NEW SCRUBBER SYSTEM BENEFITS MDF MILL'S NEW OWNER

Aconcagua Timber Corp. of Shippenville, Pa. required emission control equipment to reduce particulate carryover from its medium density fiberboard (MDF) dryers upstream of a regenerative thermal oxidizer (RTO). The existing pre-cleaning device was a "bed protector." The problem was that the twin beds in the bed protector fouled continuously, resulting in an almost uninterrupted burnout cycle. The resulting fuel costs proved too exorbitant for efficient economic sustainability of the mill.

"The clogged beds in the bed protector, combined with the constant burnout cycle, materially increased the fuel use and maintenance requirements of the mill," says Jose Kofman, President of Aconcagua Timber Corp. "We were made aware of this situation by the former owner, and thus made this our first project after acquiring the facility in late May 2004. We selected Pro-Environmental, Inc. to present us with options, and they recommended TurboSonic's TurboVenturi as a solution. The novel approach intrigued us." (TurboSonic Inc. is based in Waterloo, Ontario.)

Plugged bed protector media

Pro-Environmental, Inc., Rancho Cucamonga, Calif., was selected by Aconcagua Timber Corp. to evaluate and recommend the best solution to reduce downtime, operating costs, and maintain performance requirements of the process abatement system. Pro-Environmental offered a two-fold solution: remove the bed protectors and replace them with a state-of-the-art scrubber system to handle the particulate matter (PM); and secondly, to add thermal efficiency by upgrading the existing media in the four 2-can RTOs.

The heat exchanger media in the RTOs previously consisted of 3 ft. of monolith media and 6 in. of "snowflake" random media packing, resulting in less than 87% heat recovery. The customer agreed, and PEI subsequently removed 6 in. of the random media from each of the eight canisters, and replaced it with two additional feet of monolith type media, for a total of five feet of monolith. The bed protectors consisted of 1 in. saddle media and large burners. The original equipment manufacturer's intent was to allow the particulate to accumulate in the bed protector media and then burn it out with the large burners to prevent RTO plugging. The result was excessive gas and electricity consumption caused by the almost continuous burnout and the high differential pressure resultant from the bed protector plugging. The table below shows the before and after fuel consumption and thermal efficiencies.

Jim MacAulay, engineering and maintenance manager, Aconcagua Timber, states, "In addition to fuel savings from eliminating constant burnouts, Aconcagua Timber Corp. recognized the need to reduce overall RTO natural gas consumption. With technical assistance from Pro-Environmental, it was determined that particulate-free air would allow additional ceramic media to be installed in the RTO beds. Heat recovery efficiency was improved from 87% to 94% and the gas heat requirement dropped from 42 to 23 million Btu/hour."

Dave Chiles, President of Pro-Environmental, Inc., comments that, historically, operating RTOs downstream of wet PM control devices has resulted in good control technology for reducing the total organic and inorganic particulate carryover to the RTO. However, applying wet control technology has also often resulted in excessive water carryover into the cold face of the RTO heat exchanger media beds, resulting in cold face plugging, water collection in the plenum sections and inlet ducts, and changes to the materials of construction required to handle the standing water in the unit. The TurboSonic technology for both wet ESPs and scrubber systems addresses this water carryover problem by avoiding the traditional mesh pad or chevron mist elimination devices, which are maintenance intensive and prone to contaminant build-up, with a resultant degradation in performance. TurboSonic utilizes a proprietary "mist hood" for the WESP and a high efficiency cyclonic separator for the TurboVenturi Scrubber. Both devices remove moisture to "non-detect" levels and require no maintenance, thereby maintaining continuous peak performance.

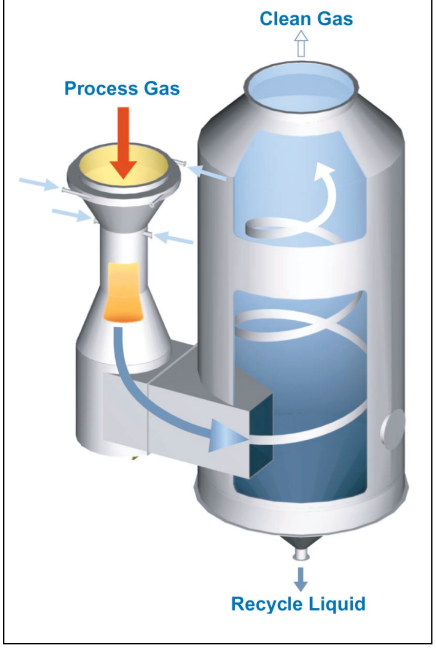
Traditionally, WESPs have been used to control fine particulate emissions, with RTOs used to eliminate volatile organic compounds (VOCs) and hazardous air pollutants (HAPs). Instead, TurboSonic proposed the use of its TurboVenturi Scrubber to achieve the necessary results at a considerably lower capital cost.

"We knew the choice of a venturi scrubber over a WESP was a new concept, but it made sense as the solution for Aconcagua," says Ed Spink, CEO of TurboSonic Inc. "With MDF dryers, there is generally larger particulate and less inorganic backhalf than in oriented strandboard (OSB) operations. The higher capital cost of using a WESP, designed to capture much finer particulate, was simply unnecessary."

The TurboVenturi system saturates incoming gases and removes particulate at high efficiencies. "Reducing the gas temperature (through saturation) causes condensable VOCs to be removed along

	Before PEI Rebuild	After PEI Rebuild
Thermal Efficiency	87%	94%
Fuel Consumption	42 MMBtu/Hr	23 MMBtu/Hr

System Performance	
Design Gas Volume	281,000 ACFM
Inlet Particulate Loading	102 lbs/hr (0.063 gr/DSCF)
Outlet Particulate Loading	10.5 lbs/hr (0.007 gr/DSCF)
System Blowdown	< 3 gpm
Mist Eliminator	No carryover
Internal Inspection	"Spotless"



TurboVenturi scrubber

with particulate in the scrubber where they are handled effectively, consequently reducing the PM load on the RTO," adds Spink. "This reduces RTO burnouts, prevents plugging and build-up of solids or condensable compounds in the RTO."

MacAulay was also optimistic about the plan. "We liked the idea that water treatment would also be supplied as part of the solution," he says. TurboSonic's proposal included a rotary screen filter to separate particulate from the recirculated scrubbing liquid. "Results of testing and visual inspection of the venturi system showed no signs of particulate carryover to the RTO," MacAulay adds. "We are currently testing to determine if we can implement catalytic oxidizer operation to further reduce fuel costs."

Upon startup, a small amount of catalyst media in a "thief basket" was installed to check the viability of running the units catalytically. Visual inspections and PM testing both indicate a strong possibility of this option. After several months of operating with the catalyst in the retention chamber, exposed to actual process gases, testing can be done to check the activity level and expected life of the catalyst. Catalytic operation will further reduce the RTO gas consumption by 50% and will also reduce CO and NOx emissions.

SCRUBBER SYSTEM

Removal efficiency is determined by the direct relationship between gas velocity and pressure drop in the venturi throat. Constant pressure drop means constant removal efficiency: by selecting the pressure drop, any particulate removal efficiency can be achieved.

Scrubbing liquid is injected tangentially at the top of the venturi and swirls down the converging section covering the walls completely and preventing creation of a wet-dry line, where solids build-up can occur. The liquid film also protects the metal surfaces from abrasion and corrosion.

Additional liquid is introduced through radial pipes in the venturi throat, complemented by a large passage, high volume spray nozzle, to ensure complete coverage of the throat area. The liquid is atomized in the throat by the high velocity gas stream. The particulate is entrapped in the liquid droplets, which are collected and separated from the gas in the downstream cyclonic separator.

Installation at Aconcagua Timber

The separator's function is to use centrifugal and gravitational forces to separate the contaminant-laden liquid from the cleaned gas. The liquid is then drained through a bottom cone and looped back into the Venturi in a continuous cycle. The cleaned gas exits the top of the separator. In this particular case, the cleaned gas continues from the separator through an exhaust manifold to the MDF plant's existing RTO, which was rebuilt by Pro-Environmental.

Internal inspections have revealed a virtually "spotless" scrubber interior. Not only did the system resolve the initial problem, but when a recent mishap occurred, where fiber was carried over from the primary cyclones, there wasn't even a "hiccup." The water treatment system actually removed the fiber from the system through routine operation. No operator attention was required. "The TurboVenturi handled the upset in stride, with absolutely no carryover to the RTO. You couldn't have planned a better demonstration of its capabilities." says Shane Spoo, TurboSonic Manager, Field Services. TurboSonic's falling film principle has once again proven itself in tough build-up prone applications. **PW**

This article was submitted jointly by Aconcagua Timber Corp., Pro-Environmental and TurboSonic Inc. Contact TurboSonic at 519-885-5513; web site: www.turbosonic.com.