Automatic Weighing & Feeding Machine in Hydraulic Press for Ceraline Production

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Abstract—The existing system in BHEL (EPD), the weighing of powder fed into press is done manually which is time consuming and affects production rate. Therefore the need arises for ‘automatic weighing and feeding machine’. Hence, we make use of Load cells in weighing the powder automatically. Project deals with minimization of job personnel, strain taken by them and automating the weighing system thereby enhancing the production rate. Using this automation, we get increased accuracy for the product made.

Key words: automation, plc., load cell, belt conveyor

I. INTRODUCTION

High Alumina ceramic wear resistant lining material is best suited for wear-resistant applications. This will enhance the useful life of products and components from wear and tear. BHEL (EPD), which is the leading manufacturer of Electroporcelain insulators and Ceralin blocks, Ceralin blocks are produced by mixing Alumina with Silica and other binders. After certain process like mixing, agitation, filtering, drying and disintegration, the binder is mixed with Ceralin powder and fed to the hydraulic press.

In existing system, the weighing of powder fed into press is done manually which is time consuming and affects production rate. Therefore the need arises for ‘automatic weighing and feeding machine’. Hence, we make use of Load cells in weighing the powder automatically.

This project deals with minimization of job personnel, strain taken by them and automating the weighing system thereby enhancing the production rate. Using this automation, we get increased accuracy for the product made.

II. OBJECTIVES

1) To automate the existing process
2) To eliminate fatigue of workers.
3) Reduction of process time.
4) Increase number of tiles produced.
5) To build a flexible and accurate system.
6) Reduction of wastage of ceraline material.

III. LITERATURE REVIEW

Primary Examiner- H. Grant Skaggs
Attorney, Agent, or Firm-Hopgood, Calimafe, Kalil,
A. Blaustein & Lieberman:
Continuous automatic feeding apparatus for bulk mate- rial is provided. The device has a vibratory feeder for moving the material to be fed, the feeder having a cen- trally disposed narrow spoon extending therefrom which provides a relatively small rate of material feed. A pair of hoppers are located under the composite feeder, and the material supplied to each controlled by a pair of displaceable deflectors. Each deflector has three positions: a first position in which the deflector prevents any flow into its associated hopper and de- flects the flow into the other hopper; a second position in which the flow from the feeder is deflected to the other hopper but the flow from the spoon is permitted to enter its associated hopper; and a third position in which the flow from both the vibratory feeder and the spoon enters the associated hopper. Each hopper has a weigh cell and control apparatus associated therewith to operate the deflectors and empty the hoppers when a predetermined weight has been attained.

IV. METHODOLOGY

Programmable logic controller (PLC) is an industrial computer that monitors inputs, make decisions based on its program and controls outputs to automate a process or machine, automatic gravity fed Nett weigher.

It incorporates a load cell, used for high speed accurate weighing.

Load cell weighing system is isolated from the product feed and weigh pan.

Direct loading of single load cell & the design of the weigh pan provides trouble free operation.
V. WORKING

A. Weighing Includes Five Steps:

1. Ready to weigh

Before weighing cycle can be initiated the machine status is checked by the control unit. These include checking that the pan doors are closed and that the weigh pan is empty of materials. The feed valve is closed and the swinging baffle is “in” (lies closed to the feed valve spout side).

2. Major Feed

On the receipt of the “main feed” command, the feed valve is opened and the materials is gravity-fed through the feed valve spout into the weigh pan at the main feed (fast) rate. The weight of material in weighpan is detected by loadcell assembly and is passed to the control unit.

Main feed continues until the “main to minor feed change-over point” is reached.

3. Minor Feed

At the “main to minor feed change over point”, the swinging baffle moves to the “out” position (is pushed into the flow material in feed valve spout). This reduces the feed valve spout outlet area and the volume of material fed into the weigh pan is reduced to minor feed rate to allow the control unit to accurately determine the feed cut-off point. Minor feed continues until the “feed cut-off” point is reached.

4. Feed Cut off

At the “feed cut-off” point (which is just before the target weight is made up) the feed valve is closed. Material “in flight” between the feed valve and the weigh pan then falls into the weigh pan to make the weighment complete. The weight of the material “in flight” is called the “in flight compensation” value.

5. Weighment Discharge

At the appropriate time, control unit causes the pan doors to open, the weighment is discharged and as pan doors recloses, further weighing of cycle is under normal circumstances automatically initiated.

B. Feeding Operates In 3 Steps:

1) Collecting the Discharge:

When the weigh scales measures desired weight at appropriate time, control unit causes the pan doors to open
and the weighment is discharged to the first cavity, chain moves a very minor distance so that the second cavity aligns parallel to the pan doors for the second weighment discharge and again this is repeated for the third cavity. Once all the three cavities are filled control unit stops the weighing system and initiates the feeding system at appropriate time.

2) Feeding To Hydraulic Press:
After the dye cavity is filled the conveyor carries the dye in fed for pressing. Once the second stage is initiated the gear drives quickly the conveyor to the press and stops at the operating point. This is achieved with the help of a stopper at the exit of the pressing machine. Once the belt is stopped pressing takes place. Tiles a removed and the chain starts moving, gear drive back the dye mould to the initial position for weighment discharge.

3) Return to Initial:
Once the tiles are removed from the mould, the gear drives back the dye mould to the initial position where the raw material is weighed and discharged for pressing. Thus the cycle is repeated and operates automatically. Thus the cycle is repeated until the desired amount of product is produced.

REFERENCES
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