

Skills for advanced manufacturing and automation

The National Science and Technology Forum (NSTF) recently hosted a Discussion Forum looking at how new technologies in the Fourth Industrial Revolution (4IR) have the potential to transform and advance manufacturing industries in South Africa. The discussion forum explored the current context, a range of initiatives in this environment and what is realistically feasible considering the challenges the country and the manufacturing sector specifically are facing.

The discussion forum was held over three days in Cape Town in September and was coordinated by the NSTF proSET sector (professionals in science, engineering and technology) in parallel with the South African Innovation Summit.

The Intsimbi Future Production Technologies Initiative was highlighted by a number of speakers, including Ilse Karg, Chief Director: Future Industrial Production Technologies, Industrial Development Division (IDD) at the Department of Trade and Industry (the dti), and Johan McEwan, CEO of the Production Technologies Association of South Africa (PtSA).

The initiative is a partnership between government (the dti and the Department of Higher Education and Training), the PtSA and industry. It is a talent-driven innovation model and the pilot is already showing success. McEwan said, to date, some 2 500 students have been trained and 95% of them are employed in the manufacturing sector.

The initiative is run by the National Technologies Implementation Platform (NTIP), a project management company owned by PtSA. At the discussion forum it was covered in more detail by Dirk van Dyk, CEO of the NTIP.

Van Dyk said Intsimbi exists as part of the solution to ensure South Africa actually has manufacturing industries in the future. The programme is seen as one of the systemic solutions to industry's needs for advanced manufacturing skills and it is already in process. It focuses on skills development and training as well as building enterprise competitiveness in the advanced manufacturing sector.

Van Dyk said, with the changes in industrial manufacturing technologies brought about with 4IR, traditional manufacturing skills are no longer adequate and we need to look at future skills required for production systems. The disruptive

environment is placing jobs at risk and the manufacturing skills gap is widening globally.

Van Dyk said the manufacturing sector in South Africa is tackling the problem directly to stop the sector's decline. We need to learn from Germany, China, Korea and the USA where manufacturing sectors are growing, he said.

The future will entail cooperation between people and technology and hybrid systems. From a manufacturing perspective, van Dyk said, the human element cannot be de-coupled completely from the process because of the human capacity for innovation. Consciousness and creativity are not inherent in machines. It is important to understand the partnership between people and technology to move forward from present training curricula, which restrict students' employability.

Industry associations including the PtSA, the Manufacturing Circle, SAIMC and smaller organisations such as the Welding Association, agreed to support an industry-led programme. This led to the formal partnership between industry and the dti and the foundation of the Intsimbi Future Production Technologies Initiative.

The programme bridges skills, enterprise development and funding, and is systemic rather than curriculum-based. It is a sustainable solutions-based approach to developing the competitiveness of industry, encouraging the creation of new businesses, facilitating the deployment of talent and skills and creating innovation capacity in the sector.

It starts with identifying talent. The skills development and training process is based on a proprietary ICT platform that comprises nine components in a blockchain-controlled environment. Based on global industry standards, it moves to learning frameworks and then student networks leading to modular knowledge and competency. The process then moves to practical learning, the factories network, localisation and possible creation of incubator businesses and new business development. Customised training programmes, based on industry needs, are compiled from existing modules developed internationally.

Learning pathways can be adapted to the individual and their talent profile. It's about packaging curriculum content into frameworks that develop competencies to meet industry needs.



Intsimbi is using existing international standards rather than "taking years to develop a South African standard," van Dyk said.

Students work on modules – on the platform – and the modular components on the system are made available free of charge. Technology companies and manufacturing businesses have put their training material on the platform and provided equipment for the practical learning labs/factories. The exchange is clear, van Dyk said. If companies want students to understand their systems, they must supply the material. Industry provides the curriculum content and the methodologies. The flexible, modular system accommodates this and allows for content to be upgraded quickly.

Students can select a company to work with, book time and train on high-end machinery. As well as covering theory and practical sessions in advanced laboratories, the guided programmes include a minimum of 40% time on the factory floor in on-the-job training – all to be completed within a year, whether the student is an engineer or a machine operator.

A key aspect of the Intsimbi approach is that it enables the individual student to take their education into their own hands. AI built into the system tracks each student and suggests what is needed to assist with skills development and in building confidence levels. Support is also built in, van Dyk said. For example, teachers can be booked as facilitators and remedial help is available, as is extra content for difficult areas.

The programme is looking to engineers and highly skilled and experienced people to assist with theory and on the practical side of the programme. Social workers assist with personal skills and are

available to help students deal with life challenges they may face.

It's a creative environment where students are allowed to test and stress, van Dyk said. This is where innovation and learning happen.

Another important aspect of the programme is that with each student's information on the system, companies can assess potential employees' competency levels. Where entrepreneurial skills are noted, these can be developed through the company incubation track or supplier development programme.

The Intsimbi programme is being piloted in South Africa and has a national footprint with well-equipped training facilities for basic training, advanced training and advanced manufacturing training. Trade tests have been included in the facilities provided. It already has a nine-year track record and has proven successful.

Van Dyk highlighted that the current student retention rate is 80%, with an average 86% permanent placement rate. In the time a student is in the programme, they reach the competency level needed. Students do not go home without some skills that will get them a job, he said.

Each student is employable after a short period of time and then keeps building on their employability. They can migrate in and out of the system. It's completely modular, flexible and self-regulating.

It is a solution supported by industry. "We see this as key to overcoming unemployment and halting the decline in the manufacturing sector. We have demonstrated that the model works. We now need to see it incorporated into the mainstream – in terms of policy and public education and training institutions, colleges and universities," van Dyk said.

The NSTF provides neutral collaborative platforms where different sectors meet on different issues.

- One of the NSTF's functions is to hold discussion forums, bringing together the private and public sectors to address important issues and engage with government policy.
- Feedback from these discussion forums is given to stakeholders.
- Recommendations are put forward to government as part of the SET community's lobbying efforts.