Getting the most out of Industry 4.0

Many manufacturers are still uncertain about how to implement Industry 4.0. This example looks at how software can contribute to advanced smart automation technology in a steel mill.

What is Industry 4.0? Industry 4.0 represents a new industrial transition phase that could last for the next 20 years or so. It concerns the industrial adaptation of new technologies, based on Big Data and cyber-physical systems that are just emerging. The image below shows three earlier transition phases we have already passed through:

- The generation of power and mechanical automation
- Industrialisation
- Electronic automation.

In 2015 we entered the 4th industrial revolution, often referred to as ‘smart automation’. Decisive enablers in this transition phase are cyber-physical systems, which include integration of computation, networking and physical processes.

Today computational power is at such a high level, that it doesn’t limit the data or software engineers. Networking speeds have also advanced so much, that Gigabyte speed is already standard and will soon be replaced by faster and therefore more powerful network infrastructure. Up to date physical systems such as sensors with advanced data collection and transmission capabilities, allow detailed information flow with almost no delay. This results in high data volume and accumulates over time into Big Data.

Big Data in industrial environments such as steel rolling mills, needs well-structured, long term, plant-wide data storage and access to allow value generating applications across related data e.g. successive production lines. A product passing several production steps must be clearly identified and tracked over the whole chain.

US-based consulting company McKinsey, defines Industry 4.0 driven by four major disruptions:

- The astonishing rise in data volumes and storage capacity
- The increase of computational power and connectivity (e.g. new low-power networks and low-power wide-area networks)
- New forms of human machine interaction, such as touch interfaces and augmented reality systems
- New methods in fragmenting digital instructions to the physical world, such as advanced robotics and 3D printing.

However, not all companies are aware of the emerging technologies. Only 30% of technology suppliers and 16% of manufacturers have an Industry 4.0 strategy in place and just 24% have assigned clear responsibilities to implement it.

Calculating the cost

What is the expected impact of Industry 4.0 compared to the major investment needs of the 1st, 2nd and 3rd industrial revolutions?

- Industry 1.0 to 3.0 (steam power, conveyor belts and the rise of automation & robotics) resulted in the replacement of 80% to 100% of industrial equipment
- McKinsey doesn’t expect the same investment with Industry 4.0. Having said that the executives surveyed, estimate that approximately 40% of today’s equipment will need upgrading or replacement.

- Traditional companies may face major challenges in competition and marketing strategy from companies with an Industry 4.0 approach.

QuinLogic and Industry 4.0

McKinsey defines a circle of Industry 4.0 value drivers and levers which are involved in the 4th industrial revolution:

- Electronic automation.
- Mass production, assembly line, electricity

QuinLogic’s ‘value driver’ contribution is mainly in the area of quality, labour, asset utilisation, resources and processes. These value drivers are heavily influenced by QuinLogic software modules.

How to achieve improved quality standards in an Industry 4.0 environment

Production conditions will often change, simply to allow for the flexibility needs of the market. Not just grade-specific production but customised mass production is the rule of the game. Therefore:

- Individual quality has to be certified and made transparent for each single product, in all process steps, for all people involved
- Quality has to be certified and made transparent for each individual process, in every step of production, for all people involved

For example, to produce a piece of metal for a car involves a long multi-step production chain. To produce a specific piece with exactly the right properties and in the right quality, is a highly complex task.

One example of Industry 4.0 within QuinLogic’s software is the innovative use of company know-how. It has always been a huge challenge to best make use of the know-how available within a company. Brilliant solutions and sophisticated documents are distributed across a company, but part of it exists only in human brains.

QuinLogic developed a solution far beyond existing expert systems, to accumulate and provide know-how at the exact point it is needed, such as solving a process problem.

The QES Expert solution enables advice to be added to the software in an easy drag and drop method. With this in mind, the system grants the following benefits:

- Rules can trigger corrective actions which are shown directly at the point of interest
- Data and advice are immediately displayed
- Process managers can attribute their rules with positions, approvals and workflow
- Colleagues gain expertise and preserve expert know-how
- Semi-automatic support of continuous improvement

Getting the most out of Industry 4.0

McKinsey doesn’t expect the same investment with Industry 4.0 to the Investment needs of the 1st, 2nd and 3rd industrial revolutions? McKinsey recommends pragmatic steps should be taken towards Industry 4.0.

- Manufacturers should focus on a limited number of Industry 4.0 applications, rather than trying to cover all levers at once.
- Companies should not be afraid to use technology work-arounds to begin implementing Industry 4.0 techniques.
- Manufacturers should build a portfolio of third-party technology providers, as Industry 4.0 is causing a shift from the single-provider model to one that hinges on a set of integrated technology suppliers.

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