

Energy Self-sufficiency and Cogeneration in Louisiana Cane Sugar Factories

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Increasing energy costs (both natural gas and electricity) have made achieving energy self-sufficiency a priority at Louisiana sugar factories. An overview of the factors that affect the factory's energy balance is presented. Data is presented on bagasse availability and analysis. Data is also presented on measured boiler efficiencies obtained during the 2005 crop. Current steam utilization in Louisiana factories is discussed. Options for reducing steam requirements are discussed.

Current Technologies Blend to Optimize Boiler Efficiencies at Rio Grande Valley Sugar Growers

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The boiler plant is the heart of the sugar mill and operating it efficiently is more important today than ever before. This paper will center its attention on the current "state of the art" of boiler water technology blending modern water chemistry with new computer technologies in control and feeding of this chemistry. When developing a chemical water conditioning program of this type, it is not only important to analyze carefully the technical merits of the chemicals to be selected, but also the microprocessors/controllers and application programs. Each plant possesses individual characteristics from location to location and even from boiler to boiler within the same steam generating plant. It is for this reason that boiler water conditioning should become as customized as possible from the feedwater source throughout the steam generating and the condensate distribution system.

Feedwater Considerations in Sugar Mill Boilers

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As the boilers are the heart of any sugar cane mill, their efficient operation is critical to the success of the mill. There are numerous ways boiler efficiencies can suffer and a number of these are related to problems in the boiler feedwater. As U.S. mills look toward higher pressure boilers and power generating turbines, these problems will become more damaging to boiler efficiencies. This paper provides a discussion of how feedwater quality issues can affect the efficiency of sugar mill boilers. It also discusses feedwater guidelines for boilers operating at different pressures as well as test procedure "best practices" to ensure the guidelines are being

met at all times. More importantly, the paper discusses how feedwater quality can be optimized and the effects of excursions minimized or eliminated. The discussion will include theoretical means of eliminating excursions as well as practical means that are currently in use in sugar cane mills in Louisiana and Florida.

Statistical Analysis of Rheological Properties of Final Molasses

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Weekly final molasses composite samples were collected from all Louisiana sugar mills and one Hawaiian sugar mill during the 2004 season (October – December). These samples were analyzed in the Audubon Sugar Institute Analytical Lab for the most important components, including starch, dextran, entrainment of air, and apparent viscosity at 40 °C. Previous work has shown that final molasses is a shear-thinning non-Newtonian fluid that can be described by the Power Law models $\tau = K \dot{\gamma}^n$ and $\mu = K \dot{\gamma}^{n-1}$: τ is the shear stress, K the consistency, $\dot{\gamma}$ the shear rate, n the flow behavior index, and μ the apparent viscosity. The final molasses data was processed using SAS/STAT (v. 9.1.3) statistical software. Using correlation analysis and multiple linear regressions with stepwise selection methods, models were built to explain the flow index and consistency variation with respect to possible independent variables. The models confirmed previous work which showed that consistency variation is strongly affected by true solids (dry substance). The degree of aeration of the sample (volume of air or other gas) was also found to be a highly significant factor. Out of the other variables considered, only dextran content was statistically significant. The variation in flow behavior index was affected by the same variables (true solids, entrainment of air and dextran). Starch concentration in these samples did not demonstrate a significant effect on either consistency or flow behavior index. The air entrainment on molasses was on average 11% by volume with a range of 1 to 30%.

Installation of New Deaerator for Boiler Feedwater Supply Achieves Better Efficiency and Operating Stability

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Sugar Cane Growers Cooperative of Florida, (SCGC), a sugar processing mill with six power boilers, achieved higher reliability, higher overall efficiency, and better operating stability by replacing the 29 year old parallel flow horizontal deaerator and installing a new feed water storage tank. This paper presents the selection process for the new counter flow two stage spray-tray deaerator, instrumentation, automation, and system modifications which led to saving 8,000,000 Btu/hr (2,340 kW/hr), and reducing the use of sulfite for boiler oxygen scavenging purposes while reducing system pressure and temperature fluctuations