Predictive Maintenance in Pulp and Paper Industry

Artesis

Predictive Maintenance in **Pulp and Paper Industry**

The invention and spread of paper is one of the most important advances in human history. Thanks to the invention and use of paper, information societies began to emerge, and with the spread of the printing press in the 15th century, the knowledge of societies was easily transferred even centuries later. Today, the pulp and paper industry contains both opportunities and risks in many ways. While the global pandemic we experienced in 2019 disrupted all supply chains, the paper industry faced tough demands. There has been an intense and uneven demand for personal hygiene products, food packaging, medical papers and corrugated packaging. Although the increasing commodity prices and the production difficulties brought by the Covid-19 epidemic on the one hand forced the sector, many facilities took this as an opportunity and increased their digital investments. Responding to the increasing demands for the paper industry, maintaining profitability and creativity/new product development are happening much faster and effortlessly with digitalization. In this document, we'll take a look at the innovative predictive equipment condition monitoring solutions Artesis offers, while examining the advantages of predictive maintenance for the pulp and paper industry.

Fact

Germany and the United States are among the world's leading paper importing and exporting countries.

Artesis

The pılp and paper industry has contracted in the last five years due to the transition to digital media in developed countries and the weakening of traditional media. Production increases in some emerging markets partially offset the decline by increasing demand for used paper, while the market trend shifted towards packaging and medical supplies. While this trend is gaining strength with the Covid-19 outbreak, serious opportunities continue to exist for manufacturers.

The pulp and paper industry is important for several reasons. Due to improved process efficiency, the industry has become more energy self-sufficient and less carbon dioxide intensive, producing more than half of its primary energy from biomass.

In Europe alone, the annual turnover from the production of pulp and packaging, graphic, hygienic and specialty paper grades and products is around 180 billion Euros. The savings that can be achieved in such a large market mean both greener production and efficient use of highly valuable raw materials.

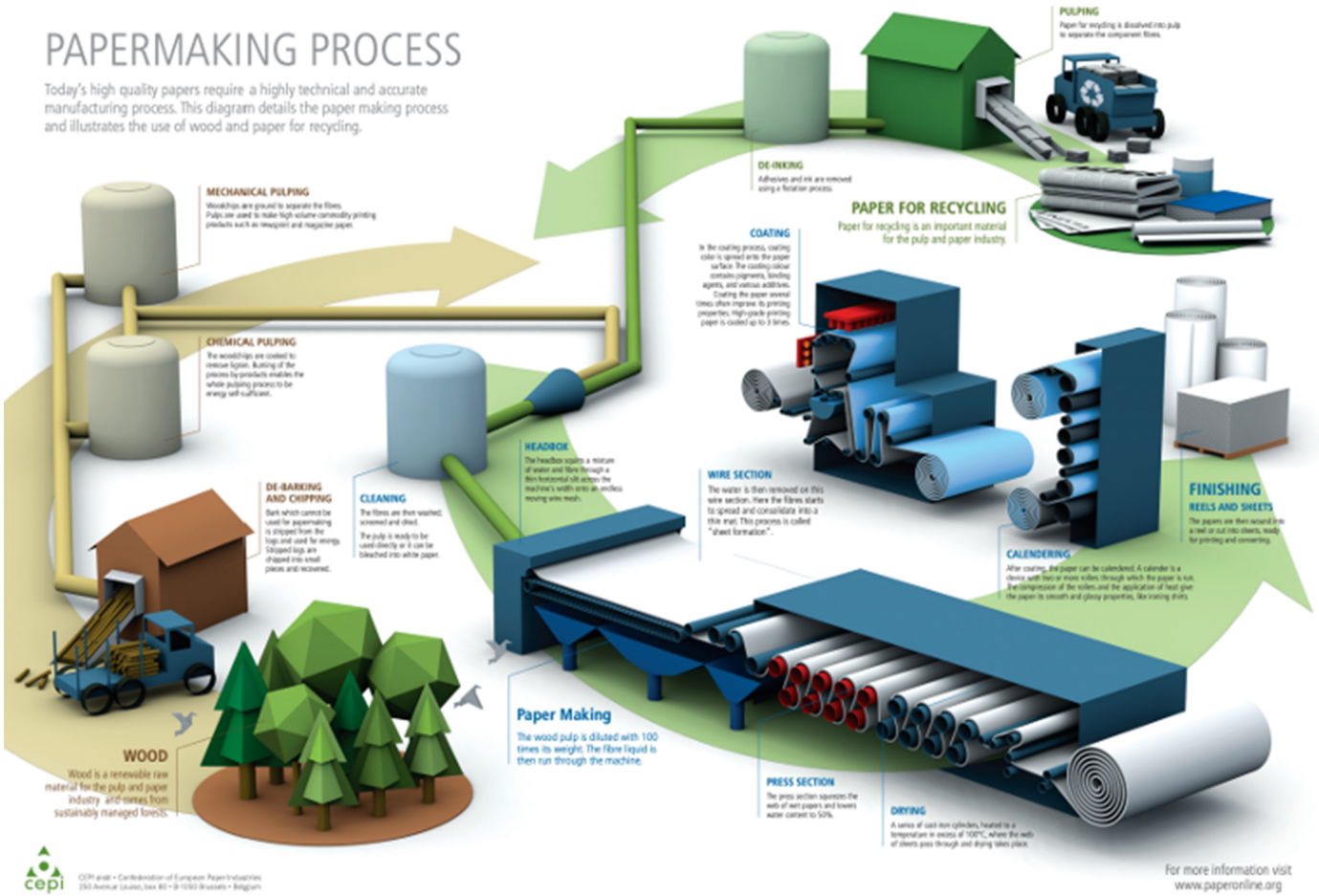


Figure 1: Flow of a traditional papermaking process. Wood and cellulose, which is a very valuable raw material, reaches the end user through tough processes.

Artesis

Voluntary industry initiatives and legislative action have resulted in a paper recycling rate of over 70% in Europe. The raw materials used in the production of paper and cardboard are obtained from sustainable sources. High levels of expertise and research and development have enabled these industries to develop new products and technologies, employ new business models, and create a low-carbon bioeconomy.

Fact
North America is the region with the highest per capita paper consumption in the world, with a paper consumption of 221 kilograms per capita.

Figure 2: : Paper that reaches us through tough processes needs digital efficiency technologies more than ever before.

The uneven demand growth brought by the Covid-19 epidemic, the increasing rise of digital media and the rapid increase in energy and commodity prices are putting a serious strain on pulp and paper producers. For this reason, technologies and digital applications that will make a difference are more important than ever.

Artesis

Fact
The worldwide pulp and paper market is expected to reach $79.6 billion by 2024.

It is Possible to Make a Difference with Predictive Maintenance

Digitalization and technological advances have allowed pulp and paper manufacturers to improve their processes and produce quality products in mass quantities. While customer demands are increasing day by day, technological developments enable facilities to respond to these demands.

However, one of the most important points where modern technology can be missing is equipment failures and unplanned downtimes caused by lack of maintenance. Predictive maintenance technologies are a great solution to meet increasing customer demands and make the most of the advancements in today's machine technologies.

Fact
It is thought that 60% to 80% of the failures in the pulp and paper industry are caused by a faulty or poorly maintained plan.

Source
The Food and Agriculture Organization of USA

Artesis

As with many manufacturers in the paper and pulp industry and many other industries, machine maintenance is not given enough attention until something goes wrong. Failure to pro-actively plan maintenance processes and not include predictive maintenance technologies in your facility can cause unplanned downtime in your production, or even stop it completely. As a result, your business can lose time, money, and most importantly, reputation for failing to meet the demands. Modern papermaking machines create a continuous paper web by filtering the fibers held in a paper stock and producing a constantly moving wet fiber mat. An important part of the paper machine is the press section, which removes most of the remaining water by means of a system of grippers formed by the rolls that formed by the rolls that support the sheet and press together with the help of the press felts that absorb the pressed water. This press section consists of a plurality of rolls clamped together to squeeze the juice out of the paper sheet. It is used to support the felt board and to remove the water from the board. The press section has a great influence on paper properties such as roughness and absorption as well as production cost. The inefficiency of the water discharge in this section causes the steam consumption to increase in the drying section where energy costs are high and the production to decrease due to the low speed of the machine.

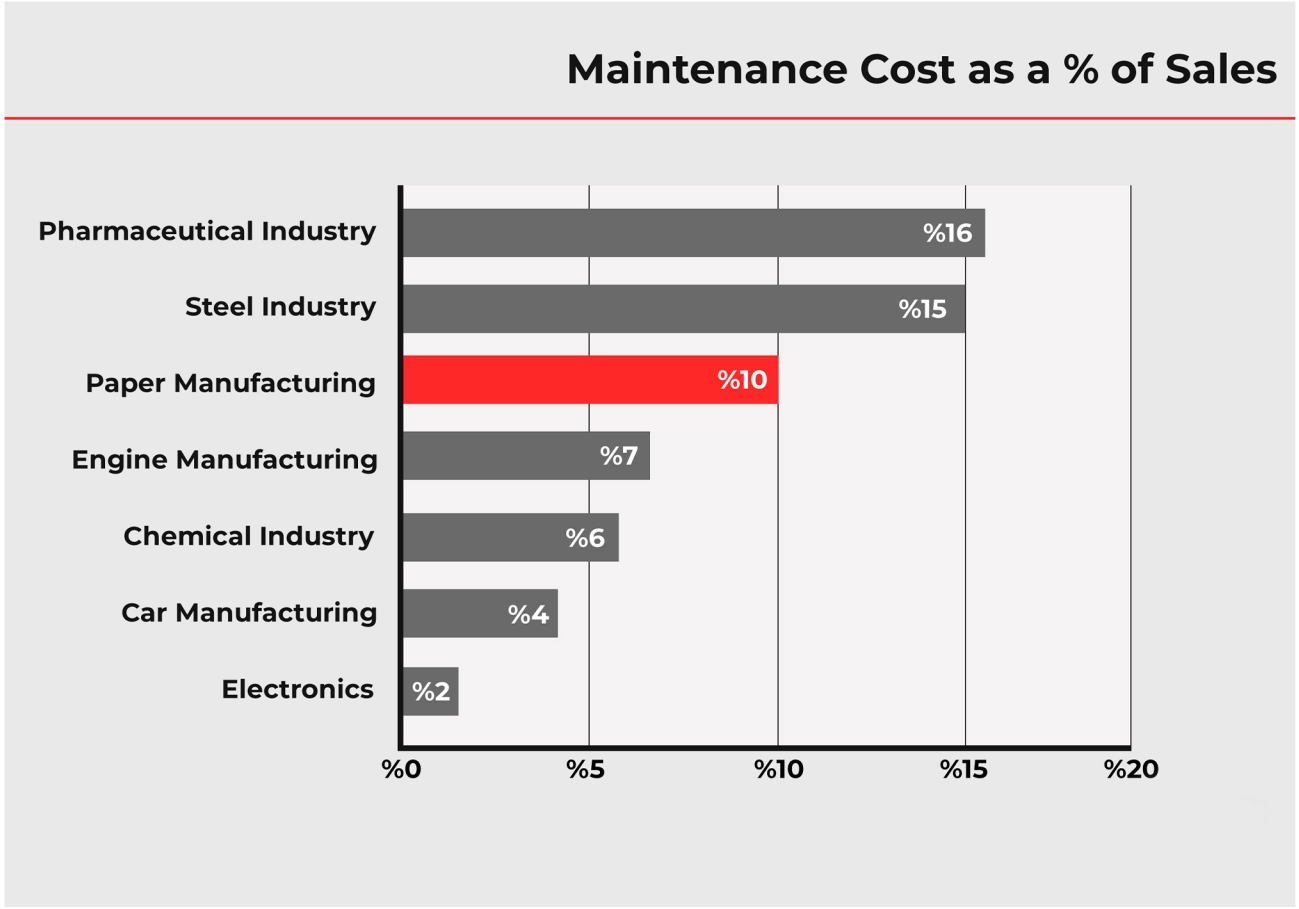


Figure 3: Maintenance costs in the paper industry make up 10% of total sales.

Artesis

Press Section Bearing Failures

One of the most common problems in the press section of paper mills is bearing failures in the printing rolls, which affect the paper quality and may cause production to stop. In most cases, bearing damage causes all bearings to come to a complete stop, causing extensive damage to machine shafts.

The causes of errors in bearings can be listed as follows:

- Incorrect design or assembly of bearings
- Bearing misalignment
- Uneven diameter rolling elements
- Improper lubrication
- Overload

When one of these malfunctions occurs, the following processes are generally applied in businesses;

- The paper machine is turned off.
- The damaged roll is removed and must be replaced with a new one.
- The defective roller is sent to the workshop where the defective bearing is replaced with a new one.

All these processes cause loss of production, additional costs and loss of time in these days of demand pressure, significantly reducing the competitiveness of your production facility.

Fact

Research shows that unplanned downtime on a single paper machine can cost more than $20,000 per minute and an unplanned factory downtime can cost more than $1 million per day.

Artesis

Actionable Solutions with
Artesis Predictive Maintenance Solutions

For maintenance and reliability professionals, they need actionable insights—knowledge—not data waiting to be analyzed to focus on production and maintenance operations. The simple and understandable interfaces we offer not only facilitate your maintenance processes, but also increase your operating efficiency by increasing your equipment performance.

Eliminate Unplanned Downtime with
e-MCM Sensorless Condition Monitoring Solutions!

In the production journey from wood to paper, any malfunction in pumps, mixers, cylinders or motors will bring production to a standstill. Apart from uninterrupted failure, even small changes in processes can affect product quality in such a finely tuned system. Many pulp and paper mill facilities prefer service/maintenance services with early and frequent intervention options. However, manufacturers now have much more options in front of them. With modern condition monitoring methods, manufacturers prevent unplanned downtime, increase plant availability and minimize maintenance costs.

By monitoring the real status of your critical equipment in real time, you can move to an effective predictive maintenance strategy. The early warning provided by modern condition monitoring systems will prevent unplanned downtime and allow your maintenance team to replace a part only when necessary. This will help you increase OEE, which is an important KPI value in your productions.

Artesis

How **e-MCM** Works

Fact
e-MCM's patented machine learning algorithm offers comprehensive fault detection up to 6 months in advance. Thus, mechanical, electrical or malfunctions occurring in the pump, motor and cylinders during the process are automatically detected and reported at the initial stage.

e-MCM constantly monitors your rotating equipment, takes measurements and compares them with the digital twin it created during the self-learning process, giving you information about the latest status of the equipment. The unique machine learning algorithm allows it to recognize normal operation in a wide variety of conditions such as different speeds or loads, providing control without false alarms.

Which Faults Can Be Detected In Advance?

Artesis e-MCM offers comprehensive solutions in the detection of both electrical and mechanical faults.

Electrical and Mechanical Failures

- Loose foundation / components
- Mechanical imbalance / misalignment
- Transmission faults
- Driven equipment malfunctions
- Gear box, belt, coupling and bearing failures
- Stator and rotor faults
- Internal electrical faults
- External electrical faults

Process Failures

- High energy consumption
- Low efficiency
- Cavitation in pumps
- Flow turbulence in fans, blowers
- Contamination in the filter and heat exchanger
- Lubrication
- Overload

Easy and Digital Use

Many predictive maintenance methods are difficult to operate even after they are installed. Artesis e-MCM provides a fast and easy use with its automatic fault diagnosis feature. Instead of dealing with dense and complex data, maintenance personnel take quick action only with actionable data.

After installing e-MCM systems in your treatment plant, Artesis IoT platform communicates easily with e-MCMs. You can establish a wireless connection by integrating a 4G / LTE router into your system that allows communication between e-MCMs Artesis IoT cloud platform. Integration packages are available for a wide variety of third-party systems, including integrated condition monitoring, SCADA/HMI, and reporting/business intelligence.

Artesis

Real-Time and Error-Free Monitoring

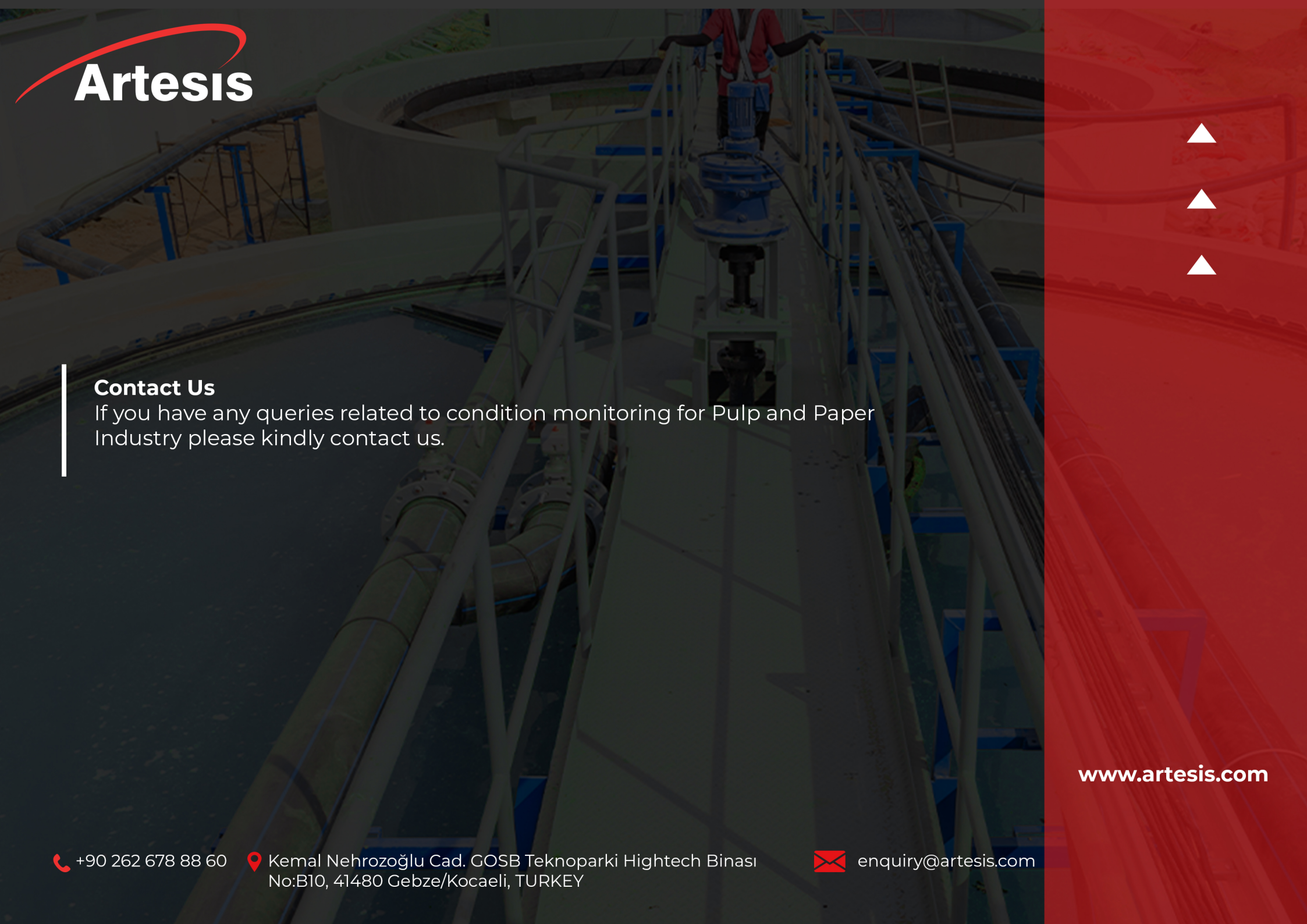
The e-MCM continuously takes measurements and compares them with the baseline condition to assess the severity and type of any developing faults. It can recognize anomalies in a wide variety of work situations and even expand the self-learning process further when it recognizes that it has gone beyond the original learning boundaries. This allows the e-MCM to detect faults very precisely without false alarms. These real-time data provided by Artesis are an effective method for solving problems such as cavitation and impermeability, which are seen in pump systems and progress quite quietly.

Artesis

Conclusion

Pulp and paper manufacturers should use predictive maintenance tools effectively and efficiently and add them to their maintenance plans in order to improve their competitiveness, increase their market share and respond to increasing customer needs in this very challenging industry. In this industry with complex and sensitive processes, predictive maintenance offers opportunities for manufacturers at many points, from improving production quality to preventing unplanned stoppages. As Artesis, we look forward to presenting you the benefits of predictive maintenance with Model Based Fault Detection (MBFD) solutions we offer.

Artesis



Artesis

Contact Us

If you have any queries related to condition monitoring for Pulp and Paper Industry please kindly contact us.

www.artesis.com

+90 262 678 88 60

Kemal Nehrozoğlu Cad. GOSB Teknoparki Hightech Binası
No:B10, 41480 Gebze/Kocaeli, TURKEY

enquiry@artesis.com