

Case Study 17

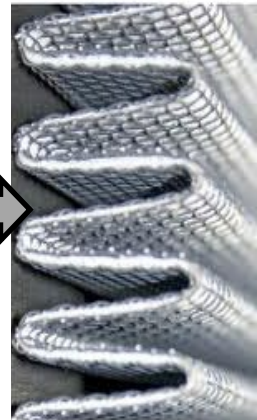
Engine Intake Emergency on Gulf Coast Tug

Background

Articulated tug barges (ATB's) are a new powerful class of pusher tugs operating in the Gulf Coast region designed to efficiently move bulk liquids and solids on open waterways. The bow of the tugboat fits into a mating notch in the stern of the barge making them a matched pair. The engine room inlets are topside while the engine intakes are located inside the engine room. Both the engine room inlets and the engine intakes often have the same grade of filter to remove particulate matter. A bulk cargo ship line operates a fleet of tugs on the Gulf Coast and one of their ATB's was dispatched to pick-up and deliver bulk aluminum oxide to an aluminum mill. During the loading process, the main engines run at low RPM to generate the electricity necessary to operate the loading conveyors. It was a very windy day, so fine aluminum oxide dust was blowing everywhere. After loading was complete, the engines were powered-up to higher RPM (drawing more air) to get underway. Before they could move, the engines seized forcing the tug to completely shut down leaving it unable to depart. Inspection of the engine room disclosed inlet air filter failure with heavy alumina dust coating all engine room surfaces and looking like a fresh fallen snow. Because the tug was paired to the barge, there were no other tugboat options. The boat captain contacted Northeast Filter with an urgent request for filter upgrade options to get them out of trouble.

Solution

Once aboard the vessel, we saw firsthand just how bad the situation was. Particle analysis of the dust and fluid analysis of the engine oil showed that the highly abrasive alumina dust not only penetrated the engine room inlet air filters, but the engine intake filters as well. Both were using bulk fiberglass media effective at removing $40\mu\text{M}$ particles however the particle size distribution of the alumina from the particle analysis indicated that the dust particles were between $5\mu\text{M}$ - $20\mu\text{M}$ with $>60\%$ between $5\mu\text{M}$ - $7\mu\text{M}$. Northeast Filter recommended heavy duty (washable) pleated synthetic filter panels with 99% retention efficiency at removing $3\mu\text{M}$ particles to replace the bulk media. The filters were installed after the engines (and engine room) were overhauled and the ATB left port to deliver the cargo to the destination aluminum mill 30 days later with no further engine problems. Later that year, the rest of the fleet converted to these filter panels.



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