Energy saving in Sugar Industry

Brief Idea: Sugarcane steam pre- treatment:

Generally we get around 10 % only as recovery from sugarcane. Many a parameters like soil, climate, manure inputs, ground water, monsoon rainfall etc contribute to the recovery rate of sugar from sugarcane. The idea here is that we pretreat the sugarcane in steam chamber in the sugar mill before it goes for crushing. If this pretreatment increases the recovery rate by a few % points, then it is worth the pre- heat & soaking of cane.

Existing procedure: (only squeezing in the Crusher)

The sugarcane bundles come in trucks, weighed and fed into the crushing machine inside the sugar mill. Let us take a bundle of sugarcane being crushed in the crushing machine. After crushing and juice removal, we find the residue sugarcane has a lot of moisture & material content. Though we mechanically break the biological barrier ie sugarcane skin and its internal mass, and squeeze it out through the crushing machine; still we find some fraction of juice & substance is left in the cane residue. Since the value addition is there only in sugarcane juice compared to the residue let us try to squeeze more juice out.

Proposed procedure: (Pre- Steam cooking / Baking & Soaking)

Let us assume a truck load of sugarcane bundles as one unit and now this unit is first fed into the steam chamber (which shall be located ahead of conveyor upstream of the crusher) inside the sugar mill premises. Since the mill has the steam boiler utility in use, we draw a steam line to this pre-treat chamber. The sugarcane bundles are blasted with steam jets of required pressure and temperature for an optimum time (this time, pressure and temperature variables are arrived at after doing trials & results). Here the steam bombards as catalyst in passing through the sugarcane skin softly, gets ingressed and makes fibre content soft, spongy and flexible. Then the next stage, cane is soaked in condensate water @ 80 *C for fraction of hour to gain weight, moisture ingress inside the cane.

Why this idea of Cane Preheating & Soaking Facility:

Laws of Energy conservation indicate that there will be definitely avoidable losses during energy conversion. Taking into account the Mass & Energy balance concepts: - If we really want to improve energy efficiency per process, the easy way to achieve the same is that to Refine the input to suit to the process demand, and then achieve better efficiency. Actually we are preparing the cane by giving more moisture ingress to the cane internals, soften the skin barrier, so that the squeezing & crushing of the cane is more efficient. And we get more juice per cane leaving less residue

Generalizing, For system - REFINE the Input & COMFORT process to Maximize output & Minimize THE RESIDUE

Easy to install this Retrofit:

The option of steam treatment chamber is economical, viable and definitely possible as the same can be tried within the premises of sugar mill. We are utilizing the steam auxiliary which is available to us when the mill is running. Already the sugarcane bundles are queued up before reaching the crusher. And the waiting-in-Que. time is utilized for steam jacketing of the same. To experiment the same, steam chamber have to be inserted in stages at the conveyor feed to the crusher. It does not cost much and takes little time to install the same.

So with little additional process before crushing, we can achieve better Recoveries and as well not disturbing the existing ratio of steam consumed in Tonnes per Tonne of Sugar output. As the sugar mill is already in for the Cogen utility, we can think of utilizing the Flash steam or LP steam recovery to steam wash / bake / cook and soak the cane. We are trying to make use of the redundant LP steam and also allow the sugarcane consume the inert steam first, allow the steam and water to react with sugarcane so as to make it moist-heavy.

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