

4IR uncovered: value and agility

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The digitalisation of business has permeated deeply into manufacturing and industry. The Fourth Industrial Revolution (4IR) is a digital revolution to enable manufacturers to create higher production efficiencies, be more flexible on the factory floor and offer mass customisation to customers. Many people who work in manufacturing know the term 4IR. But what are some of the key technologies that define a 4IR factory of the future?

Smart metal cutting

In the machining industry, new process monitoring and control technology can enable the machine operator to interrogate a lot more data about the component design, the tool choice and the material than a “normal” machine tool. DMG MORI, a machine tool company, has a model with 60 sensors embedded in the electro-mechanics of the machine to measure the effect of spindle speeds, feed rates and tool wear on the part and the machine. All the results are filtered into a front-end touch screen called CELOS. DMG MORI says this results in time savings over 30% in set up, and half the effort and time required in calculating technical values.

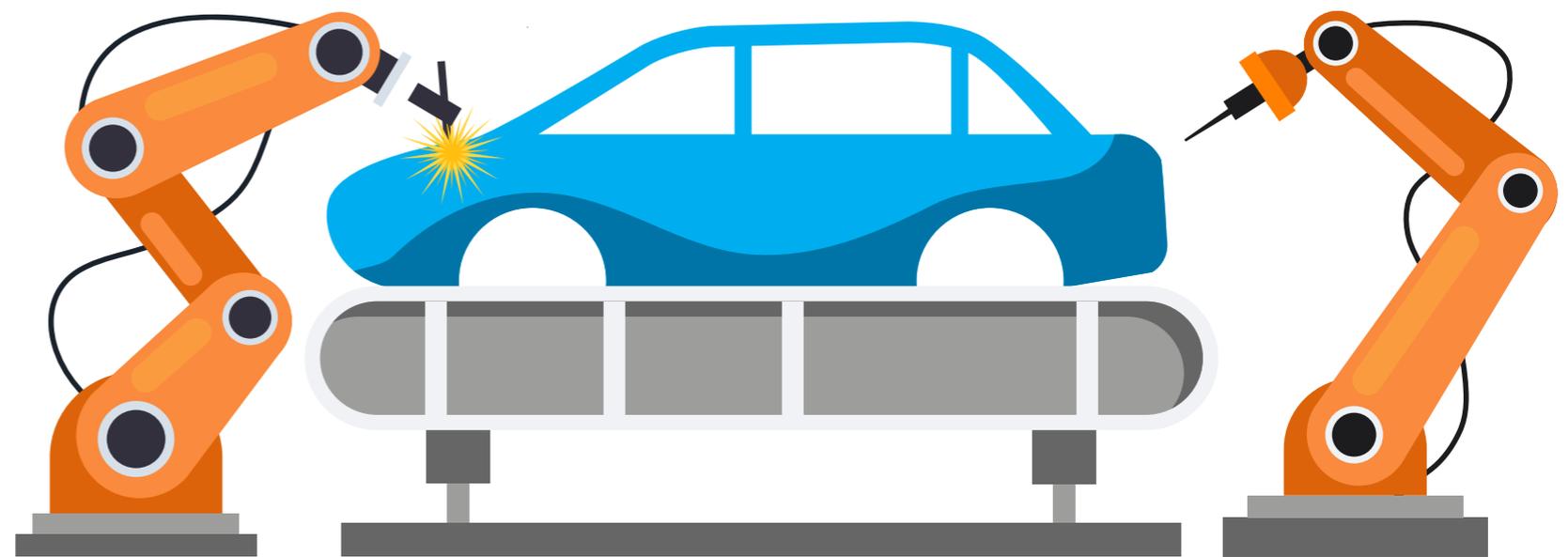
Digital twins

These are digital simulations of a component or assembly with physical properties, including finite element analysis and thermodynamic properties, built into the simulation. Testing the part for shock, compression, heat, wear and other metrics in the digital world can remove the entire “trial and error” physical prototype

stage. Factory line simulations can also be done offline, on the screen. This is very useful to industry, as stopping an automotive assembly line can sometimes cost up to £10,000 per minute¹.

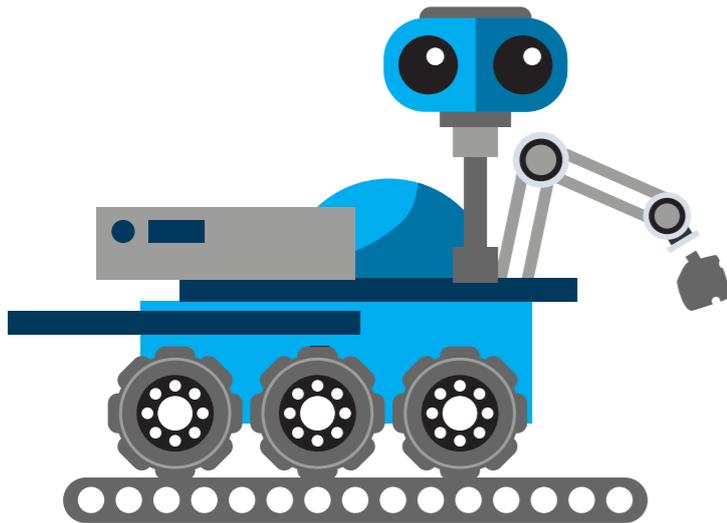
Computer aided engineering such as CAD and CAE have been around for years, so what’s new for 4IR? The next stage in digital twins

can provide richer simulations for additive manufacturing and machining. The new and better technology also means these simulations are aligned even closer to what happens in actual production. This will ultimately mean many components and processes can be 100% tested offline and digitally, which could potentially save the industry of hundreds of millions of pounds.



In factory product identification

Building sensors and Radio-frequency identification (RFID) tags into products, machines and tools will become standard practice, as these sensors become smaller and cheaper. One application is automated kanban, where products and kits needed at an assembly station can be identified automatically. When the stocks are low, an autonomous vehicle is dispatched to collect more. The assembly workers don't need to manually order more stores, as the kitted parts arrive just-in-time "as if by magic".



Product identification via sensors is also being trialled and used in the food and drink industry for filling and bottling in Germany. Rather than having one dedicated line each for one product of one bottle size, a single line can dispense multiple drink variants into different bottles in continuous production. The sensors embedded in the bottle can enable the correct dispenser selected to fill the right drink and in the right volume.

This technology will help commoditised products become more customised. It is possible for people to "choose their own" trainers or sunglasses at competitive prices, because the technology is able to mass manufacture products with small variances.

Digital skills

The current skill shortage is at the machine operator and maintenance level. Having the right skills for digitalisation will become more essential under the 4IR. Engineering companies would need the skills like PLC (programmable logic controller) programming and coding, systems integration between machine tools and enterprise software, as well as big data analysis and cyber security.

Manufacturers need to work with government and academies to provide right training and courses for the supply of digital workforce.

By fully applying the suite of digital manufacturing technologies over the next decade, UK industrial production would be up to 30% faster and 25% more efficient². This represents an amazing step change – just apply them to your business hypothetically.

4IR can drive better efficiency, quality, flexibility and give customers what they want affordably. It will also safeguard the jobs and up-skill the workforce. While our competitors in Germany, Japan and China are speeding up their digital transformation, UK manufacturers ought to think about the right technology to invest and take the 4IR into action.

Source:

1. Deciphering Industry 4.0 for the Engineering Company
2. Industrial Digitalisation Review 2017

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