



Expertise – Passion – Automation



**Keep going!**

SMC support for industrial maintenance







## SMC support for industrial maintenance

Industrial maintenance is well known by any manufacturer, machine builder and service technician working in a production process. It's no secret that it is the key to the prevention of problems, cost savings and improvement in productivity and that is why it has become a fundamental aspect of the everyday reality of production lines. With this increased awareness, many new terms started to emerge such as Total Productive Maintenance (TPM), Overall Equipment Effectiveness (OEE), Mean Time To Failure (MTTF), etc. but, as with many other trends, these are just different ways of pursuing the same, fundamental objective.

The following pages will illustrate the essence of industrial maintenance, together with the solutions that SMC can provide to achieve successful maintenance actions that will help **improve the efficiency and productivity** of your process. Not only will you find **products specifically designated** to improve your maintenance process, but you will also see how **our experts can help you** at every stage. On top of that, we have selected our best examples of successful actions that have helped our customers to solve their productive problems, reduce costs and increase their efficiency.

When the failure has already occurred: **Corrective maintenance**

One step ahead of the failure: **Preventative maintenance**

When the need arises: **Predictive maintenance**

Design from origin: **Reliability-based maintenance**

# When the failure has already occurred: **Corrective maintenance**

The most traditional way of performing maintenance actions is by fixing incidents. The basis of corrective maintenance consists of identifying and replacing parts that are compromising the production due to some kind of failure.

In these cases, it's important to **enable easy and immediate check systems** that can help maintenance workers to spot the problem and **facilitate the replacement of the problematic component**. Nevertheless, it doesn't always mean that the failure wasn't expected. Being prepared for corrective actions such as having stocked replacement parts, can help to reduce the aforementioned reaction times and thus minimise non-productive times.

There are many ways to improve your failure detection and fixing capability, starting from detection and monitoring systems but also with strategical actions such as:

- System diagnostics
- Location display
- Ease of replacement
- Preparation of spare parts
- Improvement analysis: planned corrective.



### **Local factory support**

SMC has over 6,000 local sales engineers in 82 countries to support all of your local production facilities.



### **Compressed air energy saving assessments**

SMC has developed a Streamlined Energy Savings Assessment program for our Corporate Accounts. Our goal is to find innovative solutions to reduce waste of compressed air in the factory environment.



### **Machine analysis assessments**

SMC will perform plant level machine analysis to improve machine performance, identify waste, reduce scrap rate and improve line efficiency.



### **Improvement activity reports**

SMC will document all Corporate Account application successes with Improvement Activity Reports (IAR's). These IAR's are a one-page overview of the application - highlighting operational improvements, energy savings, cost savings details or plant process improvements. These IAR's are designed to be shared with other facilities to duplicate activity.





## Facts over words

A chocolate manufacturer had to replace their depositor plate blocks at a higher frequency than expected, because the operating temperature was not being achieved, causing the blocks to leak and require repairs. Given that this situation was very costly and inefficient, our experts conducted a detailed analysis of the process, being able to ascertain that the unit which supplied heated water to the plate was delivering a reduced flow rate. Thanks to the investigation, it was discovered that the filters returning to the water supply unit were blocked.

Since this flow rate reduction was only detectable thanks to monitoring the process, a **PF3W** flow meter was installed in line to the block, so an alarm turned red each time the flow rate values dropped. This way, the block was prevented from working outside its operating parameters and damage was avoided.



### High-precision digital pressure switch ZSE20/ISE20 Series IO-Link

Check two specified items simultaneously and take advantage of the benefits of IO-link for reliable and fast monitoring.



### Bar type/Nozzle type ionizer IZT40/41/42/43 Series

Remove static from your production line to avoid problems in final product quality, disruptions and other issues derived from static charges.



### 3-screen display sensor monitor PSE200A Series IO-Link

Centralise the monitoring of any flow, temperature or pressure sensor, as long as it consumes less than 50 mA and has 1-5 VDC output.



### Vacuum pad ZP3P Series

Spot the pad easily during contamination inspections thanks to its blue colour.



### Pressure gauge with colour zone limit indicator G□-L Series

Facilitate visual confirmation of process parameters and enable the maintenance control of filters.

# One step ahead of the failure:

## Preventive maintenance

Why wait for a stoppage or failure before taking action? Preventive maintenance can help solve these issues, always trying to avoid unnecessary costs.

**Being proactive instead of reactive** is the key to preventive maintenance. By controlling the different process parameters, you can **observe the figures and anticipate possible problems**, performing maintenance at scheduled intervals to keep equipment working, based on the review and verification at a particular trigger interval, such as the product's expected service life.

If you are willing to go further in the efficiency of the maintenance process, you could also consider the following strategic actions:

- Manufacturers' recommendations
- Auto-check-in of equipment
- Visualisation and digitisation of levels
- Easy replacement and maintenance
- HOT SWAP



### *Critical spare parts for new OEM machines*

SMC will work with local factories receiving new OEM machines - to ensure all critical spare parts are available and onsite prior to production.



### *Storeroom assessments*

SMC will perform plant level storeroom assessments to reduce vendor base, eliminate duplication, standardize components, identify critical spares and offer cost savings solutions.



### *High usage spare parts analysis*

SMC will work with all local plants to identify high usage pneumatic components. SMC will conduct failure mode analysis and offer robust alternatives to ensure better performance and uptime on machines where components are used.

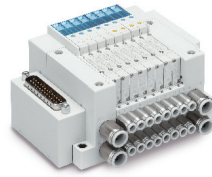




## Facts over words

*A beer producer had an issue with a set of old manifolds used to operate mechanical flow valves during the filtration of the final beer. The valves were unresponsive and failed at regular intervals causing the customer to lose a large amount of beer production. The valves were becoming increasingly hard to source and also expensive. Therefore, the customer was looking for a modern and cost effective solution that could prevent these overruns.*

*Our experts came up with the solution; supplying the customer 3, 12-station **SY5000** manifolds. This allowed the customer to isolate an individual valve for replacement whilst maintaining the power and pressure to the manifold, preventing future production losses and leading to minimal maintenance downtime due to the 'hot swap facility'.*



### Pilot operated 4/5 port solenoid valves JSY (& SY) Series

Improve the productivity of your installation by monitoring your product cycles.



### Fieldbus system EX600 Series IO-Link

Determine maintenance periods and identify parts needing maintenance thanks to the self-diagnosis functions. Wireless version (EX600-W) and IO-Link compatible version (EX600-SEN-X80).



### Modular digital flow switch for large flow PF3A7□H Series

Be aware of the machine's leakage at all times to reduce unplanned stoppages and connect it to air combination units to achieve an all-in-one solution.



### Speed controller with indicator AS-FS Series

Pre-set certain values for the regulation of your actuators and make quick, visual checks thanks to the indicator below the knob.



### In-line air filter ZFC Series

Enable optimal vacuum performance and process quality, together with easy installation and flexible mounting.

# When the need arises:

## Predictive maintenance

This popular term has been widely used in the industry for a couple decades or more and consists of setting a strategy to monitor the actual condition of equipment, with the aim of predicting a failure before it occurs. This considerably reduces maintenance labours, as they will only be carried out when the performance decreases or **predefined indicators signal that a failure is likely to occur.**

This being the case, components need to be monitored in order to determine if they are operating at their optimum range or, on the contrary, their performance is decreasing. In other words, predictive maintenance requires **data collection and non-invasive measurement of the conditions of the equipment**, such as temperature, pressure, flow, etc.

The critical actions for an effective predictive maintenance are:

- Identifying key variables and establishing their limits
- Real time diagnosis technology
- Non-intrusive measurement systems
- Designing an improvement plan.



### *Design engineering support*

To fully support your Engineers - SMC has 1600 dedicated R&D Engineers that can develop new products or solutions. SMC can quickly customise or modify existing components to meet design standards or unique applications.



### *OEM machine supplier support*

SMC will support your OEM Machine suppliers with the integration of SMC specified components. SMC will provide pricing support, innovative design assistance and SMC project management to ensure on-time delivery and commissioning of new machines or lines.





## Facts over words

A company that produces galvanised tubes for air conditioning and evaporators wanted to modernise their zinc application process. With SMC's help, a study was carried out, concluding that the process regulation and control was very limited and affected the final product quality. For example, the input air was coming directly from the compressor without any sort of regulation or filtration.

This lack of control over the process led to many inspections, repairs and discarded final products, generating unnecessary costs. Our experts helped to create a complete solution that integrated control and monitoring elements such as **ISE20** digital pressure switches, **PF3A** flow meters and **ITV** electropneumatic regulators, that helped to predict when the process parameters would start to get out of range and therefore plan a maintenance strategy that made the production run much more efficiently.



### Digital flow switch for water PF3W Series IO-Link

Monitor the variables of your fluid flow to define optimum working ranges and plan maintenance actions according to the measurements.



### Actuator position sensor D-MP Series IO-Link

Obtain continuous information on cylinder status to identify the actuator position at any time.



### Compact type thermo-chiller HRS Series

Control your process temperature and monitor the parameters with the advanced control functions that allow self-diagnosis, check and display, alarm codes, communication functions and much more.



### Electro-pneumatic regulator ITV Series

Obtain an automatic regulation of pressure/vacuum, ensuring consistent product quality thanks to a step-less control of air pressure proportional to an electrical signal.



### Step motor controller JXC Series IO-Link

Set the actuator's step data and parameters directly from the master side and eliminate the need for troublesome resetting when changing over the controller. Use the IO-link technology for fast data gathering.



# Design from origin: --- Reliability-based maintenance

This is a proactive approach to help obtain better results by getting the **highest reliability and availability**. This will lead to increased cost effectiveness and machine uptime.

For the implementation of reliability-based maintenance, it is fundamental to think about components that will facilitate their replacement, parametrisation and adjustment with the aim of obtaining a **reliable design from origin**. This helps to make the most important components of the machines more reliable, thereby reducing their preventive maintenance tasks.

Trying to reduce unnecessary maintenance costs is based on **FMEA** (Failure Mode and Effects Analysis) and is focused on the different failures that could occur and the consequences these could bring.

The key questions for fulfilling an RBM analysis are the following:

- What are the functions and associated desired standards of performance of the asset in its present operating context? – Functions
- In what ways can it fail to fulfil its functions? – Functional failures
- What causes each functional failure? – Failure modes
- What happens when each failure occurs? – Failure effects
- In what way does each failure matter? – Failure consequences
- What should be done to predict or prevent each failure? – Proactive tasks and task intervals
- What should be done if a suitable proactive task cannot be found? – Default actions.



## *Dedicated corporate account manager*

An SMC Corporate Account Manager is assigned as your one-point person of contact. They work closely with your Corporate HQ Sponsors, Engineers and all production facilities - to deliver, create, manage and execute all collaborative program objectives.



## *Machinery safety support*

SMC will work with your Engineering and local facilities for design assistance related to plant safety upgrades to meet ISO 13849-1 or other Machine Directives.



## *Onsite & online training classes*

SMC offers customised onsite and online training classes - on a variety of subjects related to pneumatic components, electric actuators, energy savings, optimal machine design and TPM methodologies.





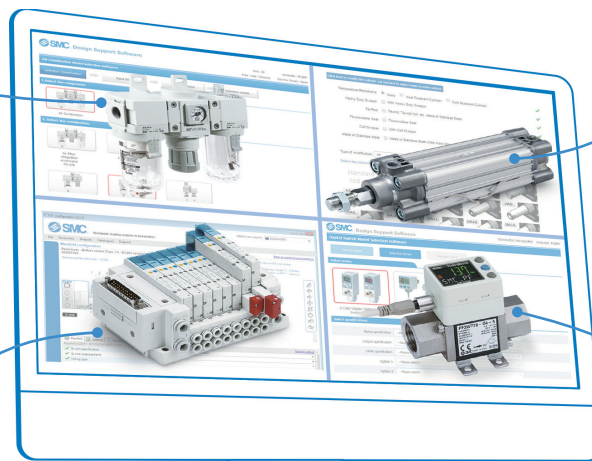
Designing a pneumatic system can be a difficult task, since it requires many parameters and calculations. Below you can find a selection of our wide range of software that will help you to tailor a design for your machine build:

### Airline Configurator

Get the exact air quality your application requires. Design and order the airline equipment your installation needs, selecting and configuring your choice from our product portfolio.

### Cylinder Configurator

Adapt the SMC cylinder to your specific requirements, defining the exact cylinder characteristics you need. All with a simple order process.

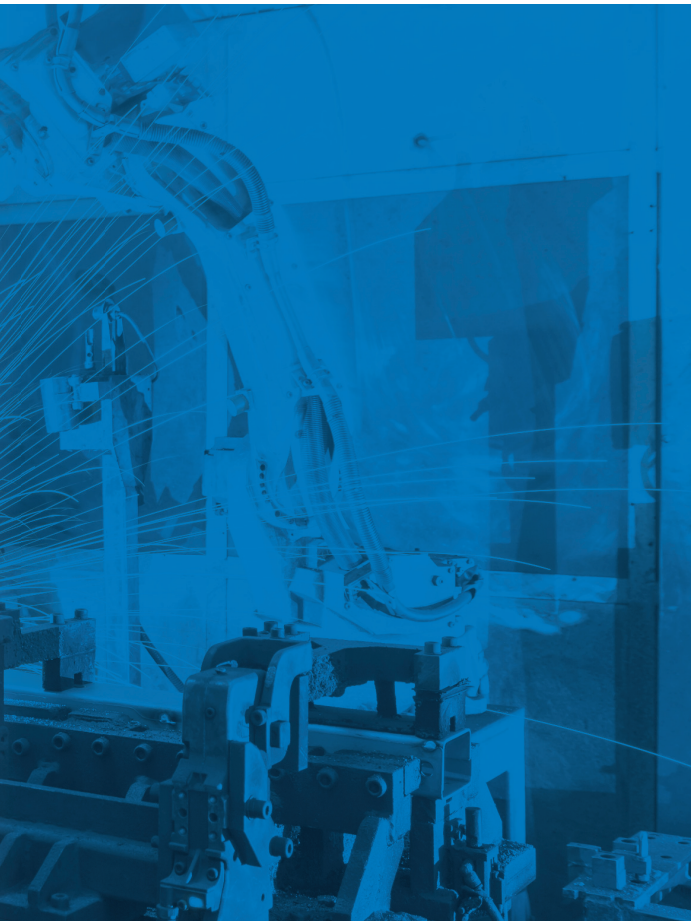


### Valve Manifold Configurator

Design the valve manifold that best suits your needs in just a few steps, avoiding oversizing or undersizing your machine. Get a summary list of components and 3D drawings for your manifold.

### Digital Switch Model Selection Software

Achieve the sensor solution you are looking for, making the selection by series, by applicable fluid or by application, leading to a simple selection. Take full advantage of our switch capabilities.



## Facts over words

*A customer produces welded aluminium parts for air conditioning for trucks and buses.*

*The request responded to the needs of increased product safety and quality of the resulting product. An analysis showed that there was a need to rebuild the process from its origin due to the lack of equipment that would suit their needs, such as exposure to welding environments or a lack of serial communication.*

*Starting from the design of the process, our experts helped the customer obtain the desired results using **TRTU** tubes, replacing cylinders, supplementing with **ASP** throttle valves and replacing the terminal with an **SY** block with 5/3 mid-position valves. Furthermore, a communication unit **EX600** was installed, with digital inputs and M8 connector, obtaining a fine control of the state of the installation.*

# Choose your maintenance

Reaching maximum productivity is not a straightforward path, but thanks to the solutions in this leaflet, you can be one step closer to understanding what your process and your machines need to improve efficiency, remove waste and, in short, reduce costs.

Each type of maintenance has its own characteristics, that can bring solutions to a variety of needs. Below you can find a summary of the benefits and inconveniences of each one, so you can think about **which one suits your application best**. If you are already applying any of them, it's a good chance to **broaden your horizons and go one step further on your maintenance plan**.

## Corrective maintenance

### Pros

- ✓ Short-term results
- ✓ Budget-affordable

### Cons

- ✗ Unpredictability
- ✗ Production stoppages
- ✗ Safety concerns

## Preventative maintenance

### Pros

- ✓ Flexible maintenance schedule
- ✓ Reduced mid-term costs
- ✓ Reduce disruptions

### Cons

- ✗ Upfront costs
- ✗ More labour-intensive
- ✗ Potential over-maintenance



## Predictive maintenance

### Pros

- ✓ Reduce downtime
- ✓ Protect assets
- ✓ Increase life cycle

### Cons

- ✗ Requires skilful interpretation

## Reliability based maintenance

### Pros

- ✓ Highly efficient
- ✓ Reduce costs
- ✓ Increased reliability

### Cons

- ✗ High start-up cost
- ✗ Long-term results

## How to sustain the site's chosen maintenance philosophy

Choosing the right maintenance for your productive process is as important as keeping it going. Implementing new processes, products and methodologies is a considerable investment, that can bring huge benefits if it is correctly maintained. Using basic operational performance excellence tools, it is possible to **ensure the maintenance type selected remains fit for purpose.**

# Strategic partnership program

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One of the things we do best at SMC is being close to our customers.

With SMC and our 12 commitments, you'll find the support you need to enhance, implement and keep your maintenance plan and achieve the maximum productivity for your process.



**1** *Dedicated corporate account manager*



**2** *Local factory support*



**3** *Design engineering support*



**4** *Machine safety support*



**5** *OEM machine supplier support*



**6** *Critical spare parts for new OEM machines*



**7** *Compressed air energy savings assessments*



**8** *Machine analysis assessments*



**9** *Storeroom assessments*



**10** *High usage spare parts analysis*



**11** *Improvement activity reports*



**12** *Onsite & online training classes*





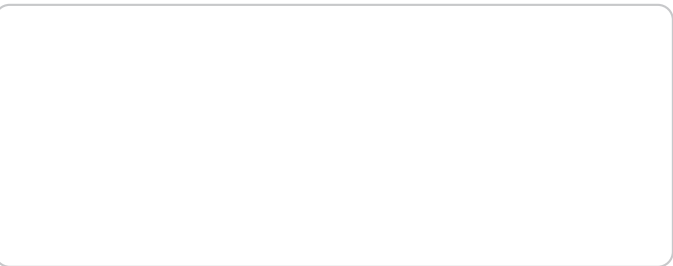


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