devoteam

Tech opportunities

for the Manufacturing Industry.

To ensure that technology matches the need for success.

Creative tech for Better Change

devoteam
M Cloud

About Devoteam

Devoteam is a leading consulting firm focused on digital strategy, tech platforms and cybersecurity. By combining creativity, tech and data insights, we empower our customers to transform their business and unlock the future.

With 25 years' experience and more than 8,000 employees across Europe, the Middle East and Africa, Devoteam promotes responsible tech for people and works to create better change.

Creative tech for Better Change

Our story

Contents

Introduction

A set of highly specific requirements

Like many industries, the Discrete Manufacturing industry - or the manufacturing of discrete items - has a set of highly specific requirements to ensure sustainability and success. To ensure that technology matches the standard for success, you will need technologies that can aid in high quality manufacturing, together with the available workforce.

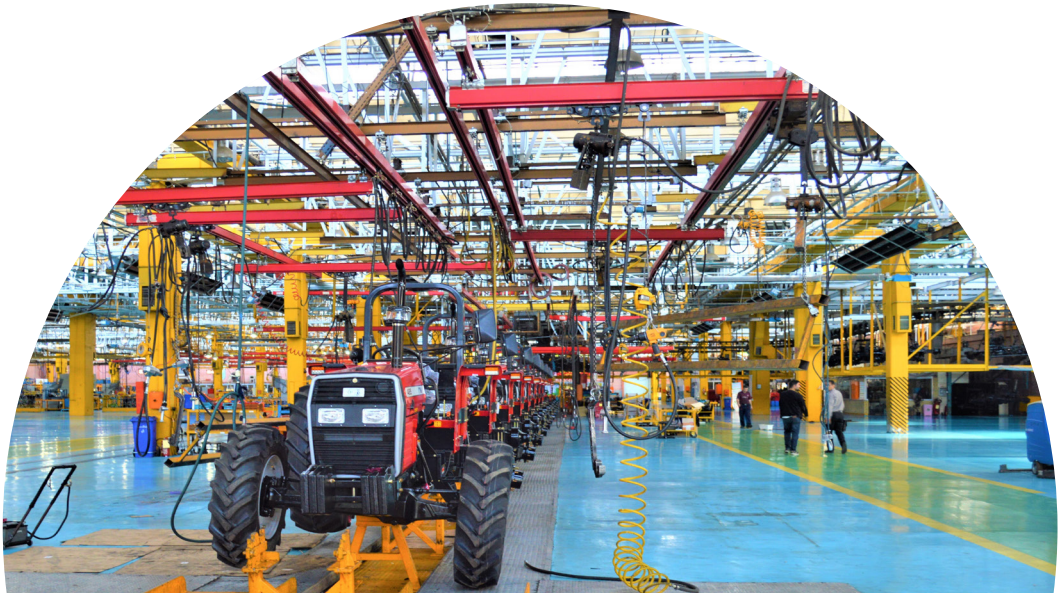
Supporting processes, like workplace IT, should be able to move towards highly flexible environments in the Cloud, for example Azure Cloud or Office365. The availabe requirements for supporting processes in manufacturing can be matched by the Azure Cloud. Manufacturing a product or part can be divided into primary and secondary processes. Primary is the manufacturing of raw materials, secondary is the part after this which changes these materials into goods. These primary processes, however, are not that easy to entrust onto a remote technology platform. Availability requirements might be '5 nines uptime' or even higher for a primary process. Any unknown interference in the primary process could have a significant impact on production. The immediate effect of this is loss of revenue which on the longer term usually has to be made up for in a shorter timespan, putting even more pressure on a successful primary process.

Last but not least is the ongoing transformation of traditional manufacturing and industrial practises, using modern smart technology.

Machine-to-machine communication (M2M) and the internet of things (IoT) are both important for increased automation and improved communication. It is also a key element for self-monitoring, supporting the production of smart machines by analyzing and detecting issues without any human intervention.

We see the following opportunities where technology can aid the primary process within the Manufacturing Industry:

- **Quality of the process**,
  aided by the Industrial Internet of Things;
- **Efficiency of internal logistics**,
  aided by Automating more than Machines;
- **Predictive maintenance and process optimization**,
  aided by Big Data;
- **Availability of the primary process**,
  aided by Cloud Computing.



Opportunity 1

Quality of the process

Aided by the Industrial Internet of Things

Quality control is the process that ensures customers receive products that are free from faults, and meet their needs. If this is done wrong, it can put customers at risk. Quality control is important everywhere — especially in the manufacturing industry. But why exactly is this? Why is it a good idea to produce the highest-quality products you can, and why is it essential to have a system in place to ensure this happens?

Problem definition

Good quality management relies on the ability to constantly monitor and control a host of machine and process parameters that impact product quality. To make sure that product properties are constitently up-to-par, equipment recalibration is constantly performed as process drifts and other changes in the production line crop up. With the increasing complexity of tooling systems and processes, many process variables are left unattended due to the limits of bulky wired networks.

A large part of wired-driven industrial systems aren't intended for data exchange beyond the factory floor, which results to disconnected islands of data. This data couldn't be used to stimulate production efficiency and throughput.

Quality management and optimization of processes often depend on reactive, manual post-production inspection. Besides human intervention, this introduces significant quality variability and associated costs while making it challenging to trace the root cause of quality issues.

During the process, many production issues can occur. Think for example of not the right quality, long lead times, high on-hand inventory and supply chain interruptions. These all affect the product that you want to produce, which eventually can affect the perception of your brand. We've placed the most common problems in four categories:

1. **Quality problems**:
   High defect rate, high return rate and poor quality.

2. **Output problem:**
   Long lead time, unreasonable production schedule, high inventory rate, supply chain interruption.

3. **Cost problem:**
   Low efficiency, idle people or machines.

4. **Management problem:**
   Bad working conditions.

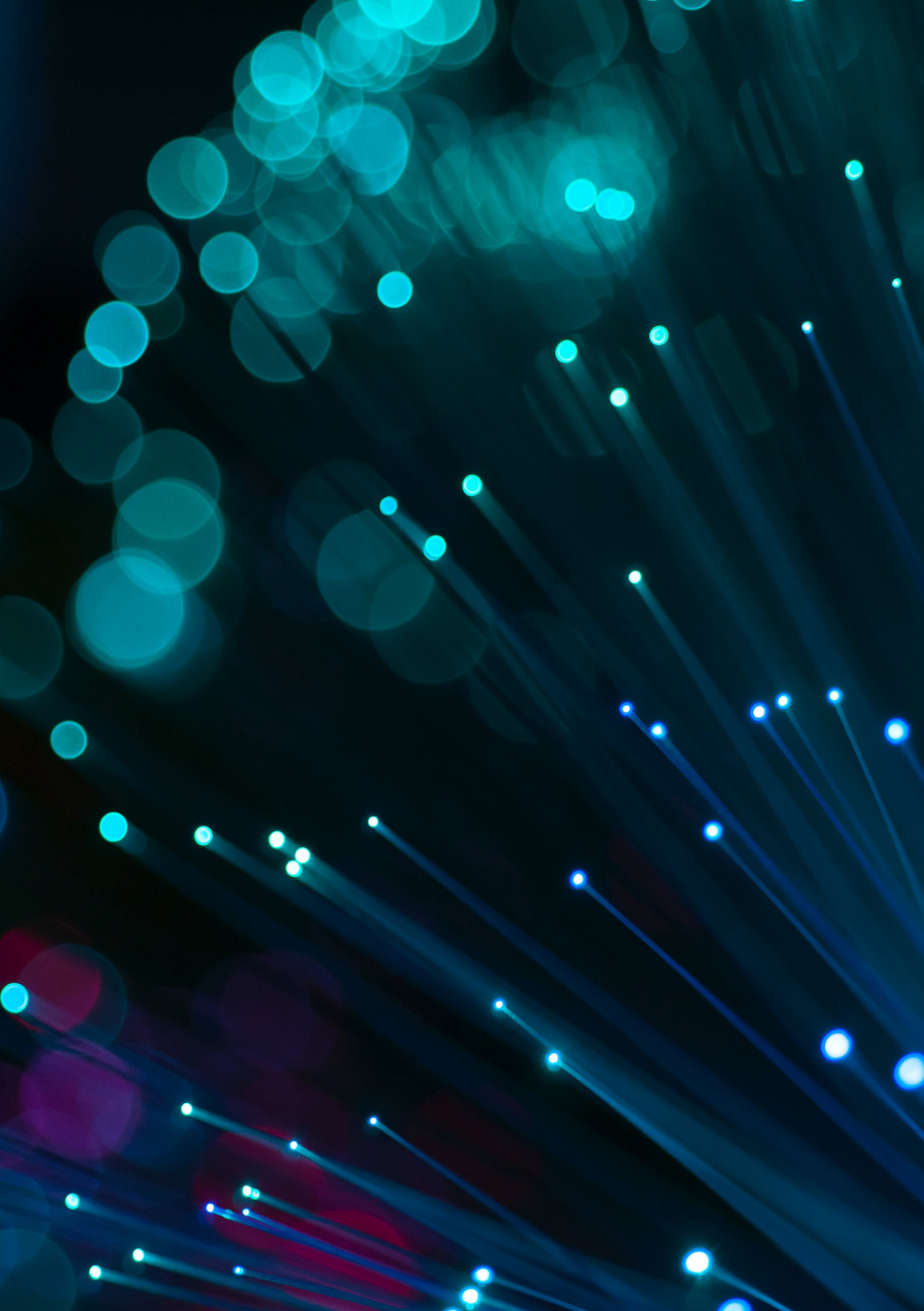
Industrial Internet of Things

The pressing quest for improved process visibility speaks to the tremendous potential of IoT. Wireless instrumentation isn't necessarily new to manufacturing, but most legacy solutions fail to live up to crucial requirements in terms of range, power and ease of integration in industrial operations. A new generation of IoT connectivity delivers not only industry-grade reliability and security for dependable communications, but also a high level of scalability, cost-efficiency, and interoperability needed to overcome the manufacturing inertia.

Wireless IoT networks that can capture vast, granular critical data points along the production line, render manufacturers with unprecedented control over their operations and product outputs. Beyond reactive, end-of-run quality inspection, IoT data empowers a proactive quality assurance approach to diagnose and prevent defects much earlier in the process for peak production throughput and repeatability alongside reduced costs and waste. Concurrently, it provides valuable insights for achieving and maintaining storage best practices.

With 24/7 remote monitoring, quality managers can instantly detect off-spec conditions among running equipment and processes that give rise to potential product defects. A prompt following quality check helps to reaffirm the problem at the source and facilitate troubleshooting to hinder future defects.

Once different quality problem sources have been diagnosed and verified, manufacturers could even develop and implement a quality control model to further optimize product properties. Capitalizing on ongoing sensor inputs, such a model allows machine operations to automatically adapt to unwanted fluctuations in variables like environmental conditions, to achieve the top and consistent product attributes.



Opportunity 2

Efficiency of internal logistics

Aided by Automating more than machines

In manufacturing, every second of process overhead, and every penny count. Often, low margins mean that competing manufacturers are locked in a battle to become the most efficient, highest quality, and cheapest producer. In the past decades, a lot of these efficiency gains came with automation. Replacing low-skilled jobs with robots that could do the same work faster, more accurate, and cheaper.

Problem definition

Most menial and repetitive actions have been shifted from human hands to robots and computers, leaving humans to perform only the more specialized tasks within primary processes. Often it was too expensive or too complex to automate those tasks.

With primary processes already as heavily automated and optimized as the previous generation of tools could handle, manufacturers were left facing the same problems of needing to increase efficiency and lower costs, without the means they have used for so long. The need to optimize however, is growing rather than slowing down. Competition from competitors producing in lower-wage countries has increased, and cannot be matched. So what can manufacturers do to increase productivity? Why of course, automate even more!

Automating more than machines

Let's start with the obvious; technological progress is speeding up at a previously unimaginable rate. That means faster computing, smarter AI, and lower cost.

Older automation tooling was either too expensive, or just plain unable to perform complex jobs. Now, a new generation of tooling (think of robots) are more flexible, more versatile, more precise, and above all cheaper than those used in many manufacturing environments today. These robots can be "trained" by frontline staff to perform tasks previously thought to be too difficult for machines — tasks such as picking and packing irregularly spaced objects, and resolving wiring conflicts in large-scale projects in, for example, the aerospace industry. Artificial intelligence is also making major strides that are increasing the potential for automating work activities in many industries: in one recent test, for example, computers were able to read lips far more accurately than professionals.

The increased cognitive skills and flexibility of modern robotics also allows manufacturers to look at other processes for automation. Most modern day manufacturing organizations see their machines and factories as their most important capital assets, and have thus invested heavily in modernizing these assets. While primary processes have long been the focus of automation, there is still enough automation potential left within the four walls of manufacturing sites.

Supporting processes, systems and applications have long been out of the spotlight when it comes to automation. Often, these supporting, but business critical systems and processes remain in a legacy state, with logistics, warehousing, supply chain management and procurement lagging behind primary manufacturing processes.

With new developments in smart robotics, it is now possible to automate warehousing with Autonomous Mobile Robots. AI can help manage inventory and optimize purchasing and SCM.

Opportunity 3

Predictive maintenance and process optimization

Aided by Big Data

Big Data refers to the large volume of diverse data sets generated at speed by heterogeneous sources. This data comes from a wide range of cloud and enterprise applications, websites, computers, sensors, cameras and much more — all coming in from different formats and protocols. In the manufacturing industry, there are many different types of data to take into consideration, including the data coming from production equipment fitted with sensors and databases from ERP, CRM and MES systems.

Problem definition

Breakdowns and errors in critical machines can disrupt the entire production chain of a manufacturing organization. Preventing these machines from breaking down or becoming a liability is key. It is crucial to ensure all machines are working optimally, all the time. The manufacturing industry is now counting on the help of machine learning- and historical data to create prediction models which can prevent downtime. Fixing the problem before it occurs is what it's all about.

The rise of smart devices together with increase of cost efficiency of storage solutions unlocked the ability of storing an endless amount of data, thus allowing to approach problems in a data-driven way. But how?

Predictive Maintenance

Predictive maintenance aims to help in solving these challenges. In manufacturing, Big Data can help in improving the efficiency of processes and reducing production costs. Transforming data into actionable insights is one of the keys to stay ahead in competition, for instance increasing sales, thanks to the ability to follow market trends or the use of recommendation engines on the e-commerce portal.

Predictive maintenance is a type of maintenance that directly tracks an asset's health, status, and performance in real time. It is aimed at reducing costly, unexpected breakdowns and offers the manufacturer the opportunity to plan maintenance around their own production schedule. Through a combination of real-time data collected through the IOT, predictive maintenance tooling continuously analyzes the condition of equipment during normal operations to reduce the likelihood of unexpected breakdowns.

Organizations can monitor and test various indicators such as slow bearing spread, or temperature. By using condition-based monitoring, these tools detect abnormalities during operations and send real-time alerts to machine owners that indicate a potential future failure.

Predictive maintenance techniques aim to determine when maintenance should be performed tracking an asset's health, status and performance.

Opportunity 4

Availability of the primary process

Aided by Cloud Computing

If there's one thing manufacturers have learned from COVID-19, it's that scaling production down drastically during lockdown, and scaling up when the world started to get to its natural pace again, was everything but easy. Flexibility of operations has of course always been a priority, but these operations and processes are not used to scaling as rigid as the past two years. Cloud is one of the solutions that can at least take care of the scalability of IT operations & processes. But how?

Problem definition

Most manufacturers are still using "homegrown IT solutions", which were once bought as out-of-the-box solutions and have been used as intended. Over time these systems have grown into the organizations, and are fully intertwined with all parts of the operation. They also come from an era where the cloud's promise of scalability was not there yet. In short, this "homegrown IT" is limiting scalability in the manufacturing industry. Time to look at cloud infrastructure.

Cloud Computing

If uptime requirements are based on '5 nines uptime' or higher, this will probably mean setting up a hybrid IT platform that can lead to controlled development of new code. This can be interpreted by the machines that aid in manufacturing and also to a less complex IT infrastructure that will ensure high availability.

Machines and robots usually grab the information they need to function from the network. A complex network is detrimental to uptime since supporting it will be tedious. However coding directly on a machine without quality assurance can be just as or even more detrimental to your primary process.

To ensure the highest levels of availability we need to mix controlled development of objects with a very simple, yet resilient IT infrastructure to ensure only quality assured objects enter the bubble of the primary process. A part of this infrastructure will, based on requirements, probably be located locally at the production facility, while the development of new objects can be done in the cloud.

The reverse flow of collecting and storing data with the goal of improving operations is probably equally important and could, based on the amount of data, also be partially local on the facility, while analysis of this data is done in the Cloud. Certainly with the advent of Industrial IoT, data is being generated at staggering speeds and high volume. This can put extreme stress on the infrastructure that could indirectly lead to loss of uptime in the primary process. Certainly a complex infrastructure could lead to extended downtime.

The creation of objects for the control of machines and robots should then be located in a controlled environment where objects can only go live after thorough quality control to ensure sustained operation. For secondary or supporting processes, Cloud computing offers a platform for users to store and process vast amounts of data in a predefined environment, meaning that requirements for in-house developed IT infrastructures will lessen.

Almost the end

Conclusion

With this whitepaper we provided our thoughts on the manufacturing industry from an IT perspective. Industry 4.0 has been around for over 10 years; in this time we have seen very high interest in applying technology in supporting processes. We also identify possibilities to move parts of primary processes around the manufacturing of items into more cloud centric solutions.

Analytics, Cloud and IoT are game changing technologies that show very high promises in highly efficient production environments like the manufacturing industry.

Cloud Computing has been around for years, but was initially never seen as a platform that primary processes could rely upon since these infrastructures tended to be far away with added complexity. With more hybrid solutions these issues can nowadays be overcome to support even the highest of availability requirements. With new ways to only insert changes into the primary processes through controlled means of secure development, cloud technology can further aid to support the requirements of an almost always available primary process.

Data accompanies these new cloud technologies to ensure prompt decision making. Data however cannot do that on its own and this is where Analytics come into play. This way we can derive information from acquired data to ensure data-driven decision making. With more and more systems generating data we can further augment this new way of data-driven thinking. All this data however must be stored and here we can fall back on cloud technologies that can answer the most diverse use-cases on storage requirements.

IoT might be a little more recent as technology, but can certainly become a serious disruptor with sensors and smart technologies that can be added into the production process of manufacturers. These sensors can tell you where your products are and help in fast resolution of potential problems.

Furthermore, data and AI can optimize manufacturing processes and Predictive maintenance can reduce down-time while process mining can enhance primary process removing bottlenecks and increase efficiency.

Devoteam focuses on digital strategy, platform technologies, cybersecurity and business transformation; we can help manufacturing organizations in their Cloud and Data journey to fully take advantage of these technologies and improve the primary processes within the organization.

About Devoteam M Cloud

Devoteam M Cloud, an Expert Azure MSP Partner, is one of the world's leading providers of Microsoft Cloud technologies currently with 16 gold certifications and 6 Advanced Specializations. Our team of 1000+ Microsoft Experts in EMEA modernize organizations' IT architecture, support our customers on their journey to the cloud, make them fit for the digital future, and provide them with high-level managed services.

The Netherlands

At Devoteam in the Netherlands, we promote technologies to have a positive impact on people and the world around us. Whatever stage of your digital journey your organization is in, we're here to help you leverage the unique capabilities of Microsoft. Getting you where you need to be, faster.

Join forces with a leading Microsoft Partner for Premium Consulting, Solutions and Managed Services. As a go to Microsoft portfolio partner with over 1.100 certifications, you can trust us to deliver enterprise-wide optimal Azure performance, securely.

Key figures

500+ clients & 1000+ Microsoft Experts in EMEA

1300+ certifications & 16 gold certifications

6 Advanced Specializations:

- Kubernetes on Microsoft Azure
- Modernization of Web Applications to Microsoft Azure
- Threat Protection
- Windows Server and SQL Migration to Microsoft Azure
- Adoption and Change Management
- Low-Code Application Development

2 Centres of excellence in Portugal & Lithuania

The authors

Marco Blanca
Big Data Consultant
marco.blanca@devoteam.com

Eli Spaans
Principal Consultant
eli.spaans@devoteam.com

Jasper Baljeu
Solution Architect
jasper.baljeu@devoteam.com

Questions?

Get in touch!

Stefan van Eijden
Corporate Sales Lead
stefan.van.eijden@devoteam.com

Ties van de Voort
Enterprise Sales Lead
ties.van.de.voort@devoteam.com

Creative tech for Better Change