The automation of metal production through increased interconnectivity has been brought about by the creation of the Internet of Things. Commonly known as Industry 4.0, this level of autonomous activity is now spreading further along throughout the industry as logistics moves from telephone and fax orders tracked on spreadsheets to machinery with artificial intelligence that orders its own supplies.

In its 2016 report Industry 4.0: Building the digital enterprise – Metals key findings, PwC said: “Companies are planning for a future where much greater horizontal supply chain integration with customers and suppliers is possible across the whole product life cycle.”

The report continued: “Supply chain integration, as well as order management and forecasting, are key focus areas for digitisation investment among steel companies. Such investment is also particularly relevant in the downstream distribution segments and for non-ferrous metals such as aluminium producers, which have a higher automotive or packaging industry exposure.”

Among the companies at the forefront of digitisation in the metals supply industry are logistics specialist Quintiq, steel stockholder and distributor Klöckner & Co, and metal manufacturing software specialist PSImetals.

Matching production to delivery

The approach taken by Quintiq to the digitisation of the supply chain in the metals industry is a holistic one — matching supply (the refining and manufacture of metals) to the demand — effectively an advanced version of lean manufacturing says Ronald Thorburn, global marketing manager, Quintiq.

Quintiq’s software is designed to manage the how and why of delivering finished metals as well as how that movement interacts with the production process of the materials to be delivered as Thorburn, explains: “Quintiq can manage the process from sales and operations planning through production planning and scheduling, while cross-
Quintiq works with metal businesses such as Hydro, Novelis, ThyssenKrupp and Ruukki to integrate, or ‘converge’ logistics across the whole production process from delivery of raw material to the shipment of finished products to the end user, whether for steel, aluminium, or copper.

Established as a software business 20 years ago, Quintiq has dedicated expertise in supply chain planning and optimisation in the metals industry, working with refiners, smelters and mills to optimise the entire production process, to remove delays and anticipate customer demand. In so doing, it removes the need for excess stock to be kept and helps to identify when there might be peaks in demand and plan increased production to match. That means there are no delays for large orders. By working in this way Quintiq can help its users to work more effectively and minimise inventory.

Talking about how this programme is put into practice at the Gartner Supply Chain Executive Conference 2017, Rob van Egmond, ceo of Quintiq (a Dassault Systèmes company) said: “The digitalisation of industries in recent years has provided tremendous opportunities for companies to create and capture value, but not without consequences. With increasingly short product lifecycles, demanding customers and diverse markets, it is getting harder for companies to maintain growth.” He also said that mastering this new level of supply chain complexity is key and that it requires “a new approach one that does not seek long-term planning certainty, but rather, the split-second agility to adapt and evolve when the unexpected happens.”

Quintiq was originally developed to manage any complex planning puzzle within any industry, but it has its original roots in the metals industry. “It just so happens that Quintiq’s very first customer was a leading aluminium manufacturer and that we have done extremely well in this market, but our customers range across the spectrum of manufacturing, workforce and logistics,” Thorburn told Metal Bulletin Magazine.

He explains that the software includes a set of features and capabilities designed specifically for metals service centres. Quintiq provides solutions for primary and secondary smelters, casting facilities, hot and cold mills, extrusion facilities and service centres globally. “We continue to provide technology that supports manufacturing, logistics and workforce planning,” Thorburn said.

Outokumpu, for example, is utilising the Quintiq Metal Scheduler system. The stainless steel producer has expanded its use of Quintiq’s planning software to optimise various areas of its operations, from logistics to forecasting and demand planning. The software has been integrated into the company’s existing SAP system to deliver substantial improvements on various projects.

Quintiq’s first involvement in digitising logistics in the metals industry was with an aluminium business, but it now works with steel and copper producers too
50% and its manufacturing cycles by almost 30%.

**Digitising distribution**

German-based steel distribution business Klöckner & Co has in recent years been focused on digitising its services, stating that its goal “is to implement an industry platform that connects buyers and sellers digitally; with the help of new digital solutions to move towards a more connected, smart and efficient supply chain.”

Speaking at the Digitising Europe Summit last year, Klöckner & Co CEO Gisbert Rühl explained how behind the times the metal industry was in terms of logistics automation and digitisation: “Our industry operates in a very traditional way; little has changed in the last 50 years. Orders are still often placed by telephone or fax. That will be drastically changed by digitisation, by which I mean mainly networking. We are aiming for complete digital networking with customers, suppliers, and even competitors and want to handle all processes via a digital industry platform in the coming year. This will revolutionise the entire industry.”

Klöckner & Co’s approach to the digitisation of logistics is taking place under its ‘Klöckner & Co 2020 strategy’. A key part of this plan was a change to the way Klöckner & Co operates. Having seen how IT start-ups operated in Silicon Valley, Rühl decided to establish kloeckner.i in 2014 as a stand-alone, start-up business in Berlin. Originally comprising just two members of staff, kloeckner.i now employs more than 60 and has spun off an additional operation – kloeckner.v. Rühl says of that new operation: “kloeckner.v invests in best-in-class start-up teams with innovative, disruptive, and scalable business models that complement or extend our digital strategy.”

Among the companies kloeckner.v has invested in is additive manufacture specialist BigRep, a manufacturer of very large 3D printers. When Klöckner & Co announced the investment, Rühl said: “The systematic emphases of our Klöckner & Co 2020 strategy are digitalizing the supply and value chain as well as boosting higher value-added products and services. Our investment in BigRep targets both elements of the strategy, paving the way for our participation in a highly promising growth market.”

One of BigRep’s 3D plastics printers is currently under evaluation at the kloeckner.i offices as the team there consider how it can be used to prototype parts for Klöckner & Co customers. In parallel the German country organization Klöckner & Co Deutschland GmbH is also investigating how metal 3D printers can be integrated into the Klöckner & Co product supply chain, producing 3D printed parts at local service centres.

Another example of cooperation with a third-party business to digitise logistics can be seen in Klöckner & Co’s work with machine tool manufacturer Trumpf, another German business, which was one of its first network partners. Owing to the work already done at kloeckner.i, the steel distributor was able to provide the interfaces needed to get connected to Trumpf’s Axoom Industry 4.0 platform. The ultimate aim of the collaboration is to enable production machines manufactured by Trumpf to order steel from Klöckner & Co autonomously. This will be possible because Klöckner & Co has its online ordering system known as the Contract Portal, and this has already been integrated into Trumpf’s Axoom customer platform.

Digitisation within Klöckner & Co is taking place internally as well as for its suppliers and customers. The company is working closely with artificial intelligence specialist Arago. The steel distributor has integrated Arago’s HIRO artificial intelligence platform into the IT system at two of its US service centres to monitor and correct minor IT issues without the need for human intervention. Talking about how he sees this benefiting the business, Rühl says: “Implementing HIRO into our IT environment is one of the levers for the further digital transformation of our company.”

The most significant change that digitisation is bringing about at Klöckner & Co will happen towards the end of this year when the company launches the first version of its Open Industry Platform. Based upon the existing solutions the new platform will expand the option for customers to not only order steel and steel products from Klöckner & Co, but also from other steel stockholders and distributors. The idea is to allow customers to have a wider choice of products and to make pricing more transparent.

About this change, Rühl says: “With the aid of digital tools we are revolutionising order and delivery processes in the industry. We are creating a transparent flow of information between all of the relevant sections in the supply chain. Not only do we want to provide our customers and suppliers with quick and efficient solutions, but more importantly, we want to make practicability and intuitiveness the focus of our work.”

He explains that with increased digitisation Klöckner & Co can reduce the amount of stock it needs to carry thanks to becoming more connected with its suppliers and being better able to predict customer demand. “The more accurately we can predict sales, the fewer resources we need to keep in stock. The same will apply to our suppliers, once they have the same knowledge,” suggests Rühl.

In summary, he says: “Our goal is to develop an open
industry platform, connecting as many market participants as possible. With the digital tools already in place, we are generating a double-digit sales share, which shows the enormous potential of digitisation.”

**Integrating logistics with production**

PSImetals is known for its production planning software, but it can take the automation of a facility much further and assimilate the business’ logistics too as it has been a long-term specialist in integrating automated production and sees logistics planning as an expansion of that.

The company first began looking at ways to use early PCs in the steel production process in 1969, as Raffael Binder, PSImetals’ marketing director told Metal Bulletin Magazine: “Although the hype around Industry 4.0 is a quite new, the ‘digitisation’ of metals production has been in the company’s DNA since the very beginning.”

PSImetal takes an all-inclusive approach to digitisation within the metal industry, with Binder explaining that logistics should not be considered in isolation in the metals manufacture and supply chain. “It is not only the automation of logistics that is important. Digital material tracking offers additional benefits allowing the integration of manufacturing execution systems, advanced planning and scheduling and enterprise resource planning,” he says.

He explains that without knowing the locations and parameters of all the materials in progress, from raw materials onward, digital production would not be possible. “The implementation of automated transport order generation and management, as well as smart destination finding, provides huge potential.”

This is even more relevant when viewed as an extension of PSImetals production software options, which include production scheduling and production tracking. “It is about supporting the improved utilisation of existing warehouse capacities, optimising all internal transports at both ends of production facilities, and making decisions for the optimum use of the means of transport available in each case,” notes Binder. “Costs can be reduced and the throughput can be increased through optimised warehouse and transport management between lines and plants.”

Despite being able to view the bigger picture of where savings can be made through the use of logistics software, some metal businesses are still reluctant to invest in such IT packages. Binder suggests that the reason for this is that the “benefit of smart logistics is often underestimated at first glance and hence it is difficult to argue for the investments”. However, the subject is, in Binder’s opinion, becoming more commonplace as users begin to realise the potential return on investment.

Binder is optimistic about the automation of logistics. “On a more outbound scale, I expect fast progress in our industry. The producers are more and more globalized with distributed supply chains all over the world and producers are working with RFID tags when shipping material. This area can provide huge potential in the digital landscape.”

Binder also suggests that material logistics is the glue in the production process and that without it the procedure will fail. He points out that: “With new technologies like data analytics it will be possible in the near future to further optimize the process.”

By making use of data analysis, PSImetals is able to take into account material characteristics, such as weight or density, and how they influence storage and transport. For example, aluminium coils need high storage bays for multi-level storing. It is also able to take into account the type of product (independent from material). As Binder explains: “In flat production, single-piece tracking and handling [coils, plates, sheet] is necessary. In the long area [tube & pipe, sections, bars] bulks are the preferred unit to be managed. Sometimes this gets mixed up. PSImetals Logistics has been developed to cope with all of these different requirements in the right way.”

“If resources are not exploited in the best possible way, a valuable potential opportunity for savings is missed. The four areas of logistics covered by the PSImetals software are: transport management; yard management; shipping, planning and execution; and material location tracking. The company has a specific focus on steel flat and long products within those logistical areas,” Binder concludes.