

REVIVAL OF THE LOW TEMPERATURE BELT DRIER FOR SUGAR BEET PULP

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ABSTRACT

Sugar beet pulp drying is energy intensive and produces emission nuisance in beet sugar factories with direct fired rotary drum driers. Most of these driers are in operation since several decades without major improvements. Low Temperature Belt Driers (LTD) are in operation for almost 30 years in the sugar industry, for example at the Südzucker plant in Offstein, Germany. A 600m² LTD with a water evaporation of 30t/h pre-dries the beet pulp with waste heat from the sugar plant. Since its start-up it has saved more than a Terawatt-hour of fuel. For some reasons this technology has been forgotten for a long time. Now, 30 years later, the low temperature drying technology has got its revival and 3 LTD plants have been installed. Since the campaign 2012/13 a LTD with 580m² (two-story) pre-dries the sugar beet pulp with molasses at the Südzucker plant in Plattling, Germany, with a capacity of 30t/h water evaporation, utilizing waste heat (condenser water and residual condensate) from the sugar factory. Besides the natural gas savings of 40% it allows to run the rotary drum driers with a lower drum inlet temperature which reduces significantly the emissions. At Agrana's beet sugar plants in Tulln and Leopoldsdorf, both Austria, LTDs with 870m² (three-story) and 45t/h water evaporation pre-dry the beet pulp with molasses, utilizing also waste heat from the sugar plant (condenser water and residual condensates), additionally flue gas from the steam boiler and heat recovered from the rotary drum driers. Condensing the drum drier exhaust gases allows to heat a part of the LTD at a temperature equal to the wet bulb temperature of the drum drier exhaust gas. As a side effect it is scrubbed in the condenser, which reduces the dust load significantly and condenses some of the VOC and odor emissions. With the LTDs the two Agrana plants achieve natural gas savings of 60% for the pulp drying. LTDs can be configured as pre-dryers achieving highest efficiency. Or with a Swiss Combi double layer system as an integral (parallel) dryer, if the mechanical throughput of the existing drying system is limited. Molasses can be added to the beet pulp before the LTD. Dust (particulate matter) emission can be guaranteed below 5mg/Nm³ (2 grain / scf). The VOC and odor emissions origin mainly from the very first section of the LTD where the warm pressed pulp steams out. This part is small compared to the overall exhaust volume flow and can be treated if required. Either by burning as secondary air in the rotary drum dryer furnace, or condensing in a heat recovery condenser. A LTD configured as an end-dryer will have little VOC but higher dust emissions. LTD can be added to a beet sugar factory to reduce energy consumption or to increase capacity, especially when the existing drying system is limiting the expansion.