

A valid cure for

Ceramic filters, recently patented by iFleet, could create a buzz in the filter market. What are the benefits of this new composite filter technology?

By Nicola Theunissen.

In December 2007, Andre Steyn and his team at diesel engine technology company, iFleet patented a first in the world of diesel filtration: ceramic filters. Although the concept has successfully been applied to air and water filtration globally, it has never been used for the filtration of diesel before.

The benefits of these solid ceramic filters – produced at iFleet’s workshop in Isando – are claimed to be quite significant compared to other filter products on the market. For a start, it claims to successfully address the transformation of engine technology into newer Tier-versions within an African context by significantly reducing vast amounts of diesel contamination to sustainable cleanliness levels. What does ceramic filtering entail? And, what is the outcome and repercussions of such a product on the market?

High pressures, poor fuel

Engine technology has advanced significantly since the introduction of the first Euro 1 engines in the '90s. Engines are becoming lighter and more powerful. Modern engines operate at higher compressions, resulting in higher engine heat, bigger stress factors and, therefore, a higher sensitivity towards contamination and lubricity. “The old Atlantic diesel engines worked on injector pressures of 170 bar, compared to the modern engines of today that operate at pressures of between 1 800 and 3 500 bar, and fuel injector clearances are as tight as 2 micron. The amount of times an injector fires per burn in a modern engine is becoming increasingly more. You must, therefore, understand the high reliance of these modern engines on the quality of your fuel in order to achieve this.”

South African diesel poses some concerns. Composition, lubricity and contamination are all factors that influence the

quality of diesel in South Africa. Steyn personally feels that the composition spec of South African diesel is too low in lubricity and high in aromatics (three times that of Europe). “We have the same lubricity spec as Europe, but Europe isn’t as hot as Africa, and it isn’t at the same altitude. It is not as dusty and does not have the same maintenance and holding issues that we face. If you add all these factors together, you have a winning recipe for carbon soot.” In the same breath, he imparts that diesel contamination is also a big concern: “South Africa has a lot more dirt in its diesel in smaller particles. People have been talking about contamination for years, but nobody is directly addressing the issue. “Bulk fuel installations are mainly poorly filtered as the market is under the misperception that it is the oil company’s sole responsibility, but they have not budgeted for sustainable cleanliness levels nor have they charged the consumer to provide this service. It is therefore the consumer’s responsibility to ultimately do so. The direct cost benefits of having direct control are clear. If it is taken into consideration that 21 kg of dirt per million litre of fuel is totally within the SABS dirt specification of 24 mg/l, the question that then arises is: how well are your primary and secondary filters on your equipment coping with these amounts of dirt given their dirt-holding capacities and filtration efficiencies?”

Ceramics to curb contamination

Filtering is, therefore, a vital aspect of reducing the impact of contamination. “The better your filtration, the better your direct fuel consumption and efficiency, and the longer your engine’s lifecycle curve,” says Steyn. In the light of this, Steyn investigated current depth filtration mechanisms on the market; paper, tree bark, multi layers and cottons; in search of a more efficient and durable alternative.



Responsible filtering

Ceramic filters have been installed at a Group Five site. According to the manufacturer, current bowser filtration is “limited”. However, if you do accept responsibility for your bowser it could save you multiples down the line.

“The objective was to develop a filter that does not have a water problem, that does not form channels and that offers a low resistance to flow.” The result was the development of ceramics as a filter medium. Ceramic filters, according to Steyn, adhere to all the filter performance criteria. “Ceramics create minimal pressure drops and minimal loss of flow. They are compatible with all fluids, pressure surges, vibrations, temperatures and flow rates. It is a product with 100% structural integrity, and which is a lot more durable than other products on the market.” Ceramic filters also claim to effectively break down hydrocarbon clots, resulting in improved oxidation and, therefore, better combustion.

Steyn admits that the disadvantage of a ceramic product is its heaviness and its breakability, which was taken into consideration during design applications. It also comes at a premium, but its higher dirt holding capacity and, therefore, its longer element life, sustainable cleanliness levels, longer service intervals and lower net operating costs offset the initial higher price, he says.

In terms of application, iFleet’s aim is to offer a 360° filter solution – upstream at bowsers and bulk diesel containers, but also downstream as additional spin-ons on mechanical equipment. The former has

contamination?

been installed at a few sites' bulk diesel storage tanks, including KGB Transport, MacDonald's Transport, Murray & Roberts and Group Five. More recently, iFleet has also entered into agreements with mining and oil companies to install massive bulk filtration units. "We are talking about filtration units to filter diesel in the region of 2 000 to 3 000 ℓ /min," says Steyn.

The downstream filtering units have not been installed yet and will be launched on the market during the end of September 2008. The product is 230 mm in length and has an outside diameter of 75 mm. Steyn says if you're an owner of a plant hire company, it makes sense to add these filters as an additional fitment to your equipment. "If you apply ceramics you would only have to replace your filter once a year. You are also guaranteed that your engine won't be damaged by particle

contaminated diesel, over which you do not have control. Instead of hiring the equipment out for four years, you can now hire it for, say, five years. You are thus extending your machine's economical service life."

iFleet is also in talks with OEMs to produce the spin-on's as primary filters on their equipment. These negotiations are in a very sensitive and early stage, tells Steyn.

The proof of the pudding

According to Louis Pieterse, service manager of Komatsu Southern Africa, the claims of the filter mediums still need to be substantiated and it is very difficult to comment on their effectiveness if no formal filter performance criteria have been quantified yet. "The concept sounds fantastic, but it still needs to be proved." It is a matter of the proof of the pudding is in the eating. Sunil Narayan, service manager at

Bell Equipment agrees, "In the light of technological advancement and the claims that are being made, by all means, yes, but only field testing can prove whether it will last. Until now we have not fitted it to any of our machines and I'm not aware of any of our clients who have fitted them as an after-market thing." Narayan says that the filters still need a long time to prove themselves – and not only in a controlled laboratory environment, but also in the construction, mining and quarrying fields.

According to Steyn, the filters are currently being tested to obtain official filter performance criteria and the results will shortly be available. "The test will prove nominal and absolute micron rating and beta rating. It will also indicate, against IP 440/EN12662, diesel cleanliness before filtration and cleanliness levels after filtration (mg/kg), as well as dirt-holding capacity." ■