Tackling technological challenges

South African equipment suppliers to the pharmaceutical and cosmetics manufacturing industries provide solutions for a variety of needs, ranging from greater efficiency to all-in-one offerings. By Nikita Geldenhuys

In his State of the Nation address, presented to parliament on 17 June 2014, President Jacob Zuma said South African companies, particularly those in the manufacturing sector, should be taking advantage of the weaker rand and stronger global recovery to export more goods.

This call is echoed by pharmaceutical and cosmetics manufacturing industry experts who believe the key to expanding these local sectors is to find new export markets.

For manufacturers of medicines and cosmetics this would mean growing production capabilities and increasing efficiencies to cope with larger quantities.

The case for going local
Many of these producers shy away from investment in new, more efficient processing and manufacturing technologies, thinking it will have to be acquired from overseas suppliers at great procurement and installation costs. Local suppliers such as MGSA Consulting, PA Cuthbert, Stewart & Brierley, and Walter Sebler have brought world-class machines to the doorstep of South African manufacturers. Their technologies present the best that top international equipment manufacturers have to offer.

The locally manufactured technology of PA Cuthbert, for instance, boasts ISO accreditation and membership to the Southern Africa Stainless Steel Development Association and international Trace association. Its machines come with installation, qualification, operation and production certifications, which it offers at a fraction of what these documents would cost if procured overseas.

“We manufacture some of our equipment ranges locally which means we may be able to offer a machine at a significantly lower cost than its imported equivalent,” explains Wilhelm van den Hoever, MD of PA Cuthbert. The benefit of relying on locally manufactured solutions is that customisation of machines can be done by a South African team on site and makes automation more affordable for businesses.

Equipment suppliers are finding that pharmaceutical manufacturers in the country are greatly automated, as the local and regional demand for their products justify the investment.

“We’ve seen that even smaller pharmaceutical manufacturers are able to automate with improved processing and manufacturing equipment as it’s slowly becoming more affordable to do so,” says Myles Davis, a director at MGSA Consulting, a newly launched supplier of pharmaceutical and cosmetics equipment.

“It’s also encouraging to see the technology gap closing as new cutting-edge solutions filter down from exclusive use by large producers, to smaller manufacturers.”

The development phase
As manufacturers develop formulations and create small consignments of new products, the demand arises for machines that can produce laboratory and pilot-sized batches for research and testing purposes.

Laboratory equipment supplier, Separations, now offers the microMatrix, a scaled-down small bioreactor, which is said to be one of the latest innovations in
The modular system of the FreDrive mill

R&D technology for pharmaceuticals and cosmetics. Bioreactors are typically machines that hold reaction vessels in which cell or enzyme-mediated biological reactions can be performed. They are also used to develop bio-pharmaceuticals or to cultivate biological ingredients for high-end cosmetics, such as micro-algae.

‘The micro-Matrix runs 24 independently controlled bioreactors in parallel, and as such it is extremely useful for process optimisation and development studies,’ explains Jeff Verlinden, divisional manager of biopharmtechniques at Separations. Produced by Applikon Biotechnology, this micro-bioreactor is characterised by a square cassette design, which maximises mixing and optimises gas transfer during the R&D of products that include biological organisms.

‘It allows parameters such as pH, temperature, dissolved gases and individual liquid additions to all be independently controlled and allows manufacturers to streamline manufacturing yields on the smallest of scales,’ Verlinden explains.

The PC-based human interface of the machine reflects Applikon Biotechnology’s popular setup and offers simple, intuitive interaction with each of the bioreactors. Integrated LEDs indicate the status of the reactors with colour-based feedback so that operators receive instant process information.

For developers who are ready to take their formulations to the next phase of creating small test batches, equipment supplier Walter Siebler offers new laboratory scale process plants.

The company is distributing the China-based IKA group’s Magic Plant to answer to manufacturer’s demands for small scale processing equipment. The new system is used for batch-wise mixing, homogenising, emulsifying and forming sample suspensions of up to 2L of pharmaceutical or cosmetics blends. Whether it’s involved with the manufacturing of liquids, pastes or powders, the machine enables a seamless transition from product development to production scale.

Three configurations of the Magic Plant are available. The basic configuration is recommended for mixing and homogenising of liquids and pastes, while the in-line model is ideal for the processing of fine and stable emulsions and suspensions. The Magic Plant Powder allows for efficient and gentle mixing of free-flowing solids.

Steps toward efficiency

As a first step towards efficient processing and automation, manufacturers of pharmaceuticals and cosmetics should consider the implementation of technology that eliminates intermediate stages of production while improving product quality and reducing processing times. The Silverson high shear and in-line mixers, locally distributed by Stewart & Brierley, achieve this.

These machines are said to be capable of reducing mixing times by up to 90 per cent thanks to the high shear mixing action of rotor and stator workheads, which also ensures that emulsions are uniform and stable.

The workheads are rapidly interchangeable, which allows for the modification of the mixers to also emulsify, homogenise, solubilise, suspend, disperse and disintegrate solids.

The in-line mixers are suitable for hazardous and aggressive chemical service and have self-pumping capacities from five to 50 000 gallons per hour. A multi-stage inline mixer is also available and quadruples a number of shearing actions per revolution of the rotor, resulting in substantially faster mixing times.

A new milling system by PA Cuthbert offers manufacturers the ability to boost efficiency even further. The newly developed FreDrive multifunctional mill from Swiss equipment manufacturer, Frewitt, offers three easily interchangeable mill heads, which allow users to quickly convert from one process to another. It enables grinding, fine grinding, and controlled screening of powders and granules.

The Swiss manufacturer’s development department has worked intensively on this modular milling system, which not only brings together the conical reduction of powders and granulates in cosmetic and pharmaceutical blends, but also the control screening and fine grinding in one machine.

The FreDrive is considered highly cost-effective as customers who were previously obliged to invest in three mills, now only need one machine.

Quality is the key

The South African market isn’t lacking at all in high-tech testing and detection technologies. The Q-Sun xenon test chamber from Q-Lab, as an example, has just made its local debut via the newly formed Avatar Solutions. Its technology enables state-of-the-art, full-spectrum photostability test exposures for pharmaceutical and cosmetics applications.

Q-Sun testers are available in two sizes with options that meet the guidelines for photostability testing of new drug substances and products as set by the International Conference on Harmonisation (ICH). Often used to test sun care products, the chambers are seen as an ideal solution for ICH because of their excellent simulation of sunlight. Light testing is an integral part of stress testing new active substances and medicinal products.

The Xe-1 in the Q-Sun range is available in a convenient tabletop size and offers an optional chiller. For laboratories that need
high throughput, the Xe-3 is a freestanding unit with triple the capacity of the Xe-1.

Automation Techniques has made cutting-edge metal detection equipment available locally by commencing with the distribution of the improved Insight pharmaceutical metal detector by Lock Inspection Systems.

Keeping pace with pharmaceutical industry demands, this advanced system, unveiled at Interpack 2014, is designed to help manufacturers maintain product integrity, whilst also accommodating different elevations of tablet press outfeeds.

The improved detector has enhanced stability, which counteracts any surrounding noise pollution that may cause false contaminant readings and increase product wastage. Hygienic according to FDA standards, the machine’s new frame is now height adjustable and has a new clamping sleeve, making it easier and quicker for operators to move the piece of equipment between production lines.

Another improvement to the Insight is the hygienic two-piece product chute, which is made of white acrylonitrile butadiene styrene plastic with a clear acrylic upper piece for easy viewing of the product during the inspection process.

The automation challenge
While it’s clear the latest technology – from R&D equipment to processing and testing machines – is available to South African manufacturers, automation still doesn’t come easy for many businesses in the country.

‘The current challenge to automation in our country is that manufacturers find it difficult to use solutions from one supplier,’ comments Davis. ‘MGSA has found that these businesses struggle to source machinery from a single equipment manufacturer that can cover all their technology needs.’

As such, businesses are using machines from various equipment suppliers which can become a problem when these technologies have to connect to one another to form an efficient processing line. Getting the software of these individual machines to communicate is a complex process.

This is where a complete turnkey solution is a more effective option. ‘But,’ says Davis, ‘turnkey solutions are expensive, and the reality is that the size of our local markets, especially the cosmetics one, doesn’t place businesses in a position to automate.’

He suggests that manufacturers automate in stages through an equipment supplier such as US-based Vanguard, which not only offers turnkey solutions, but also individual machines from its turnkey ranges.

Distributed by MGSA, Vanguard’s range of fluid bed processors, granulators and pharmaceutical blending systems is a reliable entry of medium level equipment for cosmetics and pharmaceutical producers. For processing, this supplier offers autoclaves, freeze driers, mixers and pharmaceutical ovens.

‘This company offers value for money through a wide range of machines that can cover most manufacturing needs of these industries,’ explains Davis. ‘All associated software and supplies are sourced from the US and are therefore of high quality.’

Businesses can buy pieces of the Vanguard turnkey range as and when they can afford the investment, and slowly build their manufacturing lines until they have a complete turnkey.

While the local pharmaceutical and cosmetics industries may be growing at a slow pace and will have to build itself up piece by piece, their steady investments in cutting-edge manufacturing technology will prepare them for the demands that a more vibrant economy will bring in the future.

Automation Techniques – www.automation.co.za
Avatar Solutions – www.avatar-solutions.co.za
MGSA – www.mgsa.co.za
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