

Smart manufacturing investments

By Myra Pinkham*

No doubt the Covid-19 pandemic has had an immense impact upon not just the global economy but upon the aluminium industry as well. It remains somewhat uncertain, however, what this means for industry's investment in automation, digitalization and other types of smart manufacturing, which even pre-pandemic was somewhat gradual. But while it could be argued that in the future digitalization and automation could help companies to better weather the kind of challenges that the pandemic has brought upon them, there is no question that executives have recently been more selective about which investment projects they are willing to undertake.

"It is fair to say that the global aluminium industry has been lagging some others when it comes to automation and smart manufacturing technologies," Hans Erik Vatne, Norsk Hydro's chief technology officer, admits. "But over the past five years or so the industry has been focusing more on this," he noted.

"Going forward greater automation and digitalization will be the name of the game," in what is increasingly becoming a world of Industry 4.0 manufacturing, Jean Simard, president and chief executive officer of the Aluminium Association of Canada, said. "But it will be the prudent adopters that will be on the winning side of things. That is the only way to approach a market that is shaping up to be quite different from what it had been in the past."

Stefan Koch, global metals lead for SAP SE, agreed, pointing out that while there has been continuous investment in such technologies, at least to this point it has been gradual in nature. "There haven't been any totally disruptive moves resulting in a totally different way to produce aluminium," he explained. "Rather, it has been an evolutionary process with older technologies being slowly replaced by state of the art technology as the automation of the industry keeps on moving on." He pointed out that metals companies – including both aluminium and steel producers – actually have had highly automated production lines for the past 30 to 40 years.

"Recently, with the push for more digital transformation, we are seeing more sensors



come into the game," Koch said, noting that this, along with the development of the technology necessary to do more Big Data analytics, has helped companies to better understand the physical and chemical aspects related to the production processes which companies are looking to modernize, automate and streamline to become more agile.

Another big driver of the aluminium industry's recent technology transformation and innovation, according to Tony Barnes, senior manager of Crowe LLP's metals consulting group, has been security concerns. This, he said, has involved more aluminium companies making sure that their information and people are safe and that their security is modernized by investing in modern security tools – both new hardware and software solutions.

He pointed out that while such moves to update their technology to make sure that they are better protected against security gaps and flaws was already in motion over the past several years, the Covid-19 pandemic has exacerbated the need to plan for such investments, particularly those related to beefing up digital security for a remote workforce. "While 10-15 years ago all of their data sat within a company's four walls, now everyone has mobile devices including laptops, tablets and cell phones, so people are accessing company information from everywhere," he explained, noting that this doesn't only include the company's employees, but also there are third parties such as their customers and vendors, who they want to have access to their information.

This, Koch points out, comes as, at least to a certain degree, the aluminium industry

is under pressure to further digitize, therefore increase the connectivity, of its value chain. He explained that with some of their end use market being impacted by the pandemic, aluminum companies have been under pressure to be more efficient from a cost, environmental and strategic perspective.

One way that aluminium companies

are on par with yours," he pointed out.

Cybersecurity, however, isn't the only area of technological investment that has been impacted, either positively or negatively, by the pandemic. Such investments, however, have been somewhat selective, Koch admitted, with companies making certain investments that are required to increase their efficiency or to achieve certain things they are looking to achieve while choosing not to invest, or to invest less, in certain older technologies or in technologies related to markets that might eventually go away.

Vatne agreed, noting that in general the Covid-19 pandemic has resulted in companies delaying automation investments, explaining that while it is tempting for companies to make

US manufacturing leaders said that they are moderately or extremely concerned about the pandemic's ongoing impact upon their operations, supply and demand and their profitability goals, 62 percent of the leaders surveyed said they are continuing to make smart factory investments. In fact, they indicated that they spent about 20 percent more to such initiatives in 2020 than they had in 2019.

This finding coincides with those of a separate MAPI chief executive officer survey in which 85 percent of the respondents said they either agree or strongly agree that investments in smart factories will rise by June 2021.

The study also indicated that manufacturers are finding that digital transformation is a journey that should



changes that will reduce manpower and will improve cost efficiency. "But if you really need to hold onto your money to keep up your operations, you aren't able to make those kinds of investments into the future right now. He pointed out that this has been a big challenge not just for aluminum, but for all industries.

But on the other hand, Stephen Gold, president and chief executive officer of the Manufacturers Alliance for Productivity and Innovation (MAPI), said, "While manufacturers continue to face a global pandemic and economic and political uncertainty, manufacturing leaders must continue to adapt and in their digital journeys," maintaining that fully connected enterprises allow manufacturers to expand their capabilities, identify cost savings and better prepare for the post-Covid era.

In fact, a recent Deloitte LLP study entitled Accelerating Smart Manufacturing: The Value of an Ecosystem Approach, based upon surveys conducted by both Deloitte and MAPI, with more than 70 percent of

be shared with external partners, Paul Wellener, Deloitte's vice chairman and US industrial products and construction leader, said, observing that companies today are looking beyond the silo of their own organization to establish powerful networks of vendors to source digital capabilities and solutions that drive results.

"These ecosystems are driving manufacturers improvements in agility, efficiency and production at a pace that most companies would struggle to achieve alone," he said, encouraging manufacturers to adopt such an ecosystem approach as soon as possible given that the Deloitte/MAPI study indicates that ecosystem-focused manufacturers have experienced twice the pace of digital maturity and delivery of new products and services and had operationalized 31 percent of their projects vs. 15 percent of projects for those companies that are still focused internally.

While this applies to US manufacturing in general, it is also the case for the

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aluminium companies, which, Simard said, are in a position, especially given the impact of the pandemic, where to remain in business they need to improve their competitiveness, with the best way to do that being to invest in such technologies that bring them towards smart manufacturing, including automation, artificial intelligence and robotics.

However, Barnes says there are two different camps of companies with different abilities to make such investments, especially given current economic conditions – well capitalized companies and others who aren't sure where the pandemic will take them.

He points out that given that the well capitalized companies are in a good position to grow when things come back full steam to pre-Covid levels and that

ovens and smelting capabilities, but also in new information technology solutions to help them determine the purity of their scrap melt.

This is also the case with companies who are increasingly introducing their own brands of low carbon footprint products into the market. Koch said that this push, as well as increased environmental regulations being imposed by certain government agencies, there is an increase need for companies to, at least to a certain degree, prove where some of their raw material come from. That, Simard pointed out, also includes the greenhouse gas emissions for the power they use, although that, he said, is less of an issue in Canada than many other nations given that Canadian smelters are all hydro-powered.

aluminium companies have at least on their short-term radar are less likely to be high capital cost automation or robotics projects. "Instead, they are more likely to concentrate on upgrading their data handling and data analytics capabilities and other investments that aren't very capital intensive, including preventative maintenance applications.

That, he said, is one reason why Hydro is very enthusiastic about the work it is doing on the use of digital twins – a numerical simulation model of the aluminium production process, which could be used to help us to optimize our operations and to make them more stable. "The big things, like automating processes in the smelter or making cranes and vehicles used in the plant autonomous, will have to come later," Vatne said, adding that while Hydro continues explore and test new things through pilot projects, "That is going slower than we thought it would go about five years ago."

But there is little doubt that the aluminium industry will continue to make incremental improvements in the technologies they use. But there are also some limitations inherent in certain phases of the aluminium production process for such movement toward greater automation and robotization, Simard said. For example, the high temperatures and the magnetic fields that are present in aluminium smelters could be a very demanding environment for sensors if they haven't been properly tweaked or adapted for that kind of use. "You can't just transplant existing technology from other, more highly automated industrial sectors and put into a smelter," he noted.

"There will be more automation and more autonomous processes as more confidence gets built into the systems," Vatne said. "We are on our way, although it could take a longer time to achieve than we had previously thought."

Koch agreed, noting that today we are seeing investments in infrastructure aimed to keep companies to run more efficiently as well those supporting the use of more Big Data analytics to help companies understand the physical and chemical processes involved in using aluminium in different products and applications.

That, Koch said, will likely be followed in the midterm by moves to help companies to optimize their production, including technologies give them a better digital view of the physical world and to help them develop more reliable processes, not just at a specific plant but that could even go across companies. And longer term there will also be greater use of such disruptive technologies as additive manufacturing and greater collaboration with other companies. ■



they have the resources to do so, they are investing right now in analytics initiatives and business applications systems. In fact, Koch says that many companies that have already begun to make such investments in digital technologies are actually weathering Covid quite well – in many cases better than their competition. "That is because if you have your processes digitized and put on the platform, he explained, "It is easier to run them from home, which is advantageous during the pandemic."

Koch admits that companies' issues of achieving social distancing at their production lines has been somewhat more challenging, "But in general aluminium companies have been managing quite well," he says. That, he said, includes making a variety of investments. For example, he said that one primary aluminum producer, whose product mix has changed to include more used beverage can recycling due to the pandemic, is not only investing in new

On the other hand, Barnes says that less capitalized companies – many of which hadn't had big technology investment plans on the books even before the pandemic – are generally looking to hunker down, stabilize what they have and focus on riding this through before making any big investments. "While there could be a few companies whose mindsets have changed, for the most part those companies that were already planning such investments continue to do so and companies that were laggards continue to lag in making such decisions," he said.

While he admits that it varies company by company, Simard says that at the end of the day these investment decisions largely depend upon their cost, noting that something that takes three to nine years to get a return on the investment is too risky and will not be something that a company is willing to do at this time.

Hydro's Vatne agreed, stating that at least in the current economic environment, the investments that