

# PRESS RELEASE

## I-CAT misting system for dust suppression, fire prevention in coal mining

*25 October 2018: About 75% of coal mines in South Africa have to contend with the risk of the spontaneous combustion of coal dust when material is tipped from load haul dump trucks (LHDs). The I-CAT Dust Division has devised a bespoke solution for a major coal-mining client that it intends to introduce as its latest dust-suppression and fire-prevention innovation for the coal-mining industry.*

The I-CAT Dust Division was approached by a major coal-mining operation to devise a customised dust-suppression system to prevent spontaneous combustion of burning coal when loaded onto grizzly screens from LHDs, whereupon it is conveyed to the crushing circuit.

The unique challenge posed by the project was the perfect storm of risk factors that had to be accommodated, from the actual ultra-fine coal dust itself, to the tendency for the coal to ignite when it comes into contact with oxygen, I-CAT divisional manager **Morné van Wyk** comments.

The mining client contacted the University of Pretoria for assistance, which turned to the I-CAT Dust Division for its acknowledged expertise in this regard. While a consulting engineer was contracted to design the actual structure, the University of Pretoria was tasked to carry out the 3D modelling for the tip structure, and the associated air-flow simulations.

All of this input allowed the I-CAT Dust Division to come up with a bespoke enclosed solution for the coal-mining operation. A major factor to be taken into consideration was that the coal-dust particles were not only ultra-fine, but are hydrophobic as well, meaning water does not cling to them readily, thereby mitigating any conventional dust-suppression approach.

A traditional coal-tipping area cannot be enclosed entirely within a hood-like structure, due to the danger posed by spontaneous combustion. Hence the I-CAT Dust Division used extensive air-flow simulation to design a structure that covered the tipping area as effectively and as safely as possible.

“The top of our proposed structure was U-shaped, which actually meant it was still open, while being able to contain the coal dust effectively,” van Wyk explains. The magnitude of the air-flow analysis required is indicated by the fact that up to 250 t LHDs tip coal from a five-storey height into the crusher below. In addition, the structure itself measures 16 m by 16 m, and is 11 m high.

A two-stage system was proposed, with a truck-positioning sensor detecting the initial approach of a LHD, thereupon activating the system. The second stage is a water curtain right around the bottom side of the tipper itself, with a misting system on a gantry at the top end of the tipper.

The system comprises 48 nozzles in total. If the temperature on the coal being tipped from the LHDs exceeds 80°C, a secondary cooling system is activated to prevent the conveyor belts delaminating from the intense heat, which can compromise the integrity of the entire materials-handling system. The I-CAT system is entirely automated, featuring full SCADA and PLC control.

An added benefit of the system is that it is environment-friendly, and actually saves on water consumption as well. It only uses process wastewater from the mining operation itself, which is stored in a 280 000 litre dam before being subjected to pre- and final filtration to remove all suspended solids.

Highlighting the construction challenge posed by the structure, van Wyk points out that coal produces sulphuric acid when exposed to water. This meant that Grade 316 stainless steel had to be

used as the main construction material. In addition, the project had to be designed with a 25-year lifespan, in accordance with the mine's requirements.

While the actual project only took nine days to execute over the traditional mining industry shutdown in July, the planning stage itself stretched over nine months, mainly due to the high health and safety considerations. "We had an electrical, structural and civil engineering scope, with four to five engineers required to sign off on every single aspect," van Wyk reveals.

The size of the structure meant that prefabricated elements were transported to site well ahead of the start date. Four 60 tonnes cranes and one 750 tonnes crane were required to lift and position the massive main three panel sections, in addition to the final lift of the gantry onto the tip of the structure – a logistical exercise that van Wyk describes as "hair-raising".

The I-CAT Dust Division has also clinched a 12-month maintenance contract at the project, during which time it will upskill and train a new Level 1 Broad-Based Black Economic Empowerment (B-BBEE) company to take over the long-term maintenance requirements.

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I-CAT is a leading environmental solutions company with a primary focus on supplying products and services that assist industrial clients in various aspects of environmental compliance. The company is well positioned to assist all its clients' needs in environmental management regarding; dust suppression solutions, water solutions, environmental and waste management services, agro-forestry products and fire solutions.

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