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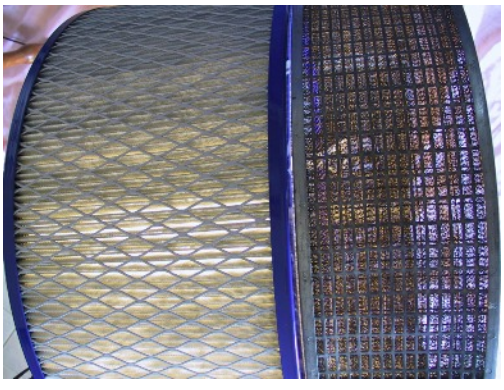
Stop Choking Your Engine

Medium Speed Turbocharger Air Filters
Serious Fuel Savings or Just Hype?



If you are serious about saving fuel you will know about the advances in hull form, advanced paint coatings, kort nozzles and air lubrication along the hull, all great ideas that work.

Yet there is another fuel saver, right under everyone's nose, it's not sexy or cutting edge, it's not the latest innovative technology and is used on all high speed engines - the air filter on the turbocharger.

As engineers we are all aware how important the turbocharger is in delivering ever increasing power to engines whilst searching for ever decreasing SFC. There is a lot of discussion on turbo nozzle and volute design, two stage and in-series designs etc. Yet little is talked about the air that flows through them.

The vast majority of low and medium speed marine engines have little more than a copper gauze to filter the air. At best these will stop a low flying seagull but will do little to block the real contaminates that stick like glue to internal services negating very quickly some of the technical advances of today's turbocharger design.

It is interesting to note that those operating a powerful Caterpillar or Cummins religiously monitor the air filters and change them at the manufacturers recommended interval, because they are supplied a filter from new, they would not dream of running the engine without the filter. Yet operators of medium speed engines continue to operate their engines drawing air from a polluted, oily exhaust leaking engine room, because they were not supplied a filter from new.

And where does all this oily polluted air end up? Against the first decent restriction it comes across - the charge air cooler and as the sticky oily air starts to coat the fins the air flow to the engine is restricted, up go the exhaust gas temperatures and up goes the fuel consumption. We have all seen it I'm sure. Why else are coolers routinely removed for cleaning with evermore imaginative ultrasonic cleaning methods and chemicals to dissolve the encrusted mass that has worked it's way into the very core of the cooler? Interestingly the Caterpillar and Cummins owners don't clean charge air coolers *because* they have a filter and maintain the SFC.

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Of course many engineers acknowledge the problem and cover the air filter silencer with a filter cloth, better than nothing one would assume, but it can actually make the situation worse. Why? The filter cloth quickly gets dirty and as it is the same surface area as the original mesh then it effectively starts to restrict air flow just like any blocked cooler but worse still they are not very effective as the cooler still gets dirty, so the engine now has two restrictions to air flow.

One turbo manufacturer now has a design with pressure ratios of 6:1, unheard of a few years ago, yet filtration is still in the dark ages, why is this? Maybe it's not the responsibility of turbo manufacture? Supplying an air charge to a design required by the engine builder is their remit and adding filtration only increases the cost to the engine builder and ultimately the end user and in a competitive world build cost is key.

So what is the cost of a dirty turbocharger nozzle ring or charge air cooler? I would like to refer to this excellent white paper from Wartsila , page 4 outlines a potential increase of up to 5 g/Kwh. That's 2% on a 3MW engine on 180 g/Kwh. Imagine, 3% fuel saving just by keeping things clean, most operators would jump at that sort of saving.

I remember clearly whilst on watch as a third engineer walking past a B&W 90GF when the turbo coughed due to a restricted air cooler, OH HELL….now THAT"S a way to back flush a bit of wire gauze filter! .....having best composed myself after thinking my world had just ended in a cloud of oily dust and dirt it left me thinking, why do we let the cooler get dirty for the sake of a simple filter?

So don't forget old technology for serious fuel savings.