The challenging world of chemical manufacturing: How can digital technologies make it easier?

Topics covered in this guide:

- Achieving consistent quality
- Complying with regulations
 Managing waste and pollution
- Identifying supply chain trends
 Supporting production planning
- Getting started with digital tools

Find out why digital tools are becoming crucial in overcoming current challenges in this industry.



Chemical manufacturing is changing

Introduction

Manufacturing businesses in the chemical sector have been facing many challenges recently. Brexit, together with its related legislation, and new auditing and recording responsibilities, for one. Volatile ingredient and compound prices, for another. And there are internal challenges within processes too – from quality control and the skills gap to waste and compliance.

Chemical manufacturing is moving to digital technologies at a faster rate than other sectors. Strict quality standards, together with compliance and reporting responsibilities that demand digital evidence, mean that it is a sector that needs technology to survive. And its use of digital tools is also set to crack these challenges and benefit the industry as a whole.

Here, we provide some crucial guidance on the matter, as well as explain why implementing digital tools is such a priority in this industry.



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Achieving consistent quality

For chemical manufacturers, the very existence of their business relies on maintaining consistent quality. Without this, your product can't be used (whether that's because it's dangerous or it doesn't fulfil its purpose), and therefore can't be sold – meaning you can't grow your organisation.

SMEs specifically design the manufacturing process so that they have the best chances of reaching consistency, but a lot of manual work is often involved. Of course, this means high overheads and production costs, as well as countless spreadsheets to track KPIs and progress. This method is just as susceptible as paper to human error and mistakes when it comes to compliance and discipline. What's more, it can't respond well to surges in demand, and increases time and staff costs.

Process problems like these simply can't happen in chemical industries. If businesses like yours end up with the wrong product, you can't take it apart, fix it and put it back together like other manufacturers can. Events (such as weighing, adding and mixing ingredients) need to be tracked at every stage, which requires a standardised process. And that's where improvement methodologies like 5S, lean and Kaizen can help, as well as manufacturing tools that can measure <u>overall equipment effectiveness (OEE)</u>.

These process standardisation and remodelling tools ensure that you maintain a customer-first approach and design a user-friendly process. Knowing your OEE will help benchmark your future success when you adopt new processes or systems, and make business decisions based on the right data. Your people should know what good looks like too. A workflow management solution can act as their guide, helping them to follow the correct procedures and reduce non-productive time. They should also have the right digital skills. <u>With</u> <u>stats</u> revealing that 75% of the global workforce will be made up of millennials by 2025, you need to guarantee that your business can replace your Generation X workers when they retire. <u>Augmented</u> <u>reality tools</u> can help here.

As for the technologies that can deliver you with in-process control? Here are just a few you may want to explore:

- Robotics To move components, as well as help with filling, bottling, crushing, dehydrating, packaging, palletising and dispatch
- Automation To automate robotic processes, reduce the amount of heavy lifting required and boost precision, and allow for data collection
- Process control To monitor and manage all inprocess events whilst at the same time collecting live data for <u>full process traceability</u>
- Data and systems integration To harness the data collected from machinery to provide insight into your processes and inform decisions
- Industrial IT infrastructure and cybersecurity To ensure devices are safe, and protected from both the conditions in your factory and any <u>cyber</u> <u>attacks.</u>



Regulatory compliance

Complying with regulations

Chemical manufacturers must be able to deliver evidence for each phase of their manufacturing process. And it's not just something that regulators insist on. More and more customers are demanding transparency and accountability, and sometimes even the batch reports that you already produce for regulatory bodies and agencies.

If your process is controlled digitally, batch reports can be made available within a matter of seconds. Live packing line performance data and full visibility of batch progress is something that <u>those in the food sector</u> are already giving their managers. However, if you opt to track via paper, spreadsheets, or even word of mouth, compliance will be incredibly difficult. As these reports are often required within four hours, a late response can put your manufacturing business at risk of a substantial fine. Process control systems are recommended for batch traceability along with general process monitoring, control and visualisation. What's more, they can support you in managing multiple process variations whilst gathering live data. This enables quicker and more accurate decision-making.

Analytics can then be integrated with other business management systems such as enterprise resource planning (ERP) and management information systems (MIS). Together, they can deliver crucial insight for further business reports on profit margins and waste. As process industries are the most regulated industries on a global level, it's worth reaching out to others to uncover their experiences and best practices when it comes to digitalisation.



Managing waste pollution

These strict regulations extend to your chemical waste in the form of air, water and solid contamination risk. But, of course, this is costly to remove – and it also (sometimes) needs to be transported outside the EU. The good news is that resources like water and power are actually ideal for process control systems.

Process control systems allow for the effective monitoring of these resources. Collected data can then be used to build a better picture of your business. You might discover that one of your process lines is utilising more resources than another, for example, pointing to a performance issue that requires maintenance. Or perhaps you'll find out that a process is either heat or cost-intensive through temperature monitoring, and is causing expenses to skyrocket. In this instance, a 'leak' of heat in parts of the facility can be identified and rectified. Water can also be reused within your factory when it's controlled by automated pumping systems linked to a supervisory control and data acquisition (SCADA) system or distributed control system (DCS).

Colne-based business ELE Technologies is using process control systems to monitor temperature in several places from a central location. Likewise, <u>Ye Olde Friars</u> in Cumbria is utilising a continuous tempering machine to ensure the correct temperature, leading not only to reduced waste but also secondary benefits like better quality consistency.



The Industrial Internet of Things (or IIoT) could prove an essential addition to your business too. Different sensors can monitor pollution, which can be done both centrally and remotely. You can therefore be immediately notified when things go outside of the permitted levels, giving your team members the chance to react and take action before a problem arises. EnviroSystems recently invested in a sensing system to reduce the environmental impact of farming emissions, and <u>their case study</u> is also well worth checking out.



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Identifying supply chain trends

Here, the value for SMEs once again comes from merging different technologies together – such as resource planning and process control systems. Whilst planning and forecasting is difficult to achieve right now, it is possible to identify trends within your supply chain through data and process tracking.

If you choose to collect process data, then:

- Your customers can obtain more accurate ETA times – this allows you to improve the customer experience and boost sales
- Your logistics suppliers can be scheduled in for the right time slot this is especially important given that some products have a limited 'use by' date
- You can get notified when the prices of chemicals are decreasing this allows you to make smarter buying or selling decisions

This is a key application of enterprise resource planning (ERP) systems, of which there are many manufacturing success stories. Let's take <u>Beverston</u> <u>Engineering</u>, who make components for a range of industries – including pharmaceuticals. They employed an ERP system to connect to 18 machines on their factory floor, automatically capturing data from them and boosting efficiency by an incredible 15%.

Or there's <u>Blends Holdings</u>, one of the UK's leading manufacturers of specialist food ingredients. Their new ERP software has replaced their disparate systems and allowed them to manage all their recipes, production, supply chain, traceability and reporting in one place. This has removed frustrations, delays and uncertainty, and improved efficiency by 50%.

Of course, now that we've left the EU, we have to comply with the 'rules of the 27' – which requires specific data around products and processes. However, given that this can be digitalised, compliance is significantly easier. Again, the only difficulty arises if you opt to record data on spreadsheets and collect it manually.





Supporting production planning

In any area of manufacturing, operations can suffer similar issues to the supply chain. But it can also benefit from the same new technologies. Digital tools can enable operations to be more precise, resulting in better production planning.

In chemical manufacturing, this may involve the ingredients or inventory you store in tanks. Production planning in this instance ensures you're aware of the volume within the tank in real time. You can then know precisely when a fresh tank needs to be prepared – minimising changeover time. The result? Less stress for the business owner, simplified processes for staff, and ultimately an enhanced bottom line for your manufacturing organisation.

Business reports can be utilised as part of an ERP solution too, enabling users and stakeholders to instantly access insightful and actionable intelligence. Then there's business data analytics, which leverages software and algorithms to extract further insights from company information and guide strategic decisions. Through the likes of business intelligence dashboards and reports, users will find visualising complex data much more straightforward.



Chemical manufacturers have reported improved productivity and a 'self-serve' information culture when using these tools, as well as better job satisfaction, increased operational efficiency and reduced operational costs. They've also told us that they've been able to enhance their customer service, thanks in part to a more intimate understanding of the market and consumer trends.



Supporting your digital journey

Getting started with Made Smarter

It's clear that digital technologies can help with so much more than just the machinery on your factory floor. But whilst the advantages are plain to see, beginning your digital journey is a whole other story.

There are a number of routes to getting started, including:

- Business assessment
- Process assessment and modelling
- Project scoping
- Solution finding

In highly regulated manufacturing, jumping feet first is very risky. Even a small project requires thorough planning as mistakes can be incredibly costly – or your investment could fail to deliver the desired results. That's why we always recommend reaching out for support. There's <u>Peer Networks</u>, for example – a national peer-to-peer networking programme for SME leaders to grow and develop their business. The industry body <u>Chemical Industries Association</u> is another source of invaluable guidance.

There's also our team here at Made Smarter. We can help in a number of ways – whether that's tailored advice from our specialist advisers on the best tools for your business, match funding of up to 50% for hardware and software, or the analysis and development of your digital skills. Our <u>digital</u> <u>transformation workshop</u> can additionally pinpoint the steps along your roadmap. We've done it for countless manufacturers – in chemical manufacturing and beyond – and we'll do the same for you. Just check out our <u>case studies</u> to discover real examples of real businesses that have solved many of the challenges we've listed here.

Ready to boost your digital know-how and futureproof your business? Get in touch with <u>our experts</u> <u>today</u>. Together, we can empower you to work smarter in the chemical industry.



