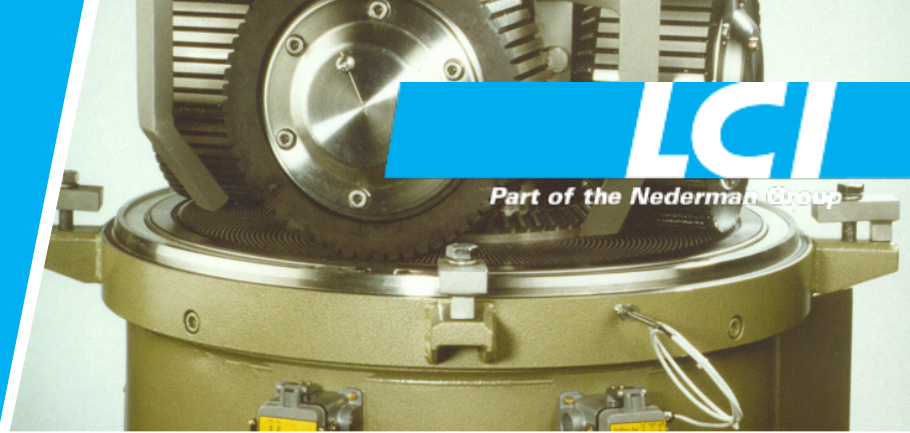


ENVIRONMENTAL

COUNTRY: USA

PRODUCT: Coffee Chaff (waste)

KEY BENEFIT: Increase the Bulk Density of Chaff



Increase the Bulk Density of Hazardous Waste

Background

A major coffee company needed to upgrade their existing facility. One of their primary concerns was how to handle the coffee chaff, or skins, from the roasting process. The coffee chaff, which comes out of the roasters at temperatures as hot as 400°F, is conveyed to storage silos prior to disposal. In some cases, the chaff is still smoldering presenting a fire hazard. Also, because of the low bulk density of the chaff, a large transport truck can only haul a small mass of chaff, resulting in high transportation and landfill costs.

Problem

The company was currently using a ring die pellet mill to pelletize the chaff. The ring die pellet mill addressed the bulk density issue but did not reduce the high risk of fire. Because of the internal configuration of a ring die pellet mill, some of the smoldering chaff bypassed the die and ended up in the pellet stream. In addition to the safety issue, early roast and late roast chaff varied in physical characteristics, resulting in frequent die blockages and system shutdowns. A new system was required that could automatically react to and be more tolerant of process changes.

Solution

LCI was consulted to discuss the existing process and explore alternate solutions. Based on past extensive experience with coffee chaff, LCI designed and proposed a system which includes the Amandus Kahl Flat Die Pellet Press. Testing was performed in Charlotte, NC using LCI's laboratory Pellet Press which has the same compaction and pellet formation principles as the production system. The trials confirmed that the designed system would perform as needed.

In the new system, a prebin with high and low level probes is used to temporarily store the hot chaff. The chaff is discharged from the prebin using a specially designed bin agitator that moves the material into a mixer/feeder where water is introduced. The addition of water (1) extinguishes chaff from the roasters that could still be smoldering, (2) cools the chaff, and (3) provides lubrication for the pelleting



Coffee chaff after pelleting

process. As material enters the Pellet Press, rotating rollers press the moistened chaff through a perforated die, and the pellets are formed.

With its vertical feed hopper, the Pellet Press is ideal for low bulk density products such as coffee chaff. An integrated control system is used to control the product feed to the system. Press amperage is used as the setpoint. If the amperage drops below the setpoint, the controller increases the rotational speed of the mixer/feeder using its variable frequency drive. This increases the feed rate which in turn increases the Press amperage back to the setpoint. Likewise, if the amperage exceeds the setpoint, the mixer rotational speed is decreased to compensate. In this manner, the process is stabilized and able to handle varying feed materials without operator input.

Results

-The potential of fire is greatly minimized because of the internal arrangement of the Flat Die Pellet Press.

-The unique integrated liquid control system employed by the LCI system gives the plant greater flexibility to handle a wide variety of feed materials. This is important because the chaff changes characteristics during the roasting process.

-The client is able to safely reap the benefits of a 3-5 times increase in bulk density by implementing the LCI system.

-Also, due to the increase in pellet quality, cost saving options have developed —the company is finding alternative uses for the coffee chaff rather than paying to send it to the landfill.