

# TEN WAYS TO AVOID MACHINE HEALTH MISTAKES

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# WHY MACHINE HEALTH MATTERS

*Machine health is crucial to ensuring uninterrupted uptime. The breakdown of a single industrial machine can cause the entire manufacturing supply chain to grind to a halt. Yet, machine health is often disregarded.*

*By using sensors and AI, you can automatically detect, diagnose and receive suggestions for how to fix malfunctions in industrial machines. And you can monitor operating conditions of thousands of machines at once.*

*The purpose of this whitepaper is to help you avoid the most common and costly machine health mistakes.*

# TEN WAYS TO AVOID MACHINE HEALTH MISTAKES

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FROM SCRATCH

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# 01 DON'T START FROM SCRATCH



Developing machine health solutions is no simple task, and many industrial companies try and fail to do so, because they don't know how to properly utilise the data their machines are already generating.

The first problem you may encounter in the process is that you may not have access to the data generated by your machines, because the data is locked by OEMs. Even after working with OEMs to get access to the data, you may discover that your data sources are not synchronised. Different OEMs record in different timeframes and use different terms and variables to describe the same thing. All of this data must be cross-correlated and sanitised.

Once the data is cleaned, it must be processed and analysed. To iteratively build predictive models, you need a data pipeline which can process large volumes of sanitised data. You can hire a system integrator or other contractor to build this custom solution. During modelling, however, you may discover that the majority of your data consists of lagging indicators which change after a fault has occurred and therefore cannot predict future faults, and for that reason mechanical data is usually required to detect early failure signals.

Another common issue is that machines do not fail very often so data from multiple facilities or even multiple companies is required to build predictive machine health models.

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## THE SOLUTION

*Simply put, the fix to these issues is to buy rather than build your solution. Specialised vendors have the experience and the in-house talent necessary to help you get results fast. Select a vendor which has access to a dataset covering multiple machine types, brands and facilities.*



## 02 CHOOSE A COMPLETE SOLUTION



Some manufacturers choose to install off-the-shelf sensors on their existing machines, because they consider sensors a machine health solution.

New sensors will generate large amounts of data, which has to be transported and stored securely in the cloud creating many hidden costs for sensor installation, deployment, remediation, data collection, storage, analysis and reliability consulting. Most of these costs occur after the initial hardware purchase, making it difficult to calculate the full cost of your system in advance.

To derive insight from the collected data, a custom solution must be built, as data collected from off-the-shelf sensors often is not actually predictive of machine failures. It may be able to identify that there is a problem, but it will not be able to tell you exactly what the problem is or how to fix it.

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### THE SOLUTION

*Sensors are a valuable part of a machine health solution, but they are not a solution on their own. Choose a partner who can provide a full stack (hardware and software) solution and who can provide you with actionable insights rather than a new set of alarms. Calculate the lifetime cost of ownership of the solution you are considering, not just the immediate hardware costs.*



## 03 TREAT YOUR PRODUCTION LINE AS A UNIT



As a production line contains multiple machines operating in a continuous flow, a fault in one machine can quickly shut down the entire line. In other words, you have to closely monitor the entire production line and not only the most critical machines.

The cumulative effect of individual machine failures can cripple a production line, even when the reliability of individual machines is very high. For example, if a production line has four machines running in a series, each of which has ninety percent uptime, the entire line may still only run sixty percent of the time. The entire production line, including support equipment like boilers or compressors, should be treated as a unit.

This is not to say that every machine needs the same level of monitoring and diagnostics. Critical machines require continuous monitoring and diagnostics which may not be necessary for equipment which can be replaced relatively quickly. Analysing past failures to prioritise critical equipment will reduce the overall cost of the machine health program.

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### THE SOLUTION

*While you should monitor critical machines more closely than the rest, you should roll out machine health on the entire production line to ensure optimum uptime. Work with a partner who can help you use past failures to decide which machines need in-depth diagnostics.*



## 04 AIM FOR SCALE



Monitoring machine health on just a handful of machines may be beneficial at plant-level but will not help your organisation as a whole. This is simply because this type of rollout is too small to be visible at corporate level.

Small rollouts usually focus on maintenance problems, rather than business problems, and you may be missing out on an opportunity to utilise machine health to further the larger business goals of your company and provide value at scale. For example, if your organisation aims to build a world-class supply chain, having more reliable machines helps you to create a more agile and efficient supply chain.

To demonstrate that a machine health solution can scale, you must show value at more than one facility. We recommend that you roll out in at least two facilities simultaneously: One facility which is well-run and forward-thinking and a second facility which is lower-performing. This will allow you to compare and average out results across different environments.

When choosing facilities, take into consideration the various cultures and geographies within your organisation. For example, if your ultimate goal is to roll out machine health across all your facilities and each region is autonomous, choose one facility per region.

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### THE SOLUTION

*Focus on business problems, not just on maintenance problems, and identify how machine health can provide value at scale. Roll out machine health on full production lines at multiple facilities. This allows you to compare results across different local cultures and to prove that the program can scale across your organisation.*



# 05 LINK MACHINE HEALTH METRICS TO P&L IMPACT



To build a business case for a machine health solution, or to justify scaling it up, you will need to translate machine health improvements into P&L impact: How are improvements in productivity or asset reliability linked to bottom line improvements? How can minimising spare part inventory reduce costs? How does having more reliable machines affect out of stock levels or topline sales? Machine health provides benefits in all these areas.

Reliability organisations often struggle to quantify the impact of their efforts on the bottom line. The problem is complicated by shifting manufacturing priorities, uneven compliance with maintenance programs and recommendations, a lack of historical data, and multiple approaches to calculating efficiency improvements and cost savings.

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## THE SOLUTION

*Machine health provides uniform metrics which track compliance with recommendations and measure avoided costs. Ensure that you plan how to measure success financially as well as operationally. The financial KPIs you choose should be significant at the company level and not just at the individual site level. Select a partner that can help you to translate machine health impacts into bottom line improvements.*



## 06 THINK LONG-TERM



To build a business case for machine health, you may be tempted to focus on reducing repair costs or downtime costs. While it is important to provide a short-term business case, the biggest opportunities for savings are often less obvious and more long-term.

Machine health can help reduce the millions of dollars a year you may be investing in inventory of spare parts, because more reliable production means fewer out of stocks. Lines that run consistently have fewer quality issues and reduced scrap rates.

All of this means that better machine health can result in retailers imposing fewer Service Level Agreement (SLA) penalties on manufacturers. McKinsey estimates that annual SLA penalties in the consumer packaged goods (CPG) sector alone could add up to more than \$5 billion a year.

Machine health can deliver both easily quantifiable short-term cost savings from reducing unscheduled downtime and repair costs and bigger, long-term savings like reducing spare parts inventory or SLA penalties.

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### THE SOLUTION

*Quantify the business case for short-term and long-term cost savings and choose a solution that can deliver both. Recognise that less obvious, long-term cost savings will emerge over time, given the wider potential impact of machine health on your production capacity, agility and efficiency.*

## 07 SELECT AND SUPPORT A PLANT-LEVEL CHAMPION



A plant-level champion, who is responsible for the local rollout and adoption of the machine health solution, is crucial to success. The champion is often a Director of Reliability, but may also be the plant manager or a senior engineer. Regardless of their role, the champion must be a highly motivated and engaged employee who wants to make significant improvements at their facility. Without a plant-level champion to drive adoption, engineers may simply ignore alerts and insights from the machine health system.

A champion can eventually drive efficiencies across your entire organisation and help you move manufacturing into the digital age. Make sure that they have the room to do so and the backup of senior plant management. If the rollout generates promising early results, you can send the plant champion to other facilities to share their experiences.

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### THE SOLUTION

*Identify a champion at each target facility. When selecting the first rollout facility, the availability of a local leader who is willing to dedicate resources to machine health is as important as any other technical or business KPI.*



## 08 FOCUS ON HIGH-VALUE WORK



In many organisations, the role of the maintenance team is to get production lines up and running fast in a crisis. With machine health in place, machines become more reliable and crises happen less frequently which can cause some uncertainty within maintenance and reliability teams.

It is important to let maintenance staff know that, rather than replacing them, machine health actually helps them to do their jobs more effectively and allows them to spend more time on high-value work. It will reduce unplanned maintenance and help them avoid the dangerous task of opening machines.

Having clear, continuous and objective visibility into the state of their machines gives maintenance teams the information they need to schedule corrective action when it's needed to avoid a failure, but also to avoid unnecessary maintenance work.

Furthermore, machine health solutions elevate the understanding and importance of the work that maintenance and reliability teams do. Improvements in overall machine health correlate with enhanced productivity and cost savings across multiple facilities.

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### THE SOLUTION

*Help your maintenance team understand their new role in working with a machine health solution, and prove its worth by predicting failures and shifting them to higher-value work.*

# 09 PRIORITISE CHANGE MANAGEMENT



Machine health requires maintenance teams to work in a different way. To drive adoption, you must demonstrate how this technology helps them to do their work more effectively, and that it is easy to adopt. If machine health helps maintenance and reliability teams to catch a failure, to perform a task faster or to confirm a hunch, they will often become advocates. However, persuading them to integrate predictive insights into their everyday workflow and decision-making process takes work.

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## THE SOLUTION

*Prioritise change management in the machine health rollout plan, and adjust your approach to fit your company culture: In a more conservative environment, don't entirely upend existing workflows. Instead, integrate the new machine health system into them. Define evaluation criteria and KPIs for the rollout with specific milestones at both corporate and plant level. Listen to plant-level feedback and adjust accordingly. Track metrics over time and continuously highlight successes.*



# 10 BUILD DIGITAL TRANSFORMATION ON MACHINE HEALTH



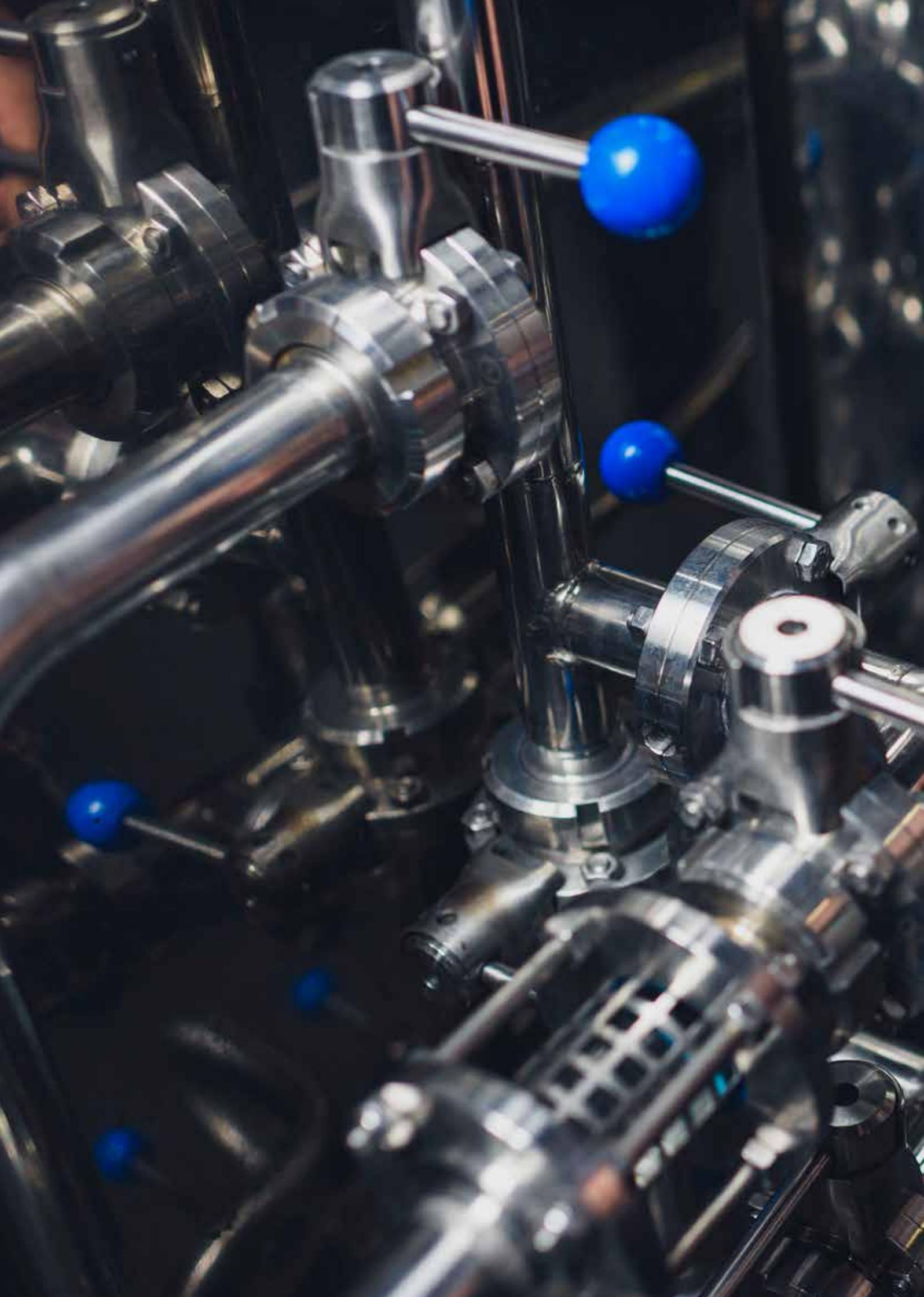
Machine health is a digital transformation use case which delivers quick time-to-value while also providing a foundational layer of digitisation on which you can build other use cases. However, in order to be effective, machine health must be integrated into your organisation's overall digital transformation strategy, and target its specific objectives, e.g. achieve world-class service reliability or a world-class supply chain.

Every machine health rollout needs a champion at corporate level. Plant-level champions tend to focus more on the specific problem in front of them, whether that is unexpected breakdowns, a shortage of labour or long lead times to get parts, and less on the big picture. Corporate involvement is essential to achieve company-wide benefits and objectives.

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## THE SOLUTION

*Machine health solutions provide unique insights, quick time-to-value and an effective adoption engine. Integrate machine health into your digital transformation strategy and ensure that machine health has a corporate champion within that strategy. Decision-making should be at least partially centralised, as should the project budget, which often comes from corporate IT or a corporate innovation or digital transformation unit.*



# GRUNDFOS iSOLUTIONS

Grundfos iSOLUTIONS is a holistic systems approach by which intelligent technology adapts with precision to deliver optimal performance, total energy efficiency, and ultimate reliability.

Grundfos iSOLUTIONS offers state-of-the-art control and monitoring solutions for the full optimisation of pumping systems and offer smart solutions for existing and new systems to maximise system capacity while minimising maintenance requirement.

Grundfos supplies market-leading high efficiency pumps and equipment to meet the demands of water networks and to enhance system control and reliability in the harsh working environment of wastewater applications.