

Dust control with spin filters

MechChem Africa's Glynnis Koch speaks to Ian Fraser, managing director of RTS Africa Engineering (RTS Africa) at the recent Electra Mining show held at Nasrec, Johannesburg. This year, the company showcased its inertial spin filter solution, designed for use in the challenging conditions of the mining sector throughout Africa.

RTS Africa began marketing spin filters shortly after it was founded in 1989. The technology was not new as it had been around for several decades prior to this in the USA where applications tended to be confined to large air conditioning intake systems. Fraser tells MechChem Africa that it took a couple of years for RTS Africa to sell the first spin filter as applications had to be found for it that were relevant in the pan-African environment. The company developed the current design, which is particularly well engineered and offers an inertial spin filtration system with a low life-cycle cost and zero maintenance.

What is attractive about the spin filter is the simplicity of the concept. A spin filter consists of a cyclone-shaped tube, through which air is propelled or drawn. On entering the tube, the air is induced to spin using vanes. Particles in the tube move to the outside of the vortex, and the clean air in the vortex centre exits through a central orifice at the end of the tube. A secondary stream of air is used to evacuate the dust-laden air back to where it came from. On mines, where the dust might contain value in the form of mineral fines, the dust being purged from spin filters can be

recovered for beneficiation.

Although the initial take-up was slow because the concepts of sustainability, energy saving and zero maintenance – unlike today – were not considered important in the early 1990s in South Africa. Once the news of the effectiveness of spin filters spread and their usefulness was not seen to be only that of putting clean air into spaces or compressor inlets, their popularity grew, with the result that RTS Africa has been installing increasing numbers of them, particularly in the past decade. They have been installed in the glass industry, mines, power stations, cement factories and steel mills.

It is a fact, Fraser says, that his company's spin filter was, and still is, a flagship solution for RTS Africa as it is so well suited to mines and other dusty environments in Africa. From small to huge, installations have increased exponentially since the 1990s and the truth is that there is no ultimate size limit!

Spin filters require very minimal (almost zero) maintenance, as the fans that drive the air through the filter are essentially electric motors, giving years of trouble-free operation with no maintenance at all. Fraser explains: "We have cases in which spin filters give

trouble-free service – with very little maintenance – for periods of up to 20 years or more."

An important application of spin filters has been their use in filtering intake air into compressor rooms. While fitted with their own air filters, all too often, maintenance of compressor filters is neglected. This can lead to complete air compressor failure with wider consequences as the compressed air is often a critical component of a production process. By removing the larger dust particles from intake air, spin filters shield compressor air filters and prevent premature clogging.

A further application of spin filters has been in the protection of variable speed drives (VSDs). VSDs are one of the most effective ways of reducing power consumption of electric motors. Additional and significant reductions in consumption can be attained through ensuring that VSDs are installed with back channel cooling: an innovative technological application that is being led in South Africa by RTS Africa.

Back channel cooling offers a cost-effective way of ensuring that the temperatures within VSDs do not reach levels that risk shortening the life of these devices. The drives are often located in motor control centres (MCCs) or similar locations, which provide appropriate protection but may become very hot through the combined effects of ambient temperature and the heat generated by the VSD's switching circuits.

Traditionally, site engineers have coped with this problem by installing large air conditioners that cooled the air in MCC cabinets. With back channel cooling, however, ambient

air from outside the control centre is channelled through a VSD, over the heat sink of the device, then vented out from the MCC.

The critical point here is that the channelled air does not have to be cooled. The steady flow of air over the heat sink keeps the VSD at ambient temperature, which is normally quite acceptable: the drive does not actually need to be kept at a cooler temperature. Importantly, the spin filter protects the VSD against damaging dust build-up.

The design of a spin filter is very simple. The only moving parts in spin filter units are the electrically powered fans, ie, an electric motor with two bearings and an armature, which require virtually no maintenance. Unlike conventional filter membranes, which clog as a result of pressure build-up after a period of use, the pressure drop across the spin filter module never increases. The units are self-cleaning, and do not block when correctly installed, thereby offering consistent performance with constant resistance. They are also extremely energy-efficient, as only the auxiliary purge fans that direct the dirty air out of the air stream require power.

Thus, the spin filter has offered solutions in many industries that were previously stuck with an expensive lifecycle cost. The pioneering, lateral application engineering of RTS Africa's spin filters has made the long-



When using spin filters for back channel cooling, ambient air from outside the control centre is channelled through a VSD, over the heat sink of the device, then vented out from the MCC.

term lifecycle cost very attractive across a wide range of industries, thus its success. RTS Africa is a preferred supplier to one of Southern Africa's largest mining groups, with the company's spin filters specified by part number. "In addition to this, we have supplied a variety of local and pan-African mines with spin filters installed in open cast and underground 'clean' and compressor rooms – from platinum, coal, iron, manganese and diamond mines – for many years," adds Fraser.

The mining industry started to use spin filters to keep dust out of large mining ma-

chinery quite recently. An early application of spin filters to large mining machines was at a base metal mine in Limpopo, which decided to fit 13 of its blast-hole drill-rigs with spin filters. Many blast-hole drill-rigs have a grid floor, so the machinery space is open to the ground below. Naturally, drilling creates a lot of dust, which enters the cabin through the floor grid and into control panels, compromising machinery such as air compressors.

With spin filters in place, the positive pressure inside the cabin prevents the ingress of dust very effectively. □



Attached to blast-hole drill-rigs, spin filters maintain the positive pressure inside the cabin preventing the ingress of dust very effectively.

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