



DV GROUP

INDUSTRY 4.0

WHY ? HOW ?

Accelerating an upturn in industry

WHITE PAPER



INTRODUCTION

Following the buzz over recent years provoked by Industry 4.0 in all the media and all Information Technology and Operational Technology experts, some key concepts, such as intelligent machines and factories, cyber-physical systems (CPS), the cloud and data analysis etc. are proving to be a precious aid in the unprecedented situation we are experiencing.

With digitalisation, the frontiers between the physical and digital worlds fade in order to create a new industrial paradigm. The inter-connection and communication between machines and products, as well as between the various functions of the company, are used in ever more flexible production whose aim is to bring a customised response to consumers' needs, whether in terms of products, services or use.

Following this unprecedented crisis, industrialists are going to have to respond to these new industrial performance challenges with a means of functioning remotely, adopting these key concepts which are now indispensable for accelerating an upturn in this sector.

SUMMARY

1/ Why?

2/ How ?

3/ Industry 4.0 and maintenance

4/ Industry 4.0 and energy

5/ Industry 4.0 and the factory



WHY ?

WHY ?

CLIENT SATISFACTION IS THE CHALLENGE FOR INDUSTRY IN THE FUTURE

Companies must operate their digital transformation at all levels of their organisation: **OPERATIONS, MARKETING AND STRATEGY**, so as not to be left behind by the competition, to respond to clients' ever higher expectations and to seize new commercial opportunities. The outlook is promising. Companies who are committed to operating their digital transformation will see the benefits on several levels:

CONSOLIDATION OF CLIENT LOYALTY

Clients want to interact with brands which value them and which give them the feeling of being important.

GROWTH IN BRAND VALUE

The digital transformation allows companies to have client-based applications and also produce customised series at affordable costs.

APPRECIATION OF HUMAN POTENTIAL

Human-robot collaboration allows an increase in productivity by reducing the drudgery of tasks. Robots are very good for repetitive tasks requiring a high degree of regularity in the gesture. On the other hand, humans are creative and can adapt to situations and therefore improve processes.

RESPONSE TO THE NEW POST-CRISIS CHALLENGES

Faced with a worldwide pandemic, digital technologies have shown their essential nature in allowing companies to pursue part of their activity remotely. Today, it is indispensable for all industrialists to prepare for post-COVID19 recovery and to transform themselves in order to improve their resilience in case of future crises.

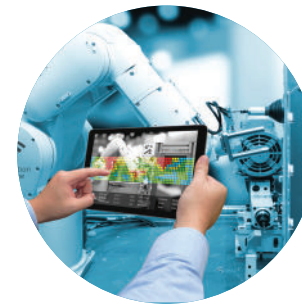


HOW ?

HOW ?

Of course, the first criterium is **to be consistent with the strategic axes** defined by the company according to its needs. Firstly, does it want to develop its product quality? Increase the availability of its production tool? Increase energy efficiency? Increase production speeds? Indeed, each brick has benefits. For example, predictive maintenance can reduce the risk of breakdowns and thereby increase the production tool's availability. Collaborative robotics can be used to increase flexibility and to create high-quality, customised series.

The industry of the future associates **the real world of production with the virtual world of information technology and communication**. Classical industrial processes are complemented and optimised by those of the digital world through the **SMART FACTORY** concept, associating the technologies of the fourth industrial revolution, such as robotics, simulation, the Internet of Things (IoT), artificial intelligence (AI) and augmented reality (AR).



ROBOTICS, COBOTICS

Aim: To be flexible and adaptive



DIGITAL TWIN

Aim: Adapt to the market and move faster



BIG DATA, IOT, BLOCKCHAIN, IA

Aim: Optimise and produce better



VIRTUAL REALITY

Aim: Maintain and train better



MONITORING

Aim: Anticipate



ROBOTICS, COBOTICS

AIM: TO BE FLEXIBLE AND ADAPTIVE

Robots now have new senses and **captors** allowing them to detect the presence of humans in order to adopt its reaction: slow down or stop in case of contact.

The mobile robot's autonomy is based on **perception, decision and action**. So, perception, obtained with through captors, allows it to get to grips with and understand its environment and its own status. Decisions, arising from the use of raw data from the captors, generate the intention to move. Finally, the action sends orders to the robot so that it can carry out its mission correctly.

Although these three processes are often presented separately, it is their **combination which guarantees efficiency** and gives the robot a capacity for unsupervised learning, in other words it supplies it with the means to learn for itself according to its own experiences, build up the early stages of artificial intelligence and suggests more and more intuitive and safe navigation.

TURNKEY ROBOTIC SOLUTION FOR YOUR NEEDS REGARDING:

- Handling
- Packaging/wrapping
- Assembly
- Machining
- Cutting and finalisation

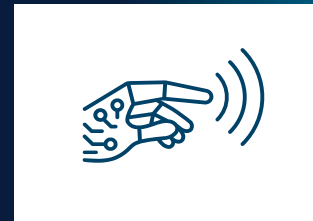
COLLABORATIVE ROBOTIC SOLUTION:

- Monitoring
- Helps assembly
- Screwing

SPOTLIGHT ON THE DV GROUP SOLUTION



WHEN PEOPLE AND ROBOTS WORK TOGETHER



- **Key-in-hand integration of robotic islands:** Handling/assembly, vision monitoring etc.
- **Environment, location, risk**
- **3D mechanical planning and design:** Catia, Solidworks etc.
- **Feasibility, trajectory simulation, cycle time:** ProcessSimulate, RobotGuide etc.
- **Platform, trial assembly**
- **Implementation and training**

COBOTICS

In collaboration with the operator

- Improves comfort and decreases drudgery
- Improves safety



DIGITAL TWIN

AIM: ADAPT TO THE MARKET AND MOVE FASTER

Thanks to the data which **the digital twin** of a product, device or factory gathers in real time, thanks to 3D design, simulation, captors and the IoT platform, design and operation are optimised, in particular by allowing predictive maintenance to take place.

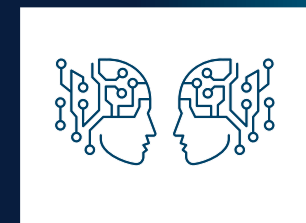
With a digital twin, it is possible to **simulate in real time** the physical behaviour of a system, to **test models** in all the defined scenarios and to **carry out virtual commissioning**. It is therefore possible to identify errors and possible improvements without taking the risk and the time to create a physical prototype.



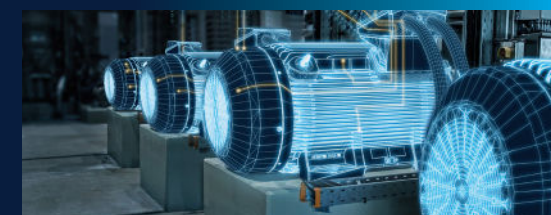
SPOTLIGHT ON THE DV GROUP SOLUTION



SIMULATE AND OPTIMISE YOUR PRODUCTION



- Test a new production before implementation
- Optimise productivity
- Introduce a new resource while providing security for your investment
- 3D feasibility study for consultation



On the other hand, in the current context of social distancing, linked to the COVID-19 pandemic, the digital twin and virtual implementation take on their full meaning as they allow a response to this **security issue** by stimulating flow, notably the circulation of operators and the ergonomics of work stations. In addition, the digital twin is also a real asset for training and remote testing.

SIMULATE YOUR PRODUCTION TOOL THROUGH THE CREATION OF A DIGITAL TWIN

BIG DATA, IOT, BLOCKCHAIN, IA

AIM: OPTIMISE AND PRODUCE BETTER

The **intelligent use of the data** allows for an improvement in the availability rate of the production line, the systematisation of predictive maintenance, energy efficiency and, owing to this, the ability to get the best from the machines onsite.

Machine learning searches for connections in the database without further reference. This approach highlights **new sources of improvement** which cannot be identified by other means of analysis.

The **economic value of connected objects** depends precisely on their inter-operability, that is their ability to communicate between them and to be integrated into a common infrastructure in order to be able to cross-reference many indicators.

The **blockchain** intervenes as the conductor of the connected objects, reinforcing their security and reliability. The connected objects are players in the confidence provided by blockchain technology.

DATA INTEGRATION, CLOUD COMPUTING AND MACHINE LEARNING

- To optimise processes
- Prescribe machine settings by optimising energy, maintenance and providing protection

INTEGRATION OF ON-BOARD INTELLIGENCE ONTO YOUR EQUIPMENT (IOT)

- To prescribe a better process conduct
- To guarantee traceability and therefore quality

IA is first and foremost based on data, so the first stage consists in placing the right captors and actuators in the right locations. Secondly, IA processes this data using algorithms and enforcement models also called Machine Learning. These two first stages are only possible by combining the calculation equipment and power.

IA can also be embedded into the factory, with calculations made directly on onsite equipment thanks to **Edge Computing**. This allows data to be processed directly where it is created by the connected mechatronic components. In this way, we obtain savings in time (response time), energy and greater security. Following the data, algorithms and calculation power, here is perhaps a fourth driving force for IA: a flourishing community of developers.

SPOTLIGHT ON THE DV GROUP SOLUTION

IT 4.0 DATA MONITORING
DV GROUP

CONTROL YOUR PRODUCTION THROUGH DATA

To better control productivity, energy, maintenance and the quality of your industrial sites, DV GROUP offers its innovative solutions combining advice, support and monitoring solutions in order to identify, analyse and make your data speak for itself.

VIRTUAL REALITY

AIM: MAINTAIN AND TRAIN BETTER

Although augmented reality has existed for years, 2020 marks the explosion of this technology, opening the way to a multitude of possibilities for designing, supervising and monitoring products, as well as for training operators and technicians, all carried out remotely.

REMOTE TRAINING AND SERVICE USING AUGMENTED REALITY

- Help with the maintenance of connected glasses, troubleshooting
- Training on your production tools and our integrated solutions
- Digital documentation

MONITORING THE COMPLIANCE OF CRITICAL ASSEMBLY OPERATIONS

- Screen located in the field of vision, data can be transferred to the operator, who verbally validates each control point, guided by a sequence of explanatory photos, videos and soundtracks

SPOTLIGHT ON THE DV GROUP SOLUTION

IT 4.0 SUPPORT
DV GROUP

CONNECT TO OUR EXPERTS

DV GROUP has developed a Support Service to TROUBLESHOOT and RESPOND to your problems. Thanks to the connected Support Service, an expert can teleport right to your side!



MONITORING

AIM: ANTICIPATE

Monitoring is defined as a tool for the constant follow-up of products and machines. Today, at the heart of the COVID-19 experience and remote operational modes, monitoring is part of the key concepts to adopt in order to analyse, monitor and supervise remotely.

Online diagnosis:

- Mechanical, electric, processes and energy module expert
- Guarantees a high level of machine availability

MONITOR PROCESS DEVIATIONS

- Real-time monitoring of critical production parameters


LIMIT PERFORMANCE LOSSES

- Connected machines make it possible to ensure the regulation of the process in real time in order to ensure optimum performance.

AVOID SUPPLY BREAKDOWNS

- Management of supply flow using RFID tags or other systems, whether connected to the company's ERP or not

SPOTLIGHT ON THE DV GROUP SOLUTION



REMOTE SUPERVISION FOR EFFICIENT PRODUCTION



Through offline and online services, DV GROUP safeguards the availability of your machines.



5G MOBILE NETWORKS

A NEAR FUTURE WITH THE COMING OF CONNECTED AND INTELLIGENT FACTORIES

With 5G IA, industry obtains a spectrum which it can use exclusively and which is therefore much safer for factories. Thus, the lag time offered by 5G allows real-time machine communication and therefore much safer synchronisation.

Collaborative robots will be able to work more closely with employees. Mobile robots will potentially be able to replace classic assembly-line production. Intelligent machines integrated into adaptive manufacturing processes connected to supply chains are not only a technical matter, but also new opportunities in terms of organisation and will offer industrialists much greater flexibility.

**5G ALLOWS
MUCH SAFER
MACHINE SYNCHRONISATION**



DIGITALISATION REQUIRES CYBER-RESILIENCE

The rampant use of digitalisation, its central role in the economy and the dependence of vital resources for human societies and companies make cyberspace an exposed zone and a potential prime target for attacks.

The rapid increase in digital threats is proof of this and has consequently raised the level of risk considerably. Many industrial systems are still vulnerable as they use machines working on Windows versions more than twenty years old. Attacks affecting company are quite rudimentary.

The search for solutions is oriented towards network architecture, the implementation of firewalls in order to have the minimum number of

connections possible to machines, the installation of perimeter security or having recourse to IA tools which carry out behavioural analysis of the network in order to detect unusual behaviour.

All cyberspace users are vulnerable and sooner or later 100% will experience an incident. It is now vital and urgent for all industries to develop a Cyber-Resilience approach and to protect data, the raw material of the XXIst century.



HR-MANPOWER

FLEXIBILITY AND COLLABORATION

From an organisational and technological point of view, the tasks triggered by the industry of the future will be more demanding. The **training and qualification** of specialist technicians will have to be adapted to the new demands of the inter-disciplinary approach. **Generic skills** are becoming more important. For example, maintenance technicians need to have knowledge in the field of information technologies as well as practical mecatronic experience in order to be able to resolve a breakdown in an installation quickly and at the highest level.

The optimistic view of the industry of the future, liberating for humankind, comes up against many fears. Far from being unfounded, it is essential to take them into consideration for a successful transition. Automation increases productivity, allowing the maintenance, even the development of business activity in France.

Factory work was the great failure of industrialisation, as man was only a cog in the wheel of automation. Today, the digital

revolution allows **the reconciliation of man and machine**. The supervisory professions are called to evolve and operators are going to gain in skill. So, by giving operators direct access to data, digital technologies can modify management by simplifying some hierarchical levels.

Even if the goal remains competitiveness, it is essential to adopt an **employee-centred** approach to these changes. Training must give the necessary skills to employees and also support a major change in trades.

Finally, it is necessary to create **conditions for the acceptance of these changes** by creating a climate of listening and dialogue, particularly on the managerial side, which will suffer the full impact of Revolution 4.0 as this requires a re-thinking of the company position, its industrial scheme and the meaning given to work.



INDUSTRY 4.0 AND MAINTENANCE

INDUSTRY 4.0 AND MAINTENANCE

The leading concept of Industry 4.0, **predictive maintenance**, is nurtured by data from machines in order to integrate IA into the heart of production with the aims of:

- Reducing costs
- Extending the lifespan of aging assets
- The reduction of risks for security, health, the environment and quality

COLLECT VITAL MACHINE DATA

The essential thing is to be able to possess series of temporary data regarding production. The electrical consumption, a temperature, a pressure and the quality of the parts at output allow a table showing the health of the equipment to be established.

MODEL DATA IN ORDER TO ANTICIPATE BREAKDOWNS

Once the data has been collected and centralised, the learning phase consists in the machine learning to recognise a normal working state for the production line. Then the injection of parameters corresponding to failures allows a model to be further developed and to trace back to the origin of the breakdowns.



INDUSTRY 4.0 AND ENERGY

INDUSTRY 4.0 AND ENERGY

ANALYSE TO ECONOMISE

It is necessary to add a component **based on knowledge** to a statistical approach based on data and machine learning, in other words the physical, mechanical and thermo-dynamic laws and the energy mapping of the site.

The reservoirs of energy savings are identified in two stages. Firstly, it is necessary to **make sense of the consumption** by cross-referencing the collected data with those of production and maintenance, which allows an identification of the levers in order to reduce it using a lean management approach. Secondly, **consumption prediction** allows purchasing to be more in line with needs and for warnings in case of consumption slippages.

We can project up to a 20% reduction in energy bills, but a certain degree of maturity is required to access the technology.



INDUSTRY 4.0 AND THE FACTORY

INDUSTRY 4.0 AND THE FACTORY

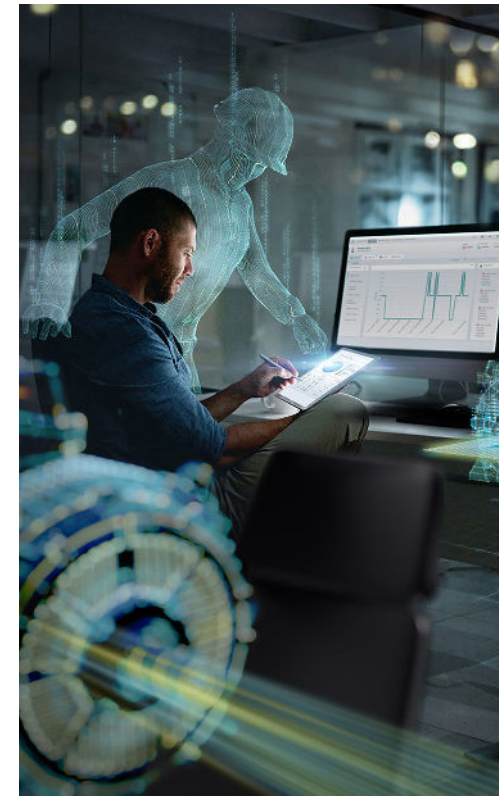
We can also retain the factory communicating with this rationale of global integration around machines and which must be able to communicate simply with all the software applications used in the company: production simulation, maintenance management, planning etc.

So, for factories, the strategy is clear and defined in this way:

- ✓ **Being capable of producing and delivering on time:** machine availability and a reduction in cycle times
- ✓ **Being competitive in order to last** by adapting processes to smaller series, tracking unnecessary costs
- ✓ **By using technology** in order to invent new products and services

And the indispensable means are:

- ✓ **Ergonomic visualisation tools** allowing an instant identification of a deviation in the process or the KPIs
- ✓ **Automatic notification systems**, (SMS, e-mail) in order to offload the permanent supervising of a single machine from operators
- ✓ **A great capacity for processing and refreshing information**, in order to facilitate real-time decision-making on the stable database.



And if Industry 4.0 is already obliging us to look further, we can imagine that companies share more than data in order to facilitate decision-making in their common actions, with inter-company partnerships based on the creation of value.

Machines must be able to communicate simply with all the company's software applications.



CONCLUSION

Numerical or digital transformation, transition, evolution etc. There are many terms in circulation to describe the necessity of companies to initiate their company's digital transformation. The aim is simple: use technology to reduce design time and accelerate productivity. Indeed, these tools generate new techniques and new economic models which fundamentally transform worldwide production systems, the driver for growth and innovation in the economies the whole world over.

With this worldwide health crisis and, with it, the development of the idea of social distancing, the whole industrial sector must capitalise on what has been learned from this crisis in order to propel structural transformations which will aim to accentuate the agility of their organisations, modernise their methods and to improve their resilience in the case of future crises.

All the technology required for Industry 4.0 is already available. Industry 4.0 can therefore be considered more as a driver for innovation for new activities not yet carried out at this moment than as a driving force of innovation for technology.

If these existing technologies are correctly assembled and combined with good company models, there are real opportunities for being able to take advantage of Industry 4.0.



IT 4.0



Challenges for the industry of the future: **GREATER CLIENT SATISFACTION**
FLEXIBILITY and DEVELOPMENT • PRODUCTIVITY • TIME TO MARKET • QUALITY

European leader in **ENGINEERING, MAINTENANCE and MONITORING**, we work every day to satisfy our clients and remain loyal to our reputation of an **"Expert in Motion Technology"**. We have 250 staff and a network of 21 European agencies and achieve a turnover of 33 million euros.

Being fully involved in the development of the factory of the future, we are contributing to this industrial change and are supporting you by developing **"IT 4.0" solutions** dedicated to the new economic, social and environmental challenges and also adapted to the **characteristics of your industrial processes** and organisations.

In this post-crisis situation, we are even more committed and available. Get in touch!

Call us on **00 800 25 825 826** or head over to **www.dv-group.com**



EXPERT IN MOTION TECHNOLOGY

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