

WHITEPAPER

Digital Maintenance

Foresighted. Preventive.

Maintenance as a Strategic Success Factor

Fewer Downtimes as a Competitive Advantage

Downtime is the enemy of profit.

Disruptions in the manufacturing process or even equipment failures in production have an immediate impact on the operating results of companies.

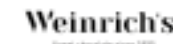
In addition, dynamic market developments require increasingly preventive action and thinking. Only if plants, machines and processes function perfectly the economic goals can be achieved. Maintenance is thus becoming a strategic success factor, which is gaining importance due to increasing automation and interconnectivity.

The aim of strategic Maintenance

is to increase the reliability, availability and process stability of the machinery in order to reduce maintenance and downtime costs and to increase on-time delivery. This can be achieved through efficient, digitalised maintenance processes and optimised maintenance intervals. Maintenance software that optimally has access to machine and operating data in real-time improves overall equipment effectiveness (OEE), enables minimum downtime and reduces the workload of maintenance staff.

Content:

- Potentials and Benefits
- Event-Oriented or Reactive Maintenance in the Case of Disruption
- Preventive Maintenance: Preventive or Interval-Oriented Maintenance
- Predictive Maintenance: Predictive or Condition-Based Maintenance
- MES module Maintenance in FASTEC 4 PRO
- Interaction with MDA/PDA
- A Look at the Field
- 4 Steps to Strategic Maintenance
- Customer Voices
- Outlook and Recommendations for Action



Potentials and Benefits

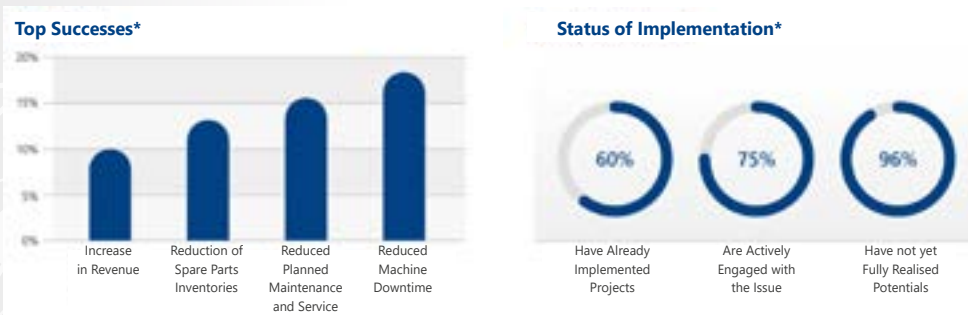
We See Ourselves as Your Partner on The Road to Strategic Maintenance

In most companies, the potential has not yet been fully utilised*:

The share of companies that have already carried out optimisation projects has increased from one third to half since 2017. The results achieved within the scope of these projects exceeded expectations, in some cases significantly.

In the areas of Planned Maintenance / Service Costs and Plant Downtimes, reductions of 18 percent were achieved and sales increased by 10 percent.

At the same time, however, it became clear that still only a fraction (4 percent) of the companies had tapped the expected potential.



*Source, accessed 02.03.2023:

<https://www.bearingpoint.com/de-de/insights-events/insights/chancen-und-herausforderungen-von-predictive-maintenance-in-der-industrie/>

Opportunities of Digital Maintenance::

- Reduction of costs
- Increase in plant availability
- Avoidance of unplanned downtimes
- Planning and simplification of maintenance activities
- Targeted use and relief of maintenance staff
- Avoidance of waste, conservation of resources
- Digitally documented processes (forms, checklists, histories)
- Basis for future AI-supported processes
- Autonomous maintenance (through digital and centrally stored information)
- Automated processes (Alerts, creation of Maintenance orders)
- Increased flexibility in production

Event-Oriented or Reactive Maintenance

In Case of Disruption

Not all maintenance is the same. A distinction is made between event-oriented, interval-based and condition-based maintenance. The goal can often only be achieved through a combination of these approaches.

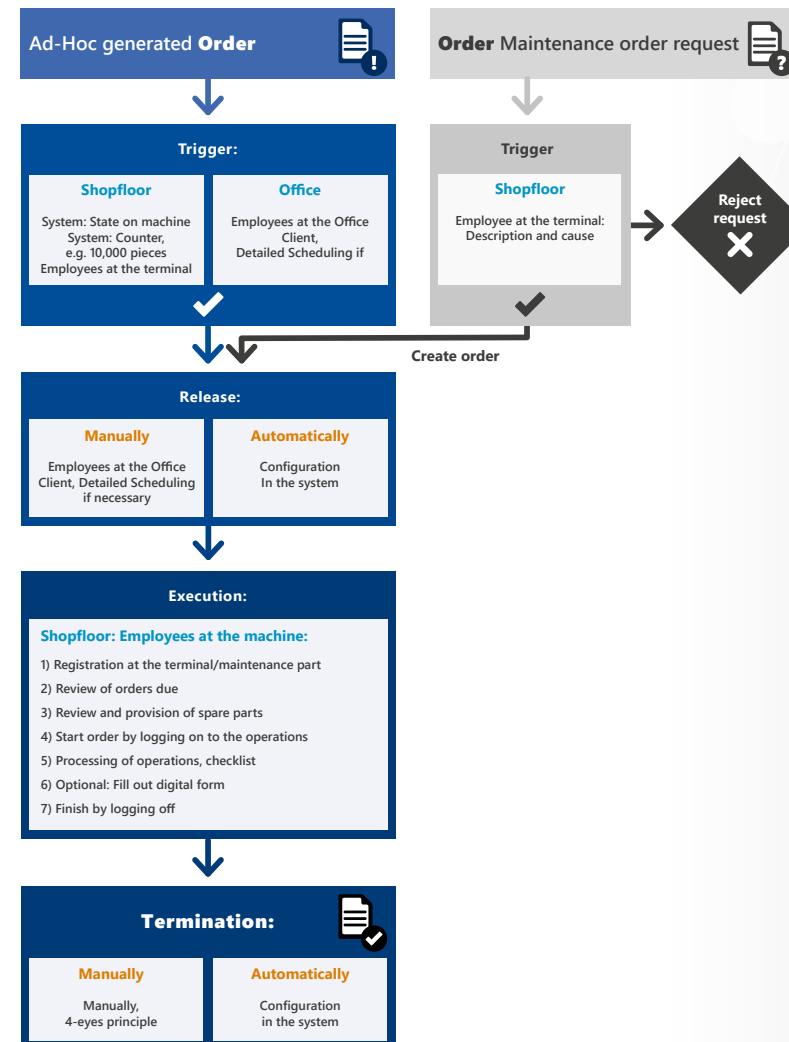
With event-oriented maintenance, a reaction is made when a failure has already occurred. If the failure of the system does not result in high costs due to consequential damage or production downtime and if the application on the machine plays a minor role in the production process, this can be an acceptable solution. The procurement time of spare parts is also a decisive factor. If these are available at short notice, reactive maintenance can also be implemented efficiently.

"Production staff is also included in the recording of maintenance activities and benefits from the digital provision of information."



Steffen Dams

MES Consultant and Product Expert Instandhaltung, FASTEC GmbH



Preventive Maintenance

Preventive or Interval-Oriented Maintenance

If the downtime costs are much higher than the Planned maintenance costs, the main focus should be on preventive maintenance. Here, critical wear parts are replaced at fixed intervals. In this way, predictable downtimes can be avoided. Planned maintenance relies on the average expected life of individual parts or equipment to predict when maintenance will be required. Planned maintenance is carried out at pre-determined (regular) intervals, for example every 300 hours. The basis of the maintenance measures is therefore a theoretical failure rate.

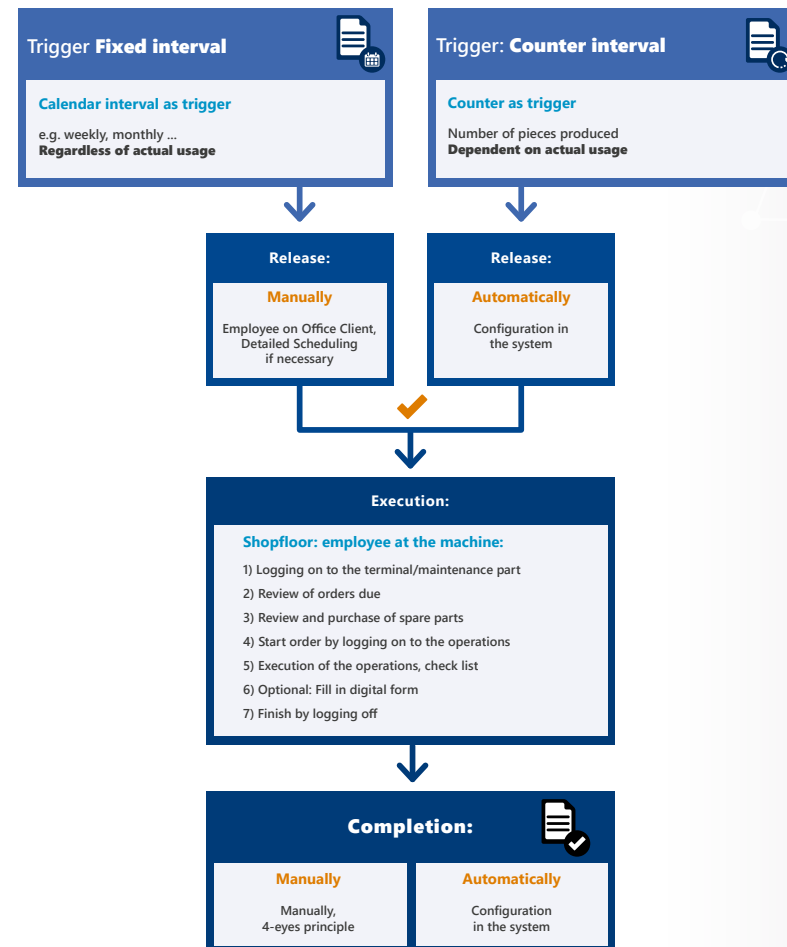
However, the actual plant performance, i.e. the actual amount of abrasion, is not taken into account. The real strain on a plant differs greatly with regard to the actual use, so that unnecessary additional maintenance work can occur during preventive maintenance. Or parts are replaced early, in line with the statistical maintenance interval, and then scrapped, even though they still function perfectly. This is cost-intensive and not in line with the idea of sustainability and resource preservation.

“Through preventive maintenance, expensive machine failures don't even occur in the first place. Everyday production becomes less stressful for everyone.”



Lars Knitter

Prokurist / Head of Sales & Marketing, FASTEC GmbH



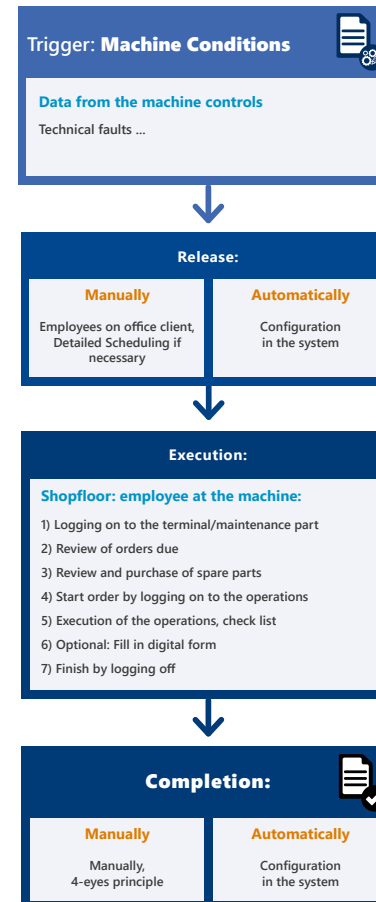
Predictive Maintenance

Predictive Maintenance or Condition-Based Maintenance

With condition-based maintenance, machine parts are to be used as long as possible and only replaced shortly before their anticipated failure. For example, individual areas of the plant at production-critical points are digitally monitored via sensors during operation. The sensors monitor the machine condition by measuring temperature, vibration, humidity and pressure. Deviations in vibration, for example, are an indicator that a machine part is about to wear out. The machines are interlinked, enabling timely identification of sources of error and prompt intervention.

Malfunctions can thus be diagnosed with a high degree of accuracy and planned maintenance and machine downtimes can be scheduled precisely. Data read live from the machine via Machine Data Acquisition (MDA), such as states, up time or number of pieces, can also be used for this purpose. This real-time data is used to determine the state of machines in operation and predict when planned maintenance should be carried out. Orders can then be generated automatically.

The main objective of predictive maintenance is to plan maintenance as precisely as possible in advance in order to avoid unexpected equipment failures and thus unnecessary costs. Knowing when which machines or individual parts need to be maintained makes it easier to plan resources for maintenance work such as spare parts or working hours. In addition, plant availability can be increased by converting „unplanned stops“ into increasingly shorter and more frequent „planned stops“. Additional opportunities include potentially longer machine life, increased plant safety, reduction of accidents with negative effects on employees or the environment, and optimized spare parts management.



*“A practical example:
A well-known German chemical company records the duration for heating up active ingredient baths.*

If a defined time is exceeded, the condition monitoring system automatically activates an alert. In this way, the heating unit is replaced, before it is defective.”



Steffen Dams
MES Consultant
and Product Expert Instandhaltung,
FASTEC GmbH

MES Module Maintenance

Digital Instead of Analog

Our Maintenance module supports you with all maintenance work – from preventive maintenance to repairs. Your benefit: Efficient, digitalized maintenance processes, regular inspections, reduced susceptibility to faults, optimized maintenance intervals.

The Most Important Functions at a Glance

- Creation of autonomous maintenance plans (types, categories)
- Separate documentation of working times for maintenance activities at the machine (manual or RFID)
- Involvement of machine operators through maintenance requests
- Various triggers, e.g. calendar intervals, states, up time or quantities
- Predictive maintenance
- Provision of supporting documents
- Documentation of activities performed and spare parts required
- Additional comments and error information
- Digital forms for your customer-specific defect reports and checklists

Benefits for Your Corporate Success

- Significant time and cost savings
- Relief of maintenance staff
- Higher level of identification for machine operators due to delegation of responsibility
- Fast elimination of minor faults by the machine operator
- Uniform order management and regulated maintenance requests
- Optimized planning through assignment of urgencies
- Fast reaction time through individual alerts



Maintenance order overview (Terminal)



Maintenance order screen (Office)



Maintenance evaluation (Pivot)

Strong Team in One System

The Importance of the Interplay between MDA, PDA and Maintenance

With continuous data acquisition, data evaluation and complete connectivity of the plants, companies in the manufacturing industry are already very close to their goal of virtually zero downtime. However, whether predictive maintenance works depends heavily on the quality of the data available. Manufacturing Execution Systems (MES) with modules for Machine Data Acquisition (MDA) or Production Data Acquisition (PDA) etc. are an important prerequisite for collecting and evaluating relevant data and automating maintenance intervals.

If the maintenance software is part of an MES software solution, a large volume of qualitative machine data can be accessed – in the form of real-time data as well as historical data, as the data collected is automatically documented digitally. Through connectivity, for example, condition data, consumption and abrasion values are recorded, providing a very accurate image of the state of the equipment and the parts produced.

When combined effectively with data from the MES and ERP system, maintenance times for a plant can be precisely forecasted. The software continuously controls the use of machines and tools and independently reminds the maintenance engineer of upcoming planned maintenance. Inflexibly scheduled, regular maintenance intervals are overcome and the maintenance engineer can intervene before the productivity of the machines threatens to decline - or only when it is really necessary.

Extensive Benefits due to Common Data Base

- Existing resources such as personnel groups, equipment and work centers/lines can be used in the entire production environment without interfaces or duplicate data storage
- The machine operator selects a predefined state. This automatically creates a maintenance order and sends alerts to involved persons/departments
- When the maintenance operator starts planned maintenance, the corresponding machine status is automatically triggered and recorded by the MDA.

Benefits of Digital Maintenance

1) Improvement of Economic Efficiency:

- Reduction of downtime
- Reduction of costs for unplanned downtime
- Increased service life of machines and systems through demand-oriented regular planned maintenance
- Better forecasts for spare parts management

2) Optimal Maintenance Timing, Avoidance of Downtimes:

- for the plant through permanent report of machine data
- within the production process through planning
- Increase of flexibility in production

3) Improvement of Machine Performance:

- Permanent analysis of collected data
- Achieving higher productivity in the long term
- Faster fault detection and reaction in case of malfunctions

A Look at the Field

Benefits Right on the Shopfloor

More Responsibility for the Machine Operator

Maintenance processes are simplified and standardized by providing supporting documents such as checklists and autonomous maintenance plans. This means that minor measures such as cleaning, oiling or other activities on the machine can be transferred directly to the machine operator.

This targeted transfer of responsibility saves time and costs and increases the machine operator's identification with the production process. As a result, the production process is accelerated because a maintenance technician no longer has to be involved for every minor maintenance measure.

Autonomous maintenance can also be configured quickly, including ensuring end-to-end documentation.

In addition, in the context of Total Productive Maintenance (TPM), machine operators have the option of entering suggestions for improvement and comments in the system at any time. TPM managers have a valid basis for checking the implementation of the proposed measures and achieving continuous improvements in the machine park thanks to the uniform management of measures and regulated processes for defect reports and maintenance requests.

Optimizations Noticeable after a Short Time

After the introduction of the FASTEC 4 PRO Maintenance module, many of our customers report immediately noticeable improvements based on the uniform production-wide database.

Manual paper or Excel file documentation of planned maintenance has been eliminated, resulting in cost and time savings by dropping manual processes. In case of inquiries by supervisors or external audits, the required documents are now available everywhere at the push of a button. Employees on the shop floor now use tablets to keep track of data and asset status in real-time. They can also take the devices directly to and even into the machine to have all the information they need at their fingertips, such as checklists, operating instructions, or images in the documents for removal instructions, etc..

For regularly scheduled maintenance work, e.g. annually, the system always shows when the last planned maintenance was carried out and when the next one is due. Altogether, paperless processes have made maintenance more efficient and effective, which has also resulted in fewer interruptions in the production process, contributing to an overall increase in production efficiency.

In 4 Steps to Strategic Maintenance

Benefit From our Many Years of Experience

1 | ANALYSIS

Workshop, tailored to your maintenance processes

- Personal consultation
- Analysis of your manufacturing process/ maintenance processes by our consultants
- Development of conceptual ideas and proposals
- Development of initial solutions

2 | PROJECT START

Configuration through step-by-step approach

- Training of key users
- First steps in digital maintenance
- Continuous exchange with our consultants
- Step-by-step adaptation and configuration

3 | PILOT PHASE:

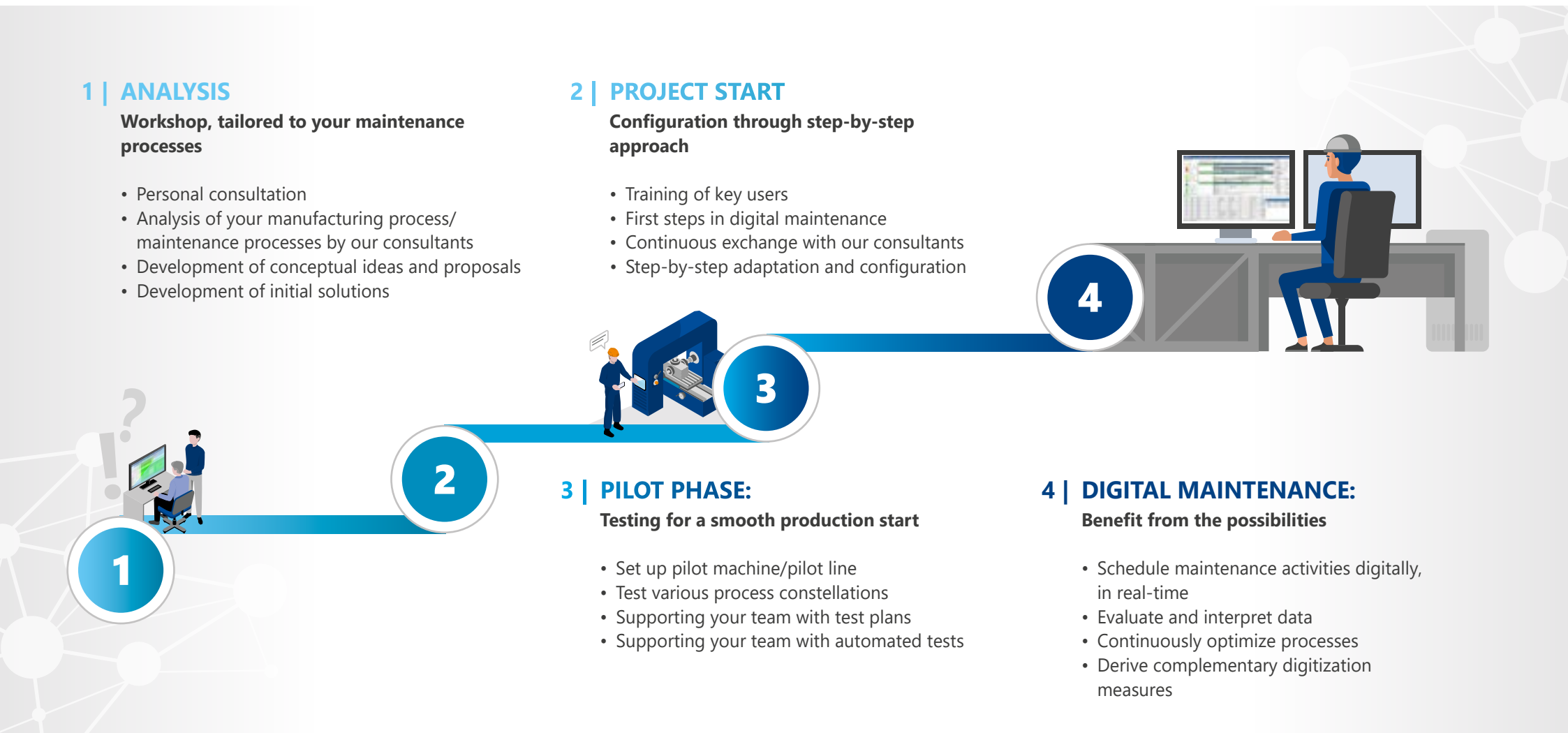
Testing for a smooth production start

- Set up pilot machine/pilot line
- Test various process constellations
- Supporting your team with test plans
- Supporting your team with automated tests

4 | DIGITAL MAINTENANCE:

Benefit from the possibilities

- Schedule maintenance activities digitally, in real-time
- Evaluate and interpret data
- Continuously optimize processes
- Derive complementary digitization measures



Outlook and Recommendations

Solid Database as a Foundation for Future AI Projects

The Next Step on the Road to Digital Transformation: Predictive Analytics

In order to make reliable statements about the state of machines and plants and thus identify expected malfunctions, it is necessary to collect large quantities of data over a longer period of time using software solutions such as FASTEC 4 PRO. BI tools and data analysis are used to analyze past scenarios in order to identify sources of error and implement improvements in the future. In combination with artificial intelligence, predictive analytics provides the opportunity to avoid failures long before they occur. Based on historical data, it is possible to make predictions about events in the future that can be traced back to certain constellations of parameters (e.g. settings for machines in production). A solid foundation of digitally recorded production data (MDA, PDA, Maintenance) is therefore a prerequisite for future AI projects.

„By focusing on a „critical machine“, further potential can be derived.“



Steffen Dams

MES Consultant and Product Expert Instandhaltung, FASTEC GmbH

Opportunities of Digital Maintenance:

- Start with small, focused projects on a critical asset or process.
- Define data elements and technical requirements for the use case
- Collect relevant data
- Iterative optimizations
- Scale selected plants step by step
- Upgrade relevant plants to collect more data and implement further optimizations
- Build up know-how (internal, external)
- Consider IT security to prevent unauthorized access

We would be happy to advise you personally!

We see ourselves as your partner on the way to strategic maintenance

- **We Have Process Experience:**

We have been digitalizing factories since 1995, meaning that we not only know many industries, but have also successfully implemented over 400 digitalization projects. Worldwide.

- **We Like It Simple:**

Not every planning process is the same. Not every data source is the same. That's why we have developed two solutions for you, which you can use individually or in combination. Completely according to your needs.

- **We Make It Fit:**

Our solution must fit your processes and challenges today, as well as your business goals. Now. That's why you can purchase a solution from us that can be flexibly adapted and expanded as needed. To grow with you.

- **We Take Your Project to Heart:**

Our customers are important to us and we are interested in long-term cooperation. That's why we accompany our customers throughout the entire process – and afterwards, of course.

- **We Offer Software Solutions from a Single Source:**

In addition to Maintenance FASTEC also offers the modular and cross-industry configurable MES (Manufacturing Execution System) FASTEC 4 PRO.

Our software solutions can be used autonomously and combined with existing systems. The interaction of our solutions results in additional synergy effects as well as the advantage of receiving everything from a single source.



Lars Knitter

Head of Sales & Marketing

Consulting for interested parties and customers as well as support for national and international digitalization projects with experience since 2013.



Steffen Dams

MES Consultant and Product Expert Instandhaltung

Over 10 years of experience in production and production management with the focus on process improvement

We would be happy to consult you individually!

Our sales department will provide you with further
user reports and information material!
Or simply make an appointment for a presentation
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