

Opportunities in the 4IR space

Yanesh Naidoo, Sales and Design Director at Jendamar Automation, spoke at the NSTF Discussion Forum on Advanced Manufacturing and Automation last year. He looked specifically at the opportunities for South African companies in the 4IR space. More recently he was invited to present a paper at the United Nations conference in Geneva, Switzerland, which considered the impact of 4IR on society.

Leigh Darroll caught up with Naidoo to discuss his views on what he describes as the huge opportunities that 4IR opens up for South Africa and on the African continent, the importance of avoiding an attempted 'copy and paste process' from the developed world, and the chance for Africa to take a leadership role in developing African solutions which would in turn be exportable. This is already happening.

Jendamar Automation designs and builds production lines in two areas of the automotive sector: powertrains and catalytic converters. The company builds lines that meet requirements not only for South Africa but for anywhere in the world. Exports have included a differential assembly line for General Motors and a fully autonomous production line for catalytic converters in the Netherlands, among many others.

Jendamar is a South African company, established 25 years ago, with its head office in Port Elizabeth, a key hub of the South African automotive industry. It employs 320 people. The company today has an international footprint with an office in India, which it opened three years ago based on expected growth of the automotive industry there and responding to India's focus on reducing carbon emissions. The small company that was initially acquired employed some 20 people; currently 220 people are employed in the Indian office. Several years ago, Jendamar opened a sales and service office in Germany so it could interact

with customers in their own language and culture. The service division of the company was established to provide support, which is also the basis for the office in the USA. A sales component is to be developed in the USA in the near future.

The production lines designed by Jendamar are built in South Africa and 95% of all the machines are exported. Naidoo says, anywhere in the world where there is an automotive hub, there are machines that were built in Port Elizabeth.

With this background, Jendamar is well established in the production line business, but the company realised in planning for the fourth industrial revolution (4IR) that future opportunities are likely to be in the digital services domain.

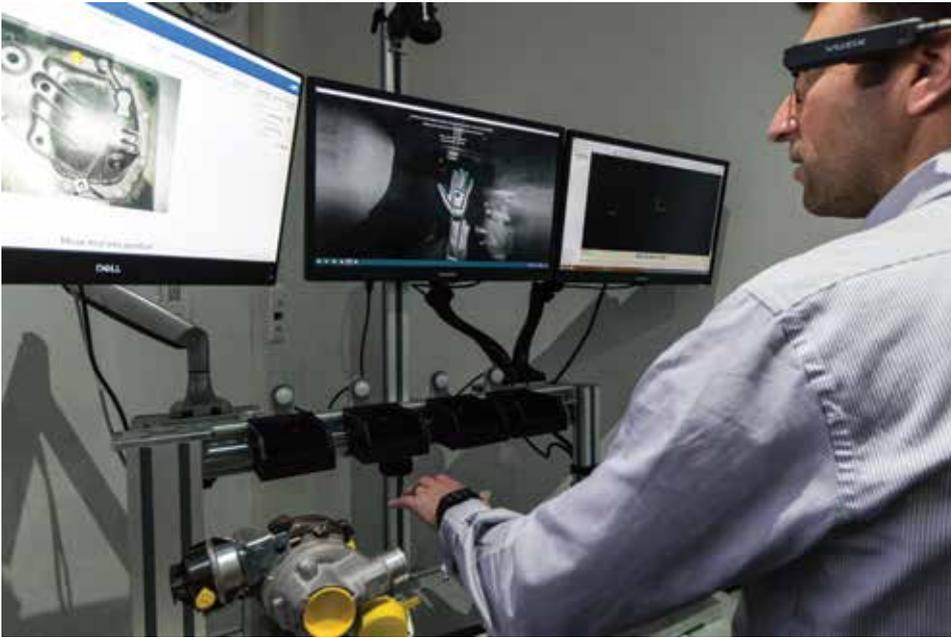
Naidoo says that while Jendamar has proven capabilities and recognised expertise in the design, engineering, manufacturing and commissioning of automotive production lines, it expects such production lines will become commoditised. "For us, it's important to stay at the innovative edge of our sector, so we will continue to produce automotive production lines and at the same time we will be looking to use digital solutions to increase efficiencies for our customers and to deliver more value.

"This is where digital technologies like data collection, artificial intelligence, machine learning and predictive maintenance become valuable. Just as we develop these services for our existing customers, they apply equally to other machines – so such digital solutions open up new markets for us, not only in the automotive sector but in the manufacturing sector at large, in South Africa and internationally."

Naidoo comments on how the automotive sector is evolving. There is a great deal of discussion about electric vehicles but, in his view, the introduction of electric vehicles



A demo session with Jendamar's Odin software set up at a workstation and use of augmented reality glasses to share work instructions for building parts.



At a glance

- Jendamarck, which is recognised internationally for its expertise in designing automotive production lines, is using digital technologies to deliver more value for its customers – and others in the wider manufacturing sector.
- It is developing new business streams based on 4IR technologies.
- Naidoo strongly believes that Industry 4.0 cannot be adopted as a direct import from the developed world to Africa. “Africa has other challenges... We should instead be using new technologies to address our own problems and create African solutions.”

Jendamarck has developed software to create animated work instructions for machine operators and this is now being used locally and internationally.

is taking place more slowly than is portrayed in the media and there are still relatively few in the market. (According to the International Energy Agency's *Global Electric Vehicle Outlook for 2019 – GEVO 2019*, sales of electric passenger vehicles passed the 5 million mark in 2018 and are accelerating fast.)

He says major manufacturers are working in this domain mainly to compete with Tesla – and to respond to the emerging eco-conscious market and demands for climate action. As a company Jendamarck realises that it might be too small to influence the market, but it is still essential for it to be involved. It has therefore targeted some electric vehicle products. For example, about three years ago the company developed the production line for an electric tuk-tuk in India – the production line was designed in virtual reality and built in India.

Naidoo notes that there are some significant differences in the design and engineering of production lines for electric vehicles compared to those for conventional ICE (internal combustion engine) vehicles, particularly for the battery assembly and motors. “We are nonetheless exploring the possibilities and, like other players in this new manufacturing sector, we are learning as we go.”

Naidoo also makes the point that while e-mobility very often gets bundled up with 4IR, it's important to distinguish these two revolutionary thrusts. They overlap really only in respect of energy efficiency, energy storage, climate action, emissions reduction, and by coincidence of timing, but their respective scope and application focus are quite distinct.

He suggests that the impact of autonomous vehicles, ride-sharing, transport-on-demand and related options, which are driven by connectivity and control technologies networked with payment and financial services technologies, will have a greater impact on the transport

market than e-vehicles. “One of the main reasons for this shift is that many young people today do not want to own a car, it is no longer aspirational. We expect to see new car sales declining quite significantly in future.”

Industry 4.0 in Africa

Naidoo strongly believes that Industry 4.0 cannot be adopted as a direct import from the developed world to Africa.

The term is often poorly understood and loosely used to encompass seemingly all new technologies. Going back to its origins, he explains that Industrie 4.0 emerged from Germany in 2011/12. The Fraunhofer-Gesellschaft, Germany's national applied research organisation, was contracted to investigate opportunities for greater efficiencies in manufacturing – in part to advance competitive manufacturing costs and specifically to address concerns around Germany's (and Europe's) declining populations. In Germany, there are not enough young people moving into the workplace to take up the roles of the country's highly qualified but aging manufacturing workforce.

The solution proposed by Fraunhofer was the Industry 4.0 Plan, now known as 4IR, and it is centred on further advancing automation and taking people off the production line. In countries like Germany that are already comprehensively industrialised and widely automated, this will lead to the transfer of blue-collar jobs to robots, which will address the German/European challenge of declining populations.

“But Africa has other challenges,” Naidoo emphasises, “and these need to be understood in order to share in Africa 4.0. Solutions developed to address African problems are then also potentially exportable to other parts of the world facing similar challenges.”

He points out that South Africa and other developing countries – in Africa and elsewhere – face exactly the opposite population picture. “We have a massively

The company has also developed software that allows for management and workers to communicate via the screen that the workers look at all the time: for example, a manager in Germany and operators on a production line in India, can interact on various matters, at any time.



growing population and a burgeoning youth population – without adequate skills. We also have a government with diminishing resources so there is less government money to subsidise industrial development or support skills training.

“These are the main reasons why we should not attempt to copy and paste the 4IR model – developed by and for the developed world – in South Africa, Africa, or the developing world. It simply will not work for us. We shouldn’t even be trying to catch up with the steps the developed world has taken.

“We should instead, be using new technologies to address our own problems and create African solutions. In my view, this is the prime opportunity that 4IR offers us. Africa and African companies can take a leadership role in this arena.

“In SA our aim must be to retain jobs, increase employment and elevate skills levels. So while 4IR will likely see the loss of some blue collar jobs, new technologies, with the requisite skills and reach and entrepreneurial vision, open up possibilities for creating new markets and new economies. We need to use technologies, to solve the problems that we face – in industry, in manufacturing, as well as in education, transport, housing and other sectors.

“If we consider for a moment the jobs and opportunities that a company like Uber has opened up (without any government subsidies) globally, within the space of a few years, or that new technologies have brought to the financial services sector – as well as the benefits of making banking accessible to more people, at lower cost, we can see that the connectivity enabled by new technologies opens up new possibilities. It creates new jobs, requiring new skills, replaces previously familiar roles and increases the number and range of opportunities available. We need to consider completely different ways of working and we need to think differently to see the opportunities.”

Using digital technologies in production line training

At the NSTF (National Science and Technology Forum) Discussion Forum last year, Naidoo outlined some examples of ways in which Jendemark is already using digital technologies to advance its own operations.

“We are aiming to bring humanity back to manufacturing. Where previous industrial revolutions have made robots out of people, we are aiming to use technologies in a more human way.

“People are involved in the efficient running of a production line, and it is important to try to make everyone involved, from the operator to the manager, more efficient at what they do. Training is central to this.

“Some time ago, it was found that the only requirement to become a machine operator in South Africa was a matric certificate. This assumed that applicants could read and thus build an engine from the instructions provided, which was not the case. Pictures are easier for operators to follow, and animated work instructions customised for the field in which they work are considered an even better option. Jendemark has developed a software product to create animated work instructions. This was intended for third world operators, but it is now being sold mostly to first world companies – because everyone follows pictures better than words. This is just one example of a solution to a South African challenge that has become a successful export product.

“Another is in the use of augmented reality glasses which we have introduced for workers on the production line. The use of these glasses removes the constraint of having to work in a position where the screen with the instructions is visible. Being able to move freely increases the productivity and efficiency of operators.

“From a human resources perspective, training on the production line and engagement between management

The virtual reality training machine that Jendamark has developed presents a simulated environment that allows machine operators to walk through different processes, to learn and understand the steps involved.



and operators are important considerations. In order to ensure that management can communicate important information to the workforce, Jendamark has developed software that allows for management and workers to communicate via the screen that the workers look at all the time. In this way, interaction can take place between a manager in Germany and operators on a production line in India, and the messages can include training matters, among others.

“Jendamark has also designed and built a virtual reality training machine which, in a simulated environment, allows operators to walk through different processes to understand the steps involved. This facility can be valuable in training and upskilling operators and a new business stream will be created developing content for virtual reality machines. Such digital solutions to existing problems on the production line can create new revenue streams for companies working in this space.”

At the business management level

Taking a wider view, Naidoo says, “A production line consists of the line itself and above this an enterprise resource planning (ERP) system. There is a bucket above the production line that collects valuable data, which is useless unless analysed by software. The data could, for instance, assist with the ongoing challenge of absenteeism, which currently involves a potentially time-consuming manual intervention. Instead, the system could trigger automatic responses and call up standby personnel, greatly reducing downtime on the production line.”

Noting that production line designers and builders are not best placed to provide the analysis of the data from the bucket system to their customers, he says Jendamark has appointed a specialist small start-up company to design an application to streamline this and other issues. Companies such as this small start-up do not have access to large customers using production lines, but by working with companies like Jendamark, a viable ecosystem is created for all concerned and this becomes a potential export product.

Naidoo emphasises the exponential value of such ecosystems and says that South African companies need to work together rather than competing against one another, especially as many opportunities are outside the country.

Major trends impacting industry

Looking ahead he sees two major technology trends impacting on industry. “Firstly, companies have the opportunity to learn more from current production by analysing long-term data to deliver greater efficiencies. The

information is there, we need to use it.

“Secondly, there is a growing demand for customisation of production – in the automotive sector, in fashion and footwear, in home appliances as well as many other sectors. This will only continue to grow and will see modular production replacing mass production through the years ahead.”

Beyond manufacturing, Naidoo says, “Problems can become opportunities if viewed differently. We have the opportunity to use 4IR technologies to address many of the challenges that South Africa and Africa are facing, and we need to develop the skills at the same time.”

He recognises that all new ideas, new technologies and initiatives will bring their own challenges and unexpected outcomes. “We need to approach these openly – to generate new solutions.”

<https://www.iea.org/reports/global-ev-outlook-2019>

1800	Industry 1.0 – water and steam power are used to create mechanical production lines
1900	Industry 2.0 – electricity lets us create a division of labour and enables mass production
1950/2000	Industry 3.0 – information technology systems automate production lines
2010 + NOW	Industry 4.0 – IoT and Cloud technology automate complex tasks and accelerate efficiencies.

(By courtesy of Jendamark)