

Wear Reduction Technology puts sustainability upfront

With its extensive global footprint of pumping equipment – especially the renowned range of WARMAN® AH® pumps – Weir's years of continued investment in Wear Reduction Technology (WRT®) components is furthering mining sustainability.

Marnus Koorts, General Manager Original Equipment at Weir, highlights that pumping operations have historically been energy-intensive, leading Weir to make efficiency a central focus of its research and development commitments. Core to the company's purpose is to make its customers more sustainable and efficient, and to create a better future for the world.

"In combination with designing new pump models, we sought to enhance our current models as well as to deliver superior wear life and energy efficiency," explains Koorts. "This was the most effective strategy given the established popularity and wide installed base of our WARMAN AH pumps, for instance, which are used by almost every mine in the world."

The advantage of using WRT® components – which began as an upgrade developed specifically for the WARMAN® AH® pump range – is that it seamlessly integrates into existing infrastructure. Customers therefore gain the energy saving benefits without extra capital investment.

"We wanted to engineer an innovation

that would be easy for the market to adopt, so our strategic goal with this endeavour was to develop a solution that would enhance our current products," he says. "It's worth noting that Weir was focused on improving efficiencies long before sustainability became such a widely accepted concept in mining and other industries."

He emphasises Weir's two-phase approach to R&D; beginning with scientific work on the design, such as finite element analysis and hydraulic simulations. The process then moves to the physical testing of the product in the field. This ensures that all innovations are well proven before being released.

"The result is that the WRT component upgrade allows our pumps to last, on average, about 30% longer – with some instances of the pump lifespan being more than doubled," he says. "Importantly for users' operational costs, the WRT components leads to a 3 to 5% saving in energy consumption. Multiply this by the large number of our pumps in operation and there is truly a global impact."

Central to the success of the WRT®



Marnus Koorts, General Manager Original Equipment at Weir.

components is their improved hydraulic efficiency. Traditional pumps experience energy losses due to turbulence and inefficient fluid flow which the WRT® throatbush and impellers address through optimised design, as well as enhanced tolerances and manufacturing precision. As modern technology has facilitated the evolution of complex patterns and moulds, Koorts explains, there are more opportunities to design more complex and intricate surfaces.

"The WRT impeller features four vanes that guide fluid more efficiently, reducing turbulence and minimising energy loss," he explains. "Unlike older impellers with steep vane angles, the WRT impeller's profile is designed to improve flow characteristics."

Other innovations were designed to guide fluid more efficiently and to mitigate against the creation of eddies. These are swirling circular currents of fluid that form within the volute, usually due to turbulent flow, making fluid move in a direction opposite to the main flow.



Left: Engineers at Weir work on designing components before moving to physical testing in the field. Right With three manufacturing centres in South Africa, Weir has the capability to assemble pumps locally.



WRT technology has also been developed for Weir's Envirotech range of pumps.

"When fluid and material spin off the edges of the impeller it means lost energy – as it counteracts the intended flow direction," he explains. "Our design innovations not only improve efficiency, but also reduce the internal wear on components."

The WRT® design has also minimised the surface area of the impeller by reducing the number of vanes from five to four – creating more space for the material to flow while still delivering the same duty. The throatbush also plays a crucial role in fluid transfer, working in tandem with the impeller. In WARMAN® pumps with WRT® components, there is a smaller gap between the throatbush and impeller to reduce recirculation losses and enhance efficiency.

Underpinning these technical advancements is Weir's local investment in production capacity, which allows the company to cast and machine its pumps and components locally. This includes casting facilities in Isando and Gqeberha, as well as the capability to press rubber components and assemble the final products.

The improved efficiency from the WRT® component upgrade has another important benefit, he points out, by decreasing the net positive suction head (NPSH) required

– which translates into a smaller sump requirement. As these sumps are important aspects of civil engineering infrastructure in many plants, and can be sizeable, they represent a significant cost for new projects.

"By operating with less energy, pumps equipped with the WRT design allow users to build smaller less costly sumps to achieve the same effect," says Koorts. "This also helps to overcome the risk of sumps being under-specified which, in turn, can lead to cavitation inside the pump. In fact, many users who faced challenges with regard to cavitation were able to address this issue by specifying a WRT upgrade for their pumps."

Production flexibility is highly valued across industries, enabling increased throughput to meet demand surges. The WRT® component system plays a key role in enhancing efficiency, supporting this adaptability. Production levels in a process plant, for instance, are often constrained by the power output of the pump motors.

"The 3 to 5% energy savings from the WRT system gives a boost to those plants which are running their pump motors at full capacity, but are still looking to push the production envelope," he says. "They don't want to replace entire pumps to do this as

this is costly and operationally disruptive. Instead, these operations can retrofit WRT impellers and throatbushes – to allow the same motor to deliver more."

He points out that the innovative WRT® components are interchangeable with the classic WARMAN® pumps. The customer therefore does not need to replace their older pumps and can simply replace the components as they wear. This has already allowed a large proportion of the customer base to adopt the latest energy efficient options.

"In Africa, for instance, all new WARMAN AH pumps sold contain WRT technology, and a majority of our existing WARMAN AH pumps have already been converted," he says. "This indicates clearly that the WRT component upgrade has seen a very positive uptake in the market, indicating that most of our customers are benefiting substantially."

Koorts notes that Africa is also home to a large installed base of ENVIROTECH® pumps, leading the company to create WRT® solutions for this popular range too.

"We want to continue investing in Africa and in the technologies currently in use, so it made sense to apply WRT technology to the ENVIROTECH range," he says. "The result is that – for the past two years – all these pumps have been supplied standard with WRT, and more than half of all our ENVIROTECH pump spares sales are now WRT designs."

While the sustainability drive is often most visible at corporate level, he highlights that Weir is proud to make a direct contribution to meeting customers' environmental, social and governance (ESG) goals at operations level – in many cases without the plant even realising the scale of the benefit being achieved.

"In addition to the savings and performance improvements on the level of customer sites, Weir is proud of the impact that these efficiencies are having on global sustainability goals," concludes Koorts.

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Weir has a large installed base of Warman AH pumps supplied standard with WRT components.