



# New Treatment Plant Cuts Mittal's Discharge to Zero

Weir Techna SA, represented locally by VWS Envig has handed over a fully commissioned water treatment plant to Mittal Steel South Africa in Vanderbijlpark. The R100-million water treatment plant will cut the steel producer's liquid discharge down to zero. VWS Envig was created earlier this year through the merger of Weir and Veolia Water Solutions.

**W**ith a focus on delivering complete water treatment solutions that benefit both customer and the environment, this project showcases the company's extensive research capabilities and its ability to draw on vast international resources and expertise. According to VWS Envig General Manager – Design and Build Projects Francois Gouws, the water treatment project was necessary in order for the steel manufacturer to reduce the environmental impact of its operations. It forms part of

Mittal Steel's larger R1-billion environmental plan designed to help the company to meet the highest possible environmental standards.

"In addition to treating water efficiently, the plant needed to be cost effective both in terms of capital and operating costs. The primary objective of the plant is the removal of hardness and suspended solids from the main process water circuit and the removal of salts from the blowdown water from various unit

processes within the steel mill, for example, the cooling towers."

VWS Envig executed the project on a turnkey basis, the scope of which included design, detailed engineering, project management, procurement, construction, commissioning and testing.

"After an extensive study of the plant's requirements, and internal laboratory work, we designed a unique combination of technologies, tailor-made to ensure optimum

efficiency, cost effectiveness and the highest quality of water. The solution combines various technologies, namely clarification, media filtration, reverse osmosis (RO), evaporation and crystallisation.

"The result is a zero liquid discharge plant. The process water is treated at a rate of up to 2 000 m<sup>3</sup>/h and, once treated, is reused within the plant as general utility water. The waste sludge generated in the process is dewatered and sent to a landfill," says Gouws.

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The blowdown water is treated at a rate of up to 220 m<sup>3</sup>/h, but with its high concentration of salt, it is not suitable for direct reuse within the plant. The dissolved salts are removed through membrane separation and evaporation and the plant therefore provides a suitable salt sink from the overall water circuit. The final waste from the plant consists of dewatered crystals. This is sent to a landfill for disposal. Stormwater from around the plant is also treated, and a portion is reused.


The process involves pre-treatment of the water, which includes lime and soda ash softening, clarification, sand filtration and granular activated carbon filtration. The RO process consists of a two-stage brackish water RO (BWRO) phase, including cellulose acetate membranes in the first stage and composite polyamide membranes in the second. The evaporation stage includes a double-effect evaporator with thermo-compressor, while the crystallisation stage employs a single-effect forced circulation crystalliser with thermo-compressor.



*Mittal Steel South Africa's zero liquid discharge plant.*



*Process water is treated at a rate of up to 2 000 m<sup>3</sup>/h and is then reused.*

Gouws notes that during commissioning experts from French parent company, Veolia Water Solutions and Technologies, were called in to assist with the blending of the various streams of feed water. "The plant was fully commissioned at the beginning of this year and in addition to limiting its effect on the environment, Mittal is also lowering its water consumption by using the reclaimed water." 

#### **MORE ABOUT THE VANDERBIJLPARK PLANT**

Vanderbijlpark is one of the world's largest inland steel mills, and the largest supplier of flat steel products in sub-Saharan Africa. The plant employs some 5 200 staff.

The plant's steel products are manufactured in an integrated process. Raw materials such as iron ore, coke and dolomite are charged to blast furnaces where they are converted to liquid iron. Then the liquid iron is refined in basic oxygen furnaces and electric arc furnaces to produce liquid steel.

The liquid steel is cast into slabs, which are hot rolled into heavy plate in a plate mill, or into coils in a strip mill. The coils are either sold as hot-rolled strip or processed further into cold-rolled and coated products, such as hot-dip galvanized, electrogalvanised and pre-painted sheet, and tinplate.

Vanderbijlpark has two blast furnaces, three electric arc furnaces and three basic oxygen furnaces.

*Source: Mittal Steel South Africa website*