

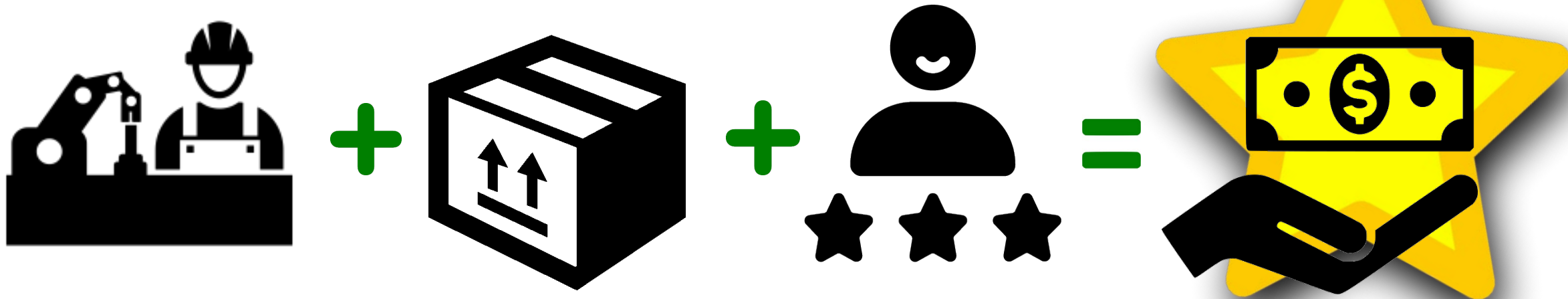


# The End of Reactive Maintenance: Today's Predictive Solutions for a Proactive Future

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# What is the Main Objective for Manufacturers?

The **main objective** for **manufacturers** is to **produce** as many goods as possible in the least expensive and fastest way possible, while satisfying the customer.



# Reactive Maintenance, More Like Breakdown Maintenance!

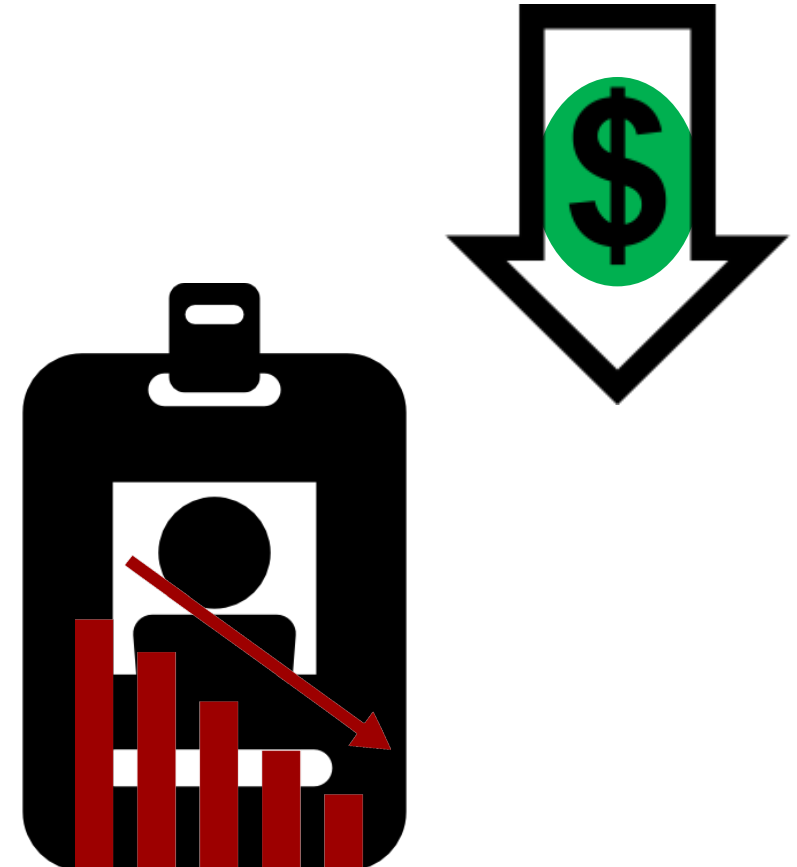
**Reactive maintenance** is the process of repairing assets to standard operating conditions after poor performance or breakdown is observed.



# Reactive Maintenance, Any Advantages?

**Reactive maintenance** usually incurs **less initial costs** and requires **lower staffing needs**.

Activities are limited to fixing **identified issues** and unnecessary preventive maintenance won't be necessary.



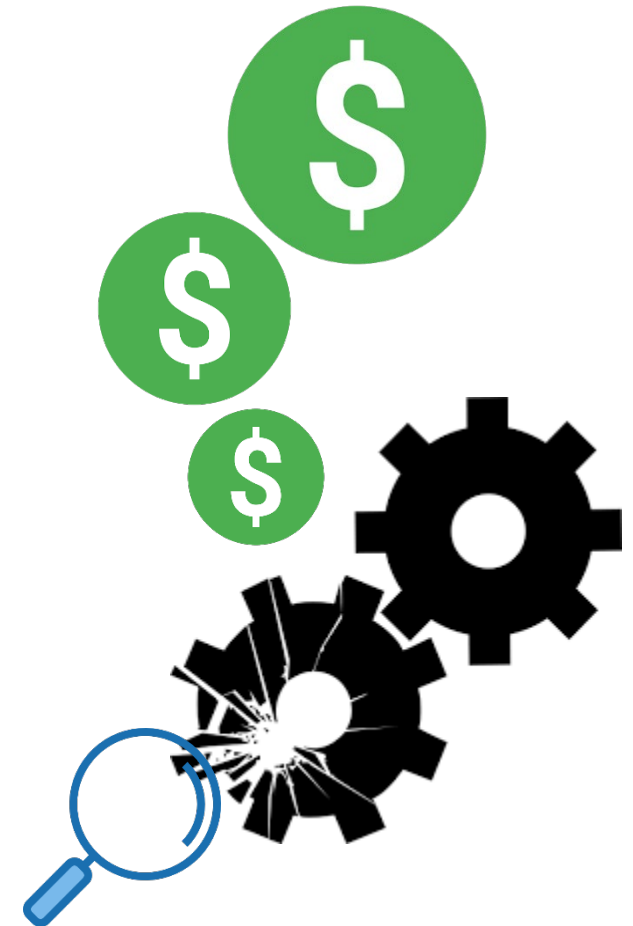
# Reactive Maintenance, The Disadvantages.

**Reactive maintenance** can have big risks that surely offset the benefits.

Any minor or major manufacture have some vital equipment on which production and performance greatly rely on.

Breakdowns that lead to **unplanned maintenance** can cause production to go into a standstill and cause major order completion issues.

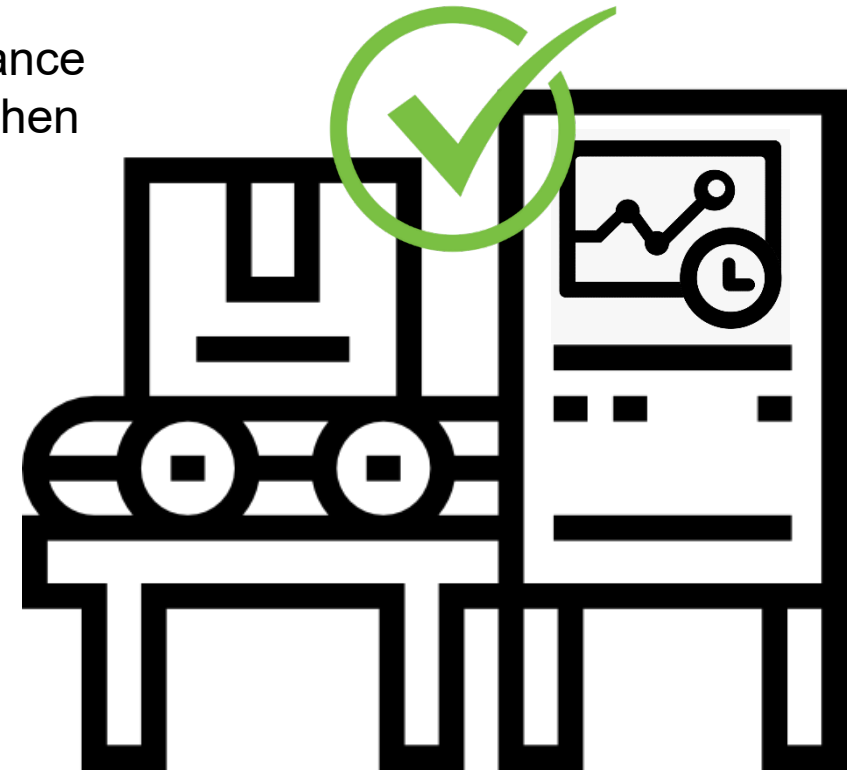
All of that can add up to more than fixing the equipment itself.



# Predictive Maintenance, Seeing the Future.

**Predictive Maintenance** is being able to monitor the performance and condition of equipment during all operations. This data is then used to reduce the likelihood of unplanned failures.

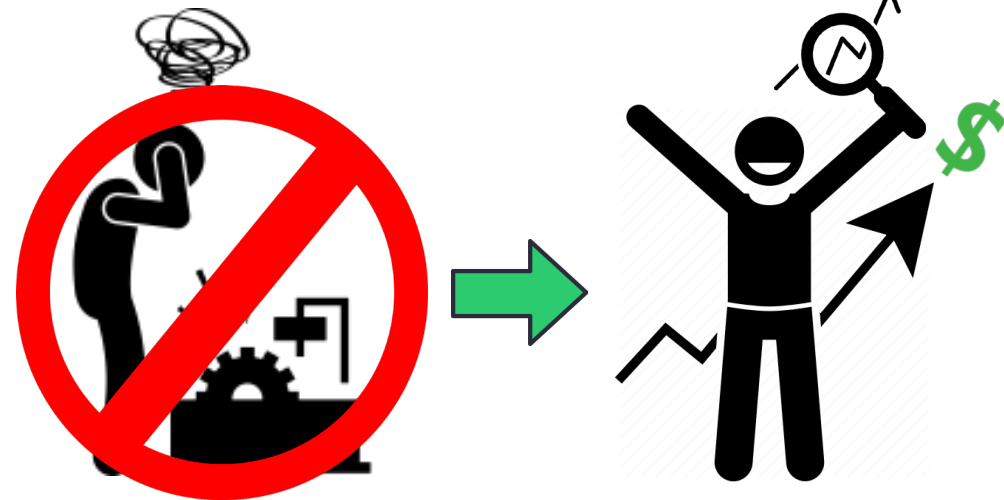
It is also known as **condition-based maintenance**, predictive maintenance has been around since the early 1990s.



# Predictive Maintenance, Benefit From the Advantages.

**Predictive maintenance** is used to predict the future failure point of a machine component, so that the component can be replaced, based on a plan, just **before it fails**.

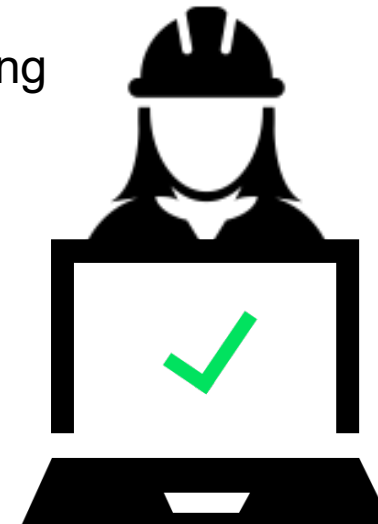
As a result, equipment **downtime is minimized** and the **component lifetime is maximized**.



# Predictive Maintenance, There Are Disadvantages.

**Predictive Maintenance** needs to be implemented carefully. It requires **specialized expertise** to correctly interpret the values given.

In comparison with reactive maintenance, applying the monitoring techniques can be **costly in the beginning**.

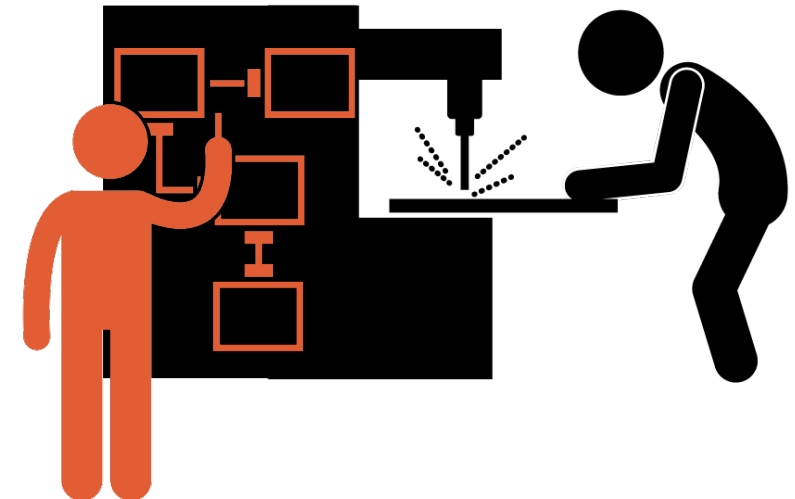




# Proactive Maintenance, An Apple a Day, Does Keep the Doctor Away.

**Proactive maintenance** works to correct the root causes of failure and avoid breakdowns by proactively fixing underlying equipment conditions.

The purpose of proactive maintenance is to see machine failures as something that can be anticipated and **eliminated before they develop.**



# Proactive Maintenance, Countless Advantages.

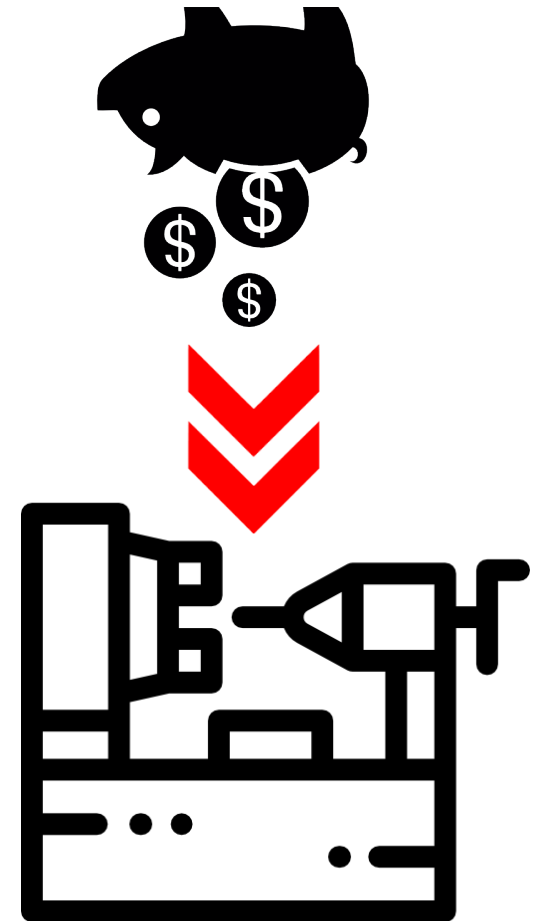
- **Reducing Downtime** of equipment or a system malfunctions.
- **Minimizing Repair Costs** of unexpected repairs. This can often take a toll on the finances.
- **Minimizing Labor Costs** with a proactive maintenance approach, you only need one or a few technicians because you do not need a team of technicians costly fixing down equipment.
- **Longevity of Machines and Other Equipment.** Proper maintenance ensures a piece of equipment withstands the test of time.
- **Real-Time Monitoring** helps prevent severe issues from occurring.



# Proactive Maintenance, Only One Disadvantage.

The one disadvantage to proactive maintenance strategies is the **initial costs required**.

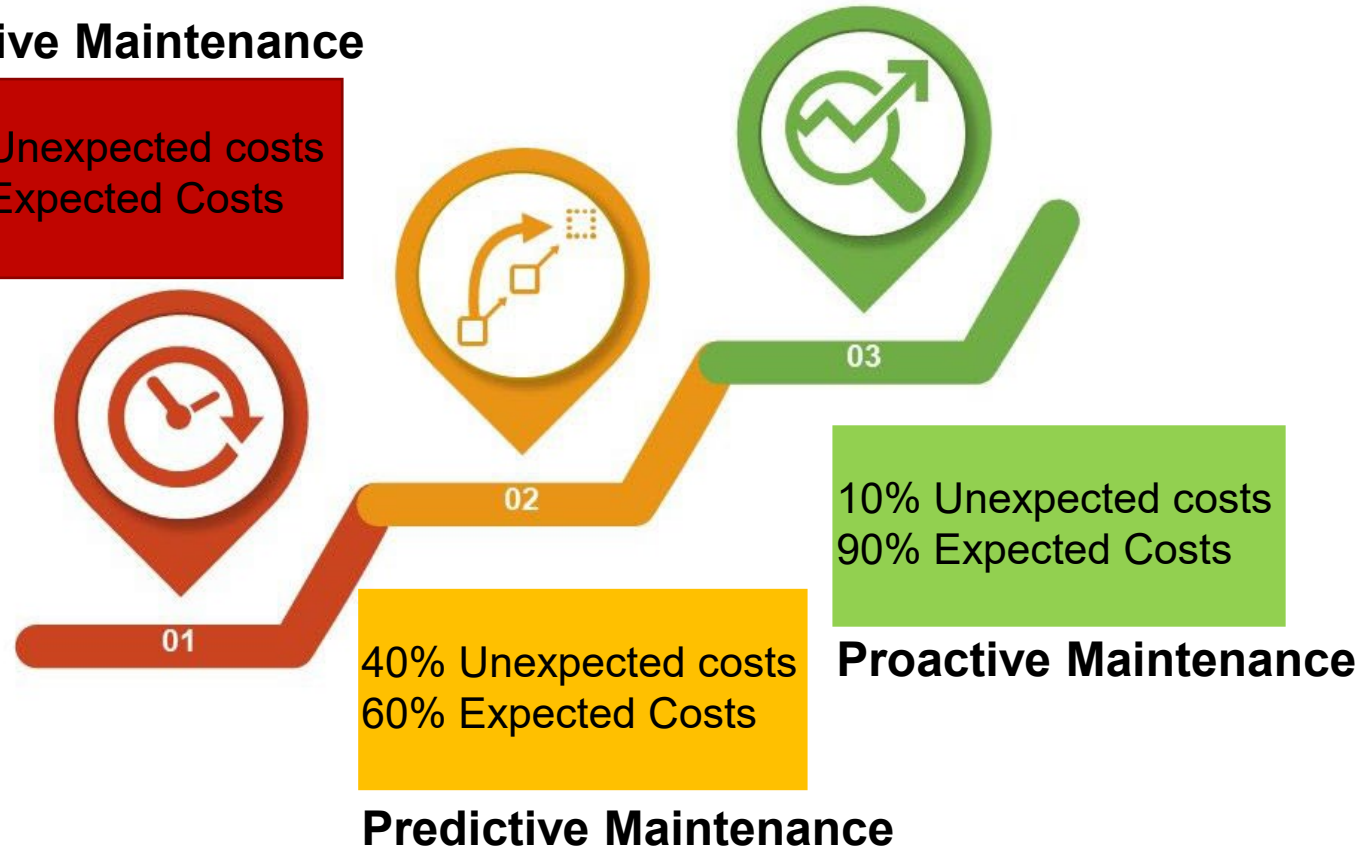
Proper planning can help to ensure that **proactive maintenance** strategies are cost-effective and beneficial.



# Reactive VS Predictive VS Proactive, A Industry Showdown.

## Reactive Maintenance

80% Unexpected costs  
20% Expected Costs



# The Internet of Things, A New Way To See Data.

The **Internet of Things (IoT)** is the concept of connecting any device to the Internet and to other connected devices.

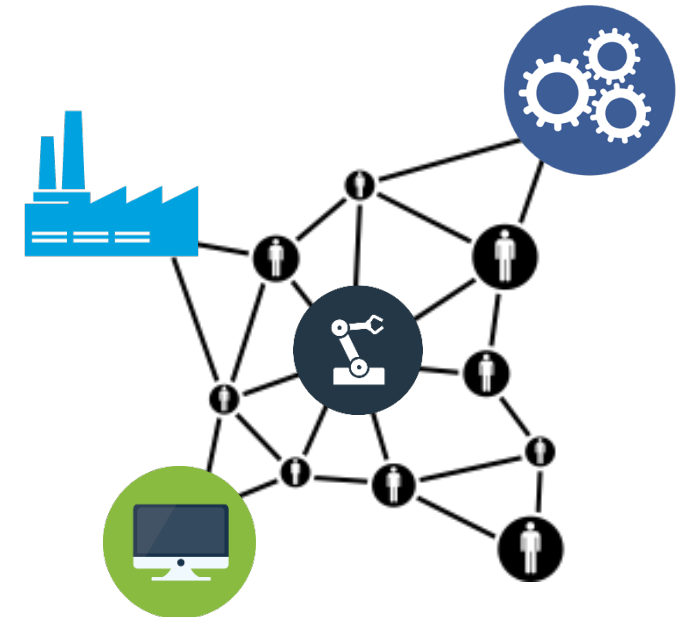
The IoT is a **giant network of connected devices and people** – all of which collect and share data to further better their knowledge.



# The Internet of Things, How does it work?

Devices and equipment that have sensors integrated and are connected to an **Internet source that gathers the data**, is the bases of a IoT platform. This lets the user compare data from other devices and applies analytics to share the most valuable information with applications built to address specific needs.

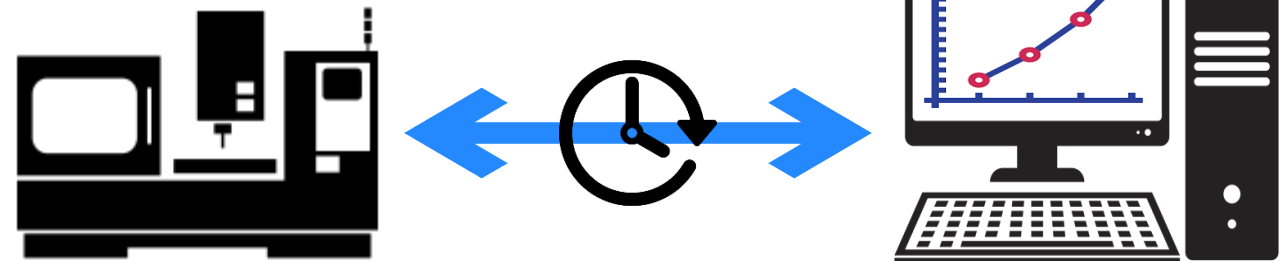
These IoT platforms can pinpoint exactly what information is useful and what can safely be ignored. This information can be used to detect patterns, make recommendations, and detect possible problems before they occur.



# Preventive Maintenance & IoT, Can They Work Together?

By using the sensors that are implemented on the equipment and incorporating a **gateway** to transmit data to a **local** computer or server, this gives the user a starting point into IoT. At that point, whoever has access to that computer or server can analyze the data, away from the equipment.

**Gateways** are physical devices that filter and pre-process the data into a computer or server.

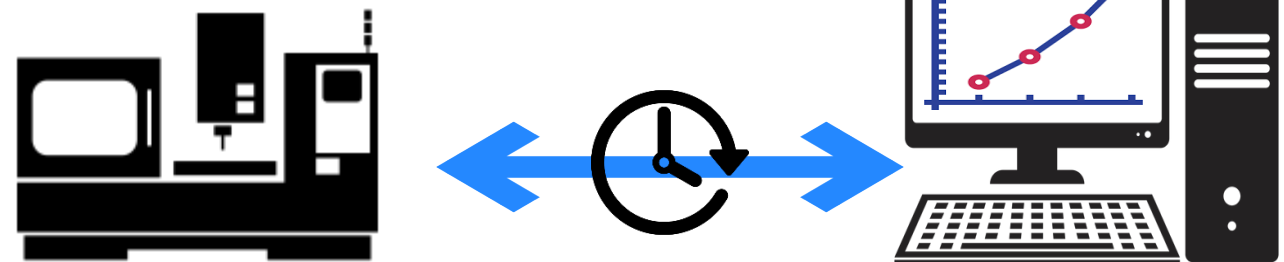


# Proactive Maintenance & IoT, A Match Made in Heaven.

Proactive maintenance is all about **fixing the problem before it occurs** and having the means to plan out all maintenances required.

A IoT platform can access equipment in real-time for **condition monitoring**, while **providing recommendations**. All remotely over a network.

Pair this all together to remotely access a system for real-time data analysis, while having access to archived data.

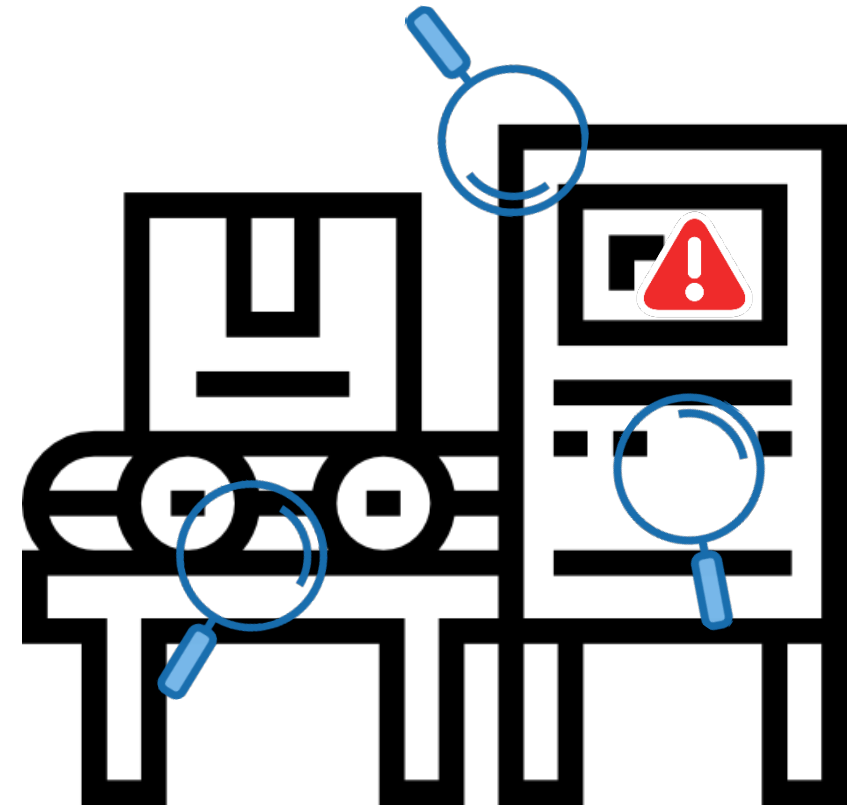




# Condition Monitoring, What can I Monitor?

Condition monitoring is the process of **monitoring a parameter of condition in machinery**, in order to identify a significant change which is **indicative of a developing fault**.

Anything can be monitored. As long as there is a sensor that can support it.



# Condition Monitoring, Hydraulic Fluid.

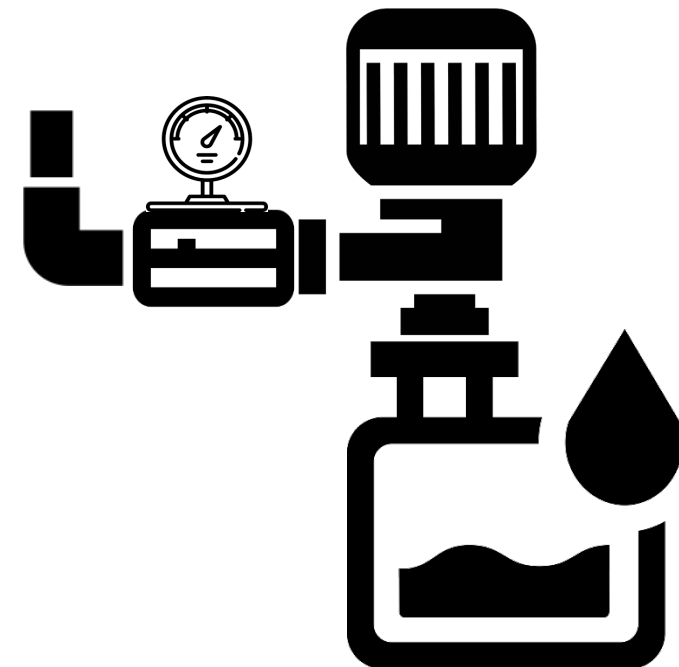
- A hydraulic system transfers force from one point to another point using an incompressible (hydraulic) fluid.
- To ensure that the fluid functions properly, it is crucial that it remains free of contaminants and particles.
- Particle contamination is the single most common cause of hydraulic system failure. Dirt-laden fluids in any moving pump or motor part may cause damage to the fine tolerances of valves, motors, and hydraulic systems.

Filtering and condition monitoring are used in combination to detect and prevent system failure.



# Condition Monitoring, Hydraulic Fluid Cleanliness Sensors.

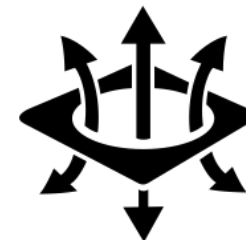
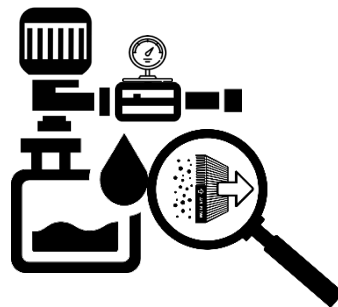
- Stationary **particle sensors** are for the continuous recording of solid particle contamination in fluids can be used.
- **Flow rate transmitters** are specially conceived for measuring fluids through plants and equipment.
- **Electronic pressure switches** are for relative pressure measurements in the high-pressure ranges.
- **Saturation sensors** measure the percentage of water relative to the saturation concentration.
- **Temperature sensors** measure the temperatures of fluids.



# Condition Monitoring, Roll-Off Cleanliness Strategy.

The main purpose of roll-off cleanliness is to minimize damage to the various system components in their infancy and reduce warranty claims.

- **Built-In contamination** is inadvertent contamination from incoming “new” fluid or contamination left in the system or a component during initial assembly or a system rebuild.
- **Generated contaminants** are internally generated during system operation, or caused by wear, corrosion, agitation, oxidation or fluid degradation.
- **Ingested contamination** is externally introduced contamination that enters a system from various openings such as breathers, worn cylinder wipers, improperly sealed access covers, etc.

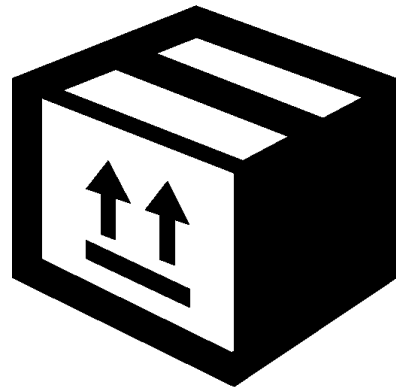


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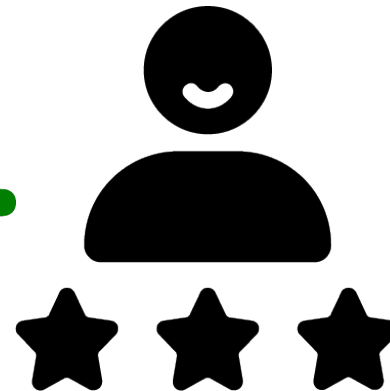
Preventive or Proactive  
Maintenance with  
Condition Monitoring

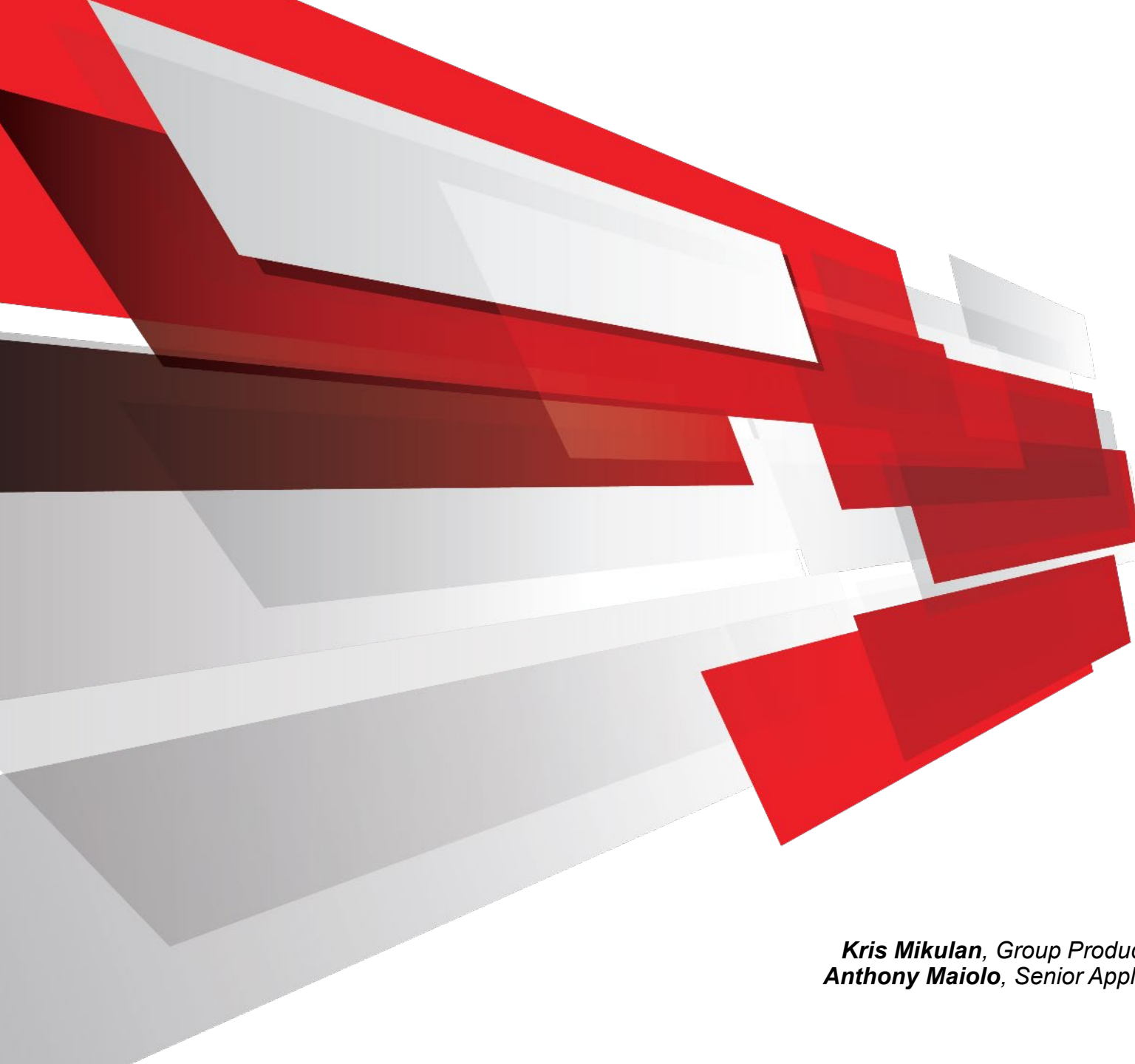


Roll-Off  
Cleanliness



On Time Delivery  
and  
No Warranty Claims





# Questions?

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