



## TWO FERROGLOBE CALCINERS = ONE THEISEN SCRUBBER PLANT

At FERROGLOBE PLC eMalahleni, South Africa, also known as Rand Carbide Witbank, the two existing anthracite carbide calciners were connected to the new single THEISEN Disintegrator Scrubber Plant during 2019/2020. With this One-For-Two-Solution, effective environmental pollution prevention and the individually optimized processes of both furnaces has been achieved; providing full operational flexibility coupled with high safety level at significantly reduced investment costs and sustainably reduced operational costs.

The THEISEN Disintegrator is remarkable technology in that:

- it is proven to be the most effective Scrubber to remove particles and gaseous compounds in the off-gas far below the legal requirements
- it provides process and operational benefits by intrinsically safe handling of toxic and potentially explosive (CO/H<sub>2</sub>) gas, having an ID fan function, controlling furnace pressure and boosting the clean gas to the downstream stack or gas consumer system

all in one machine.

With the installation of only one Disintegrator servicing to the two Ferroglobe calciners, the machine's flexibility is used to further raise the operational benefits, without compromising the primary function of pollution prevention, whilst reducing investment and operational costs.

In the new system, the CO / H<sub>2</sub> gas mixture carrying high pollutant loads are passed through the counter-current cooling and pre-cleaning Gas Coolers, the flow and furnace pressure Control Flaps and the intrinsically gas-tight water seal Overflow Valves (OVs) before joining in the Mixing Chamber. The final gas cleaning of the (mixed) off-gas(es) is done by the (one-for-two) Disintegrator, which pushes the clean gas through the Water Separator and the Clean Gas Stack Flow Control Flap to the flare stack.

Flexibility of the system is provided by the two OVs which allow for either single or two calciners (or none) operation on clean gas. The calciners can be switched in and out of clean gas operation; without affecting the other calciner's operation irrespective of its operation mode.

Post commission isokinetic tests have proven that residual Solid Particulate Matter (SPM) and gaseous components are far below requirements. As the scrubber is operated at very variable gas throughputs and loads depending on the calciner operation configuration, the Disintegrator is unusually operated at different speeds. By adjusting the Disintegrator draft the two furnace's Control Flaps and the Clean Gas Stack Control Flap at all times operate in their suitable range (low-resistance open-position) thus accurately controlling the static pressure inside the furnaces according to set point.

Compared to the usual approach of connecting each furnace to its own gas cleaning unit, the installation of only one Disintegrator with the single variable speed drive drastically reduced the investment costs. Also, operational costs will be reduced due to the flexible power-saving VSD-operation; and by saving valuable water resources due to minimized evaporation losses.

As is well known for any brown field project, integrating new equipment into an existing plant, coping with space and structural load restrictions, is always demanding. However, the main challenge of servicing two furnaces with one Disintegrator is the PLC control to cover the flexibility of the system, whilst ensuring each furnace is operated safely and is individually optimized. The achieved "one click" operation requires no further operator input to control the highly automated process thus ensuring safe switching in and out of calciners for all operation configurations.

