



Proudly SA PTFE manufacturer supplies the world

MechChem Africa visits the PTFE (polytetrafluorethylene) facilities of Trident Plastics and talks to operations manager, Louis Botha about the manufacturing process and the company's niche offering.

Trident Plastics is a specialised manufacturer of PTFE products, which are widely used for industrial valve components and other sealing solutions. "We are a Proudly South African company that produces all of our products here in our Boksburg facility and we have been a PTFE specialist in this country since 1998," says Botha.

After having traded in the local market as Hardomid Plastics for many years, Trident Plastics was recently bought out by one of its principal customers and immediately started to expand its market to also include European OEMs. "Various industries and markets have been supplied by Trident Plastics, but the company's strongest footprint is in the valve industry where Trident's products are used to seal industrial valves internally and to atmosphere according to highest international standards," says Botha.

Trident Plastics supplies both semi-finished components and completely machined PTFE parts. Latest state-of-the-art machinery is used to manufacture PTFE billets as well as finished components from the smallest micro parts to big and heavy PTFE liners. Recent investments into new production capabilities enable the company to meet

highest international quality demands and to supply the market in very short lead times.

According to MD, Erich Ermel: "Highest quality supplied with short lead times is our strength and what we strive to constantly improve."

The company's new Boksburg premises were acquired in order to cope with increasing demand from the market. "Our new premises allow us to further improve our workflow and, additionally, we have installed fully air conditioned production facilities according to latest state-of-the-art technology, which sets a new benchmark in the PTFE industry. Trident Plastics keeps a wide range and high volumes of PTFE powders in stock to keep the delivery reliability high and to be less dependent on the volatile PTFE raw material market," says Botha.

"The international market demands more from a supplier than products. Customers expect us to develop components according to their very specific needs," he adds. "This is one reason why the company has set up its own design and in-house laboratory

PTFE bellows with metallic flanges to compensate for axial, radial- and angular displacements of pipelines.

facilities where products can be developed and tested according to exact specified requirements."

Describing the need for PTFE in the valve industry, he explains that PTFE is an ideal contact seal material because of its low friction coefficient, good sealing capabilities and excellent chemical resistance. "Ball valves, butterfly valves, plug valves, safety valves and many other types of industrial valves use mainly PTFE components for internal and external seals and both valve manufacturers and valve repair companies use our PTFE parts to achieve reliable tightness that withstands the chemically corrosive media used in chemical processes," he explains.

Parts manufactured start from simple sealing rings up to large and complicated components where excellent tightness and safety is mandatory. Trident Plastics supplies internationally renowned valve OEMs in large quantities "but we also supply small and local valve refurbishment companies who have very specific demands".

On a tour of the Boksburg facility, Botha starts at the raw material store, where sealed boxes of raw materials imported from Europe are stored. "We import different PTFE powder mixes. The white PTFE is pure and known as virgin PTFE. It has the best chemical resistance in the range," he says, warning that the powders should never be touched as even the smallest amount of contamination can impact the material's properties.

As well as virgin PTFE, glass-, carbon-, graphite-, bronze-filled and other powders are also imported, depending on prevailing client needs. "Carbon- and graphite-filled PTFE offer a longer wear life under wet or dry conditions and are suitable for use as high

temperature bearing materials, particularly when a load bearing capability is required," Botha explains, adding that glass-fibre-filled PTFE, with glass percentages varying from between 5 to 40%, offers improved compression and wear properties. "Bronze-filled PTFE has better hardness and size stability and is used for tubes and seals in the hydraulics industry and for compressor wear, piston and bearing rings," Botha informs *MechChem Africa*.

Using one of the hundreds of moulds designed, collected and manufactured by Trident Plastics over the years, powders are then pressed into near-product billet sizes or component blanks. "After inserting the correct mould, the powder is weighed to the exact quantity required and then poured into the mould. It is then cold pressed into billet shapes of anywhere between 20 and 520 mm in diameter," Botha explains, adding that the compression ratio by volume is about or 3:1 under pressures of between 1.5 and 3.0 MPa.

"When removed from the press, the material is un-fused and very brittle. It is then transferred into one of our ovens for sintering at between 360 and 370°C and, depending on the size and wall thickness, it takes up to 18 hours to fully 'cure' a billet – and some large blanks take 56 hours to cure," Botha tells *MechChem Africa*.

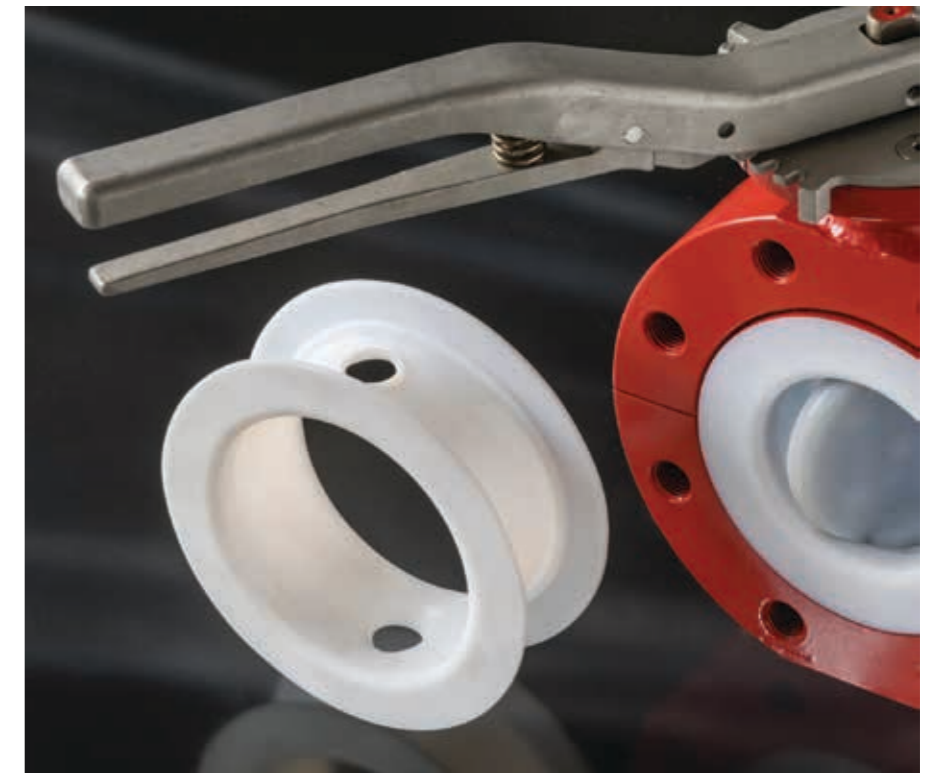
Botha points at a big billet with a hollow core destined for use in making PTFE skived tape. "This is a skive billet that will be placed on a machine with a shaving knife to produce the ultra-thin skived tape," he explains.

Sintered billets are a key product for Trident Plastics, for use by downstream valve and other product manufacturers, which machine the PTFE components they need in their own workshops. "But we also have our own machine shop for manufacturing custom designed components, our niche being valve seals and seats," Botha says, taking us into a machine shop next door where components are being profiled, chamfered, threaded and sized.

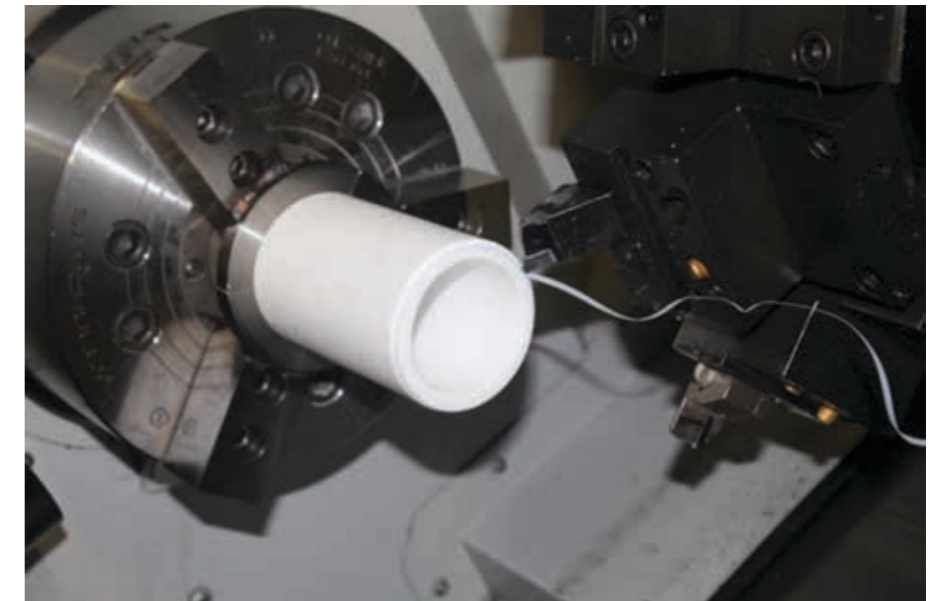
"We often have to use sophisticated jigs to hold the PTFE blanks for the likes of ball valves. And another factor complicating machining processes for PTFE is temperature. The material is more flexible when hot, so responds differently to machining, so one needs to be very aware of temperatures – one of the reasons for the air conditioning," he notes. "While the process is simple in principle, there are many subtle complexities that can trip up inexperienced people," he adds.

On the waste side, Botha says that the company strives to keep the blank sizes as near to the finished size as possible to reduce waste, both for cost saving and for environmental purposes.

"While we don't manufacture or assemble



PTFE liners for Butterfly valves.



Machining of PTFE components on multi-axis CNC machines.

valves, some customers will send us a stripped down or re-machined ball or butterfly valve for us to take accurate measurements. We will then manufacture a billet and machine a seal to suit the new size. And this service is available to any valve manufacturer and any valve brand," he assures.

Describing its properties, Botha says that PTFE is a thermoplastic, but due to its high viscosity, it cannot be processed using conventional polymer processing techniques. "PTFE has to be first processed cold during shaping/pressing operations, followed by hot sintering to fuse the particles. It can also be welded, though, should a particularly large billet or component be needed.

"Generally, PTFE is a tough, flexible, non-resilient material of average tensile strength but with great thermal properties, a very low friction coefficient and excellent resistance to chemicals," he says. "The list of applications of PTFE is almost endless. Its excellent properties lead to its use in numerous everyday applications, from the plate support rings in almost every microwave oven, to pots and pans and even clothing," he says.

"In the industrial space Trident Plastics has now become a global specialist in the design and manufacturing of PTFE solutions for parts used in chemical, petrochemical, food and beverage applications, as well as a host of machinery seats and seals," he concludes. □



Ball valve seats and packings in various materials for different applications.