures from them: The documentation of findings is done on paper, additionally pictures are taken with a digital camera, which then have to be archived digitally. The effort of transferring data from paper back to the software is time-consuming and ties up work resources.

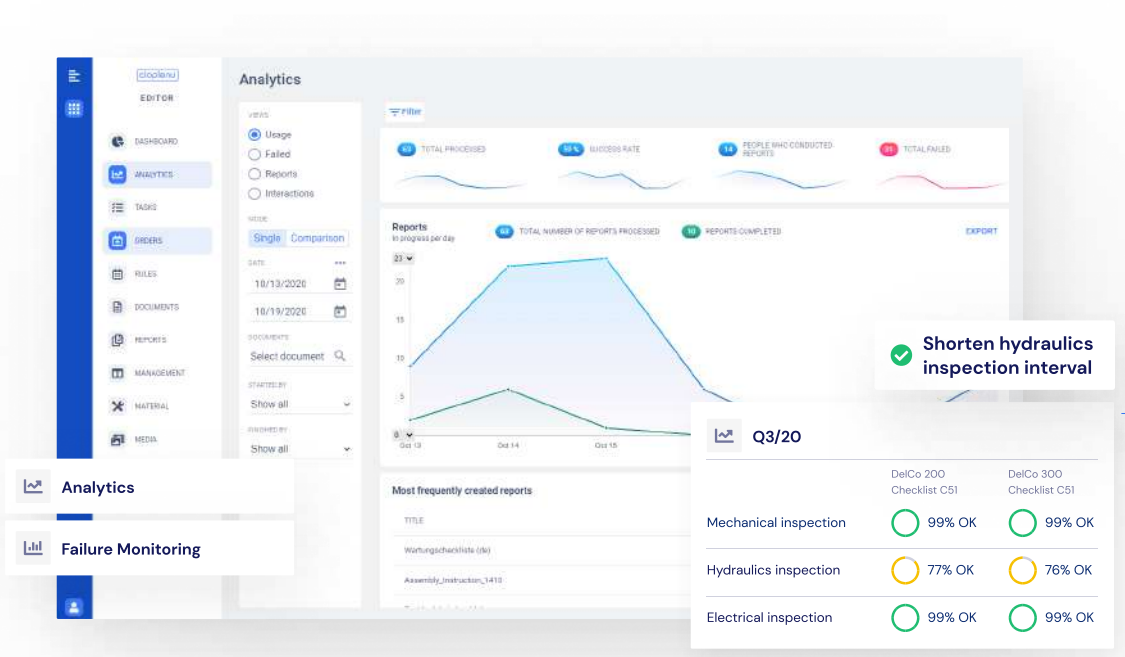


Solution:

Since a digital solution records all process data in real time, process documentation is seamless. For example, it is possible to specifically evaluate how long certain maintenance work has to be carried out, where problems occurred and at which points they occurred. Reports of the activities performed are generated automatically and, if required, the data can be transferred to an external analytics tool to be combined with data from other areas. In addition, diagnostic images and videos can be used retrospectively for analysis. Thanks to this seamless transparency, improvement measures can be reliably derived and activities that do not add value are completely avoided.

The advantages:

- ✓ Derivation of improvement measures based on process data
- ✓ Increase in OEE key figures
- ✓ Avoidance of non-value-adding activities when collecting and evaluating data



Aspect 6:

Reduction of maintenance costs and increased resilience to shortage of skilled labor



Challenge:

In times of a shortage of skilled workers, there is often not enough maintenance staff available internally or the specific expertise is lacking. Companies then have to resort to external service providers, which results in high maintenance costs and also increases the risk of only being able to react to machine failures with a time delay.

To ensure that the valuable knowledge of experienced employees is not lost when the company leaves and that new employees can be trained quickly, it is also extremely important to save this process knowledge centrally. However, paper-based processes make this difficult, since maintenance knowledge is usually stored in the heads of individuals and is not centrally stored anywhere. The issue of a shortage of skilled workers therefore presents companies with a major challenge and increases the pressure on the internal workforce.

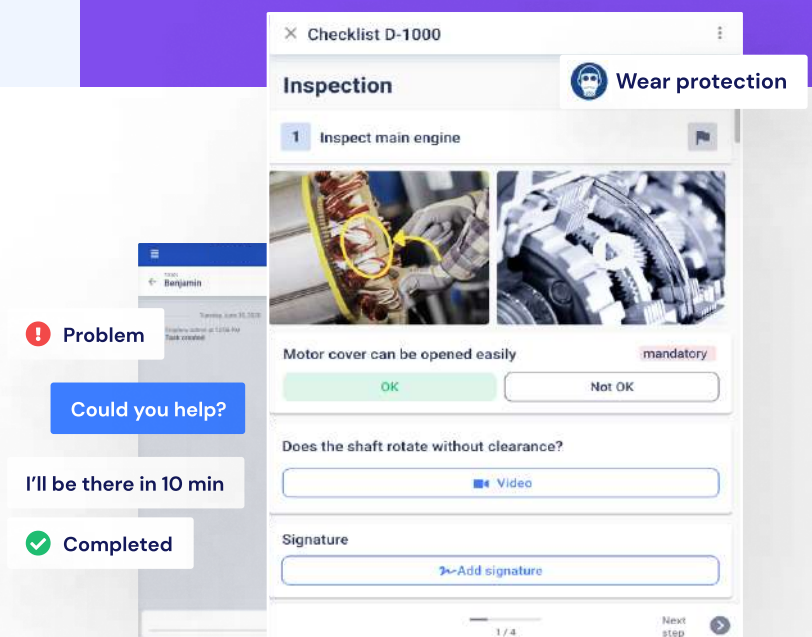


Solution:

With a software solution, not only can external maintenance costs be avoided through insourcing, but machine operators can also perform autonomous maintenance tasks themselves, as self-explanatory image- and video-based checklists safely navigate them through the process. This helps avoid unexpected maintenance costs and significantly reduces machine downtime thanks to regularly maintained machines. Empowering maintenance staff with digital tools in their daily work and centralizing knowledge in the cloud for everyone to access has the advantage of making companies more resilient to the issue of skills shortages, as well as making the onboarding process for new staff efficient and fast.

The advantages:

- ✓ Up to 67% shorter training time for new employees thanks to intuitive checklists
- ✓ Flexibility in staff deployment through autonomous maintenance
- ✓ Increased employee productivity
- ✓ Increased employer attractiveness and employee satisfaction through the use of state-of-the-art technology
- ✓ Resilience to shortage of skilled workers



Aspect 7: Audit security



Challenge:

The topic of audit security is extremely relevant for companies, because a lack of transparency and data quality can, in the worst case, massively restrict or even jeopardize business relationships. With paper-based maintenance, it is precisely this complete traceability that is not given due to the numerous media and system discontinuities already described. Moreover, if documents have to be compiled for the auditor, this means a high research effort due to analog archiving.

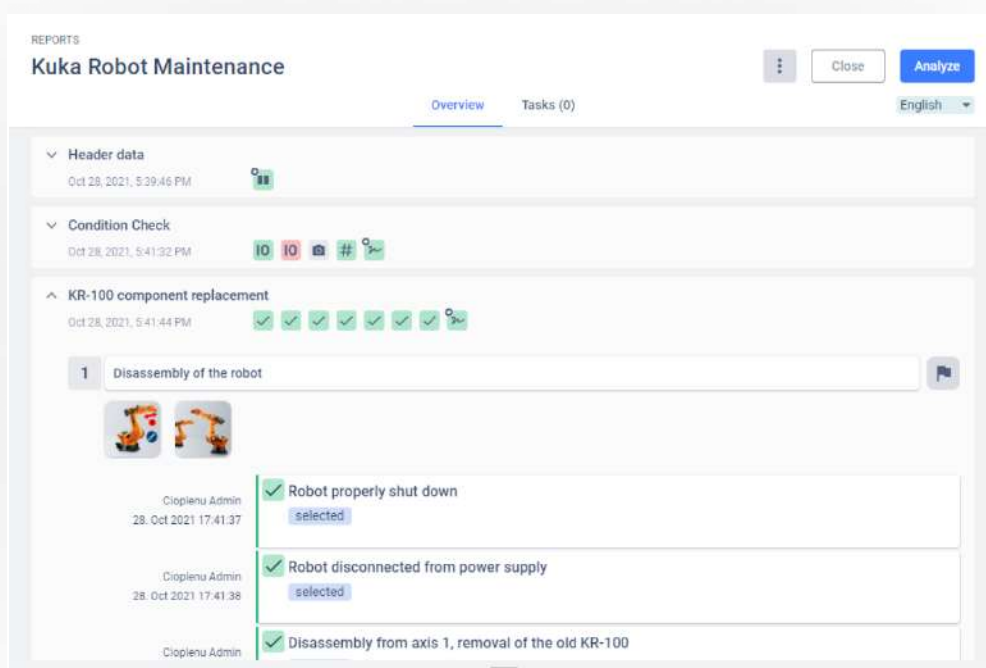


Solution:

In the Connected Worker Platform from Operations1, all data is seamlessly documented and immediately accessible. Both the data depth and the data quality are thus significantly deeper and it is possible to trace back exactly which employee performed which maintenance measure on which day and at what time. The documentation of each individual test step also facilitates the rapid retrieval of individual documents through filterable evidence of all activities performed. As a result, companies not only make a good impression on the auditor, they also have much greater audit security.

The advantages:

- ✓ Increased audit security through complete documentation
- ✓ Strengthened verification power through increased data transparency, data depth and data quality
- ✓ Easier research through integrated search function and filters



Aspect 8: Establishing a global process standard



Challenge:

Global standardization of maintenance practices is very complex and time-consuming in a paper-based process: Work instructions have to be created in several languages in MS Office, document management usually differs within the various plants and is not stored centrally anywhere. Both complicate and delay the ramp-up of new locations at the same time.

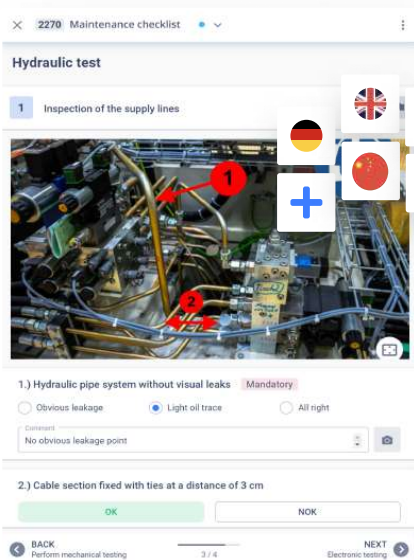


Solution:

In the Operations1 software solution, maintenance checklists can be easily created in multiple languages, managed and made centrally accessible to all plants. This allows a global process standard to be flexibly established for all plants – with cross-plant maintenance quality and process reliability. Likewise, efficient processes that work well in one plant can be easily and quickly transferred to other plants thanks to the central knowledge backup in the cloud and the timely provision of documents. The control effort for standardized documents is reduced as a result of automatic revision control and simple document approval.

The advantages:

- ✓ Operational excellence across locations
- ✓ Single source of truth for complete maintenance planning, execution and documentation
- ✓ Easier ramp-up of new locations through flexible knowledge transfer
- ✓ High sustainability by eliminating paper in global plants



Location 1



Location 2





The sum of all the aspects presented ultimately leads to an increase in overall asset effectiveness and improved mean-time-to-repair. The graphic summarizes the operational and strategic improvements of digital preventive maintenance. It shows how much the entire company benefits from placing the maintenance employee at the center of the operational processes:

Opportunities for digital preventive maintenance with Connected Work



V. Customers already benefiting from digital preventive maintenance

A number of companies are already benefiting from a digital preventive maintenance approach. We present two in more detail below: Oetiker, a leading supplier of high-end joining solutions, and Hirschvogel, one of the largest, globally operating automotive suppliers in the field of solid forming of steel and aluminum.

Status Quo before Operations1:

- ✓ MES in use to determine maintenance intervals
- ✓ Last mile to the worker still paper-based
- ✓ As a result, high effort for document provision and suboptimal execution of maintenance processes
- ✓ Ambitious targets for increasing overall equipment effectiveness (target value of 85% OEE)

Why Operations1:

- Cloud-based solution
- Simple implementation of machine-specific maintenance processes
- Multilingualism of the software
- Close and trustful cooperation



With Operations1, we were able to increase machine availability by 5%P after only 6 months.

Jacob Reid
Head Engineering



+11%P

OVERALL EQUIPMENT
EFFECTIVENESS

-23%

MEAN-TIME-TO-
REPAIR

+5%P

INCREASE OF PLANT
AVAILABILITY

Status Quo before Operations1:

- ✓ Fragmented, paper-based process landscape
- ✓ Complex maintenance instructions and Excel-based maintenance planning
- ✓ High employee-dependent knowledge led to delays in maintenance & travel activities
- ✓ High dependence on external service providers & thus high costs



By constantly increasing our knowledge, we find solutions faster and reduce downtimes.

Stefan Führer
Maintenance Manager



Why Operations1:

- ✓ Detailed maintenance planning in Operations1
- ✓ Integration possibilities of the software
- ✓ Intuitive and multilingual software
- ✓ Dynamic and experienced team

€2m

ANNUAL SAVINGS
THROUGH
INSOURCING

-60%

LESS DOWNTIME

-50%

REDUCTION
OF ERROR RATES
IN THE PROCESS

**Leading companies
rely on Operations1 in maintenance**



DAIMLER TRUCK

VETTER®



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operations¹

Operational excellence in maintenance **through** **digitization**

Empower your employees, establish excellent processes
and strengthen your company for the future.

DO YOU HAVE ANY FURTHER QUESTIONS? CONTACT US!

sales@operations1.com | www.operations1.com