



Industry Application Report Number One

Product Applications for the Pulp and Paper Industry



Non contacting, non-intrusive Radiometric and Microwave
Moisture Measurements

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http://en.wikipedia.org/wiki/File:%C3%84%/C3%A4nekoski_pulp_mill.jpg

Green Liquor

Application

In any Kraft Pulp Mill, recovering and regenerating the pulping chemicals and burning off organic material dissolved from wood is a critical step in the process. This can generate power in the form of steam which saves a Mill power generation costs. Causticizing is also performed in order to convert the inactive sodium carbonate into the proper cooking chemical recipe as efficiently as possible. Smelt from the bottom of the recovery boiler and weak liquor recovered from the Causticizing plant is fed into a green liquor dissolving tank where the green liquor is formed.

Application problem

An accurate, repeatable on line density measurement is absolutely necessary to properly operate this phase of the process. It can affect the process down line and cause inefficiencies throughout the remainder of the process. Ordinary contact type instrumentation can be problematic, foul up and be affected by buildup and other process factors. Some are rendered useless due to the coating as a part of this process. This in turn causes needless downtime and unnecessary repair costs.

The Berthold Technologies Solution

Berthold Technologies' non contacting/non-intrusive density gauges are the right solution. They are unaffected by process variables that make contacting type or similar instrumentation inefficient. There is no need to use redundant instruments as been common practice with other technologies. Placed between the Green Liquor Dissolving Tank and the Causticizer, Berthold Technologies density measurement gauges provide the solution for this tough application in pulp mills around the world.

Moisture in Wood Chips

The Application

Understanding the Moisture measurement of wood chips is a prerequisite for process optimization in the Pulping process. Since this measurement is so critical to the rest of the operation, a method of determining the moisture content of the chips in real time is critical to insuring the most efficient use of Mill resources. The quality of the pulp stock is determined, in part, by the accurate measurement of wood chips before they enter the digester.

Application problem

Conventional moisture methods measure only the surface of the chip profile which does not provide a representative measurement. In addition, other technologies do not compensate for changes in the bulk density of the load—further creating inaccurate measurements.

The Berthold Technologies Solution

Berthold Technologies Microwave Moisture measurement systems are the answer to this problem. Using 4th generation microwave technology, the microwaves penetrate through the chip load to provide an accurate and reliable measurement. As the measurement is made on line and in real time, there are no unnecessary delays waiting for lab data. Due to the fact that the system does not touch nor contact the process, there are no moving parts or other components to repair or replace. The system has the flexibility to account for changing load profiles as well as changes in bulk density.

Wood Chip Bin

Application

The chip bin is the starting point of the Kraft Pulping process. Its operation can affect different steps downstream as the process evolves through its cycle. Chips are fed into the bin for pre-steaming as part of the cooking process. In order to control the effectiveness of the throughput during the operation, a precise and constant level measurement is required so that the bin can be used at maximum efficiency. Having this consistently reliable measurement can enhance and optimize the pre-steaming of the wood chips. Proper pre-steaming is crucial to the digester efficiency because it affects absorption of the white liquor, longer cooking times and higher energy costs.

Application Problem

The environment in this application is hot, steamy and can cause problems for contacting type technologies as well as those that are contained inside the bin itself. Excessive maintenance costs are incurred by having to replace contacting systems with moving parts. Downtime can occur when it is least expected generating higher labor maintenance costs. Excessive repair and replacement costs can occur when using traditional type contacting technologies.

The Berthold Technologies Solution

Berthold Technologies Radiometric Level systems are the most cost effective methods to achieve efficient and accurate chip level measurement. Whether a continuous or point level measurement is required, the non-contacting and non-intrusive nature of radiometric technology assures a highly repeatable and consistent measurement with virtually no repairs or downtime.

Lime Mud Thickener

Application

The Lime Mud Thickener is designed to separate suspended solids particles from a liquid stream by means of a gravity settling. Its purpose is to increase the solids concentration of the feed stream. Chemicals called flocculants are added to aid the gravity settling.

Application Problem

A steady state material balance must be maintained around the thickener in order to insure proper production output as the material continued through the process. The volume of the process must be controlled to prevent both solids overflowing from the thickener as well as preventing the bed pressure from falling to unacceptably low limits and the underflow density dropping below required ranges. Underflow pumping control is necessary to control both bed pressure and the underflow solids concentration.

The Berthold Technologies Solution

Berthold Technologies Density gauges are the right solution for the underflow thickener process. Due to its non-contacting, non-intrusive and solid repeatability, the % solids can be measured and the proper operational steps can be taken to insure the proper material balance is maintained between the solids and the liquid stream. With the nature of radiometric non-contacting and non-intrusive technology, unnecessary repairs and downtime are virtually eliminated when compared to contacting, probe type technology.

MC Pump Standpipe Level

Application

The latest evolution of the MC pump (standpipe system) includes a centrifugal pump with a recessed impeller that fluidizes the pulp mixture. Fluidization of the pulp permits an 8-18% (medium consistency) pulp stock to be pumped with centrifugal pumping methods. The strong turbulence used to fluidize the pulp allows for the addition of bleaching chemicals. The process is especially hard on impellers as level must be maintained to prevent cavitation—which can cause severe damage and expensive repairs.

Application Problem

Pumping of pulp stock in the 8-18% range is difficult to achieve because of plugging. Traditional instrumentation, using load cells, DP cells, and capacitance probes, have proven to be ineffective for this application. Load cells are unpopular because of their high cost. DP cells produce problems because of frequent bridging inside the standpipe, which leads to false level measurements. With capacitance probes, coating on the probe could produce an erroneous reading, and all intrusive measuring instruments cause high maintenance costs.

The Berthold Technologies Solution

Berthold Continuous Level gauges have significant advantages over other contacting type technologies such as capacitance probes and DP cells. There is no danger of coating of the probe or shearing off due to the high consistency pulp stock. The easy installation eliminates the need for maintenance due to the non-contacting and non-intrusive operation. Berthold Technologies radiometric continuous level gauges are an industry standard and used in over 100 continuous applications in the US, Canada and worldwide.

Wood Chip Bulk Flow

The Application

Measuring the bulk weight of the wood chips as they begin their transport through the Kraft Pulp Mill process is essential to starting the entire process. Before the wood chips go into the chip bin to begin re-steaming, plant operators need to know how much is being conveyed in order to control their inventories and optimize the steaming and cooking process.

Application Problem

Providing a reliable and stable measurement for these products has always been a challenge. Mechanical type scales work fine—but for a very short period until they have to be recalibrated. Add in the problems with belt alignment and tension, counterweight and other factors related to this technology, maintenance and overtime costs can go out of control.

The Berthold Technologies Solution

Berthold Technologies Bulk Flow Meter can provide an accurate and repeatable measurement of wood chips. As it is mounted around the belt frame and does not physically touch it, Berthold Technologies Bulk Flow Meters are not subject to the typical problems associated with mechanical scales. Costly repairs and overtime are virtually eliminated.

Chip Digester

Application

The wood chips are cooked in huge pressurized digesters. Some digesters operate in batch manner and some in continuous processes. There are several variations of the cooking processes both for the batch and the continuous digesters. Digesters producing 1,000 tons of pulp per day and more are common with the largest producing more than 3,500 tons of pulp per day. In a continuous digester the materials are fed at a rate which allows the pulping reaction to be complete by the time the materials exit the reactor.

Application Problem

In order to maximize process efficiency, both continuous level and point level measurements are important. As the chip digester is the all-important feed vessel going into the black liquor flash tank, it is necessary to know and understand the level in the digester at any point at the upper part of the digester. Also key is to prevent an overflow in the digester itself which could be quite costly. As it is impractical to put contacting type level measurement due to the high temperature and steam environment, getting a good level measurement in this most critical vessel is of prime concern.

The Berthold Technologies Solution

Berthold Technologies Continuous and Point level measurement systems are the answer to precise, consistent level measurement and control. High temperatures, steam and other process related factors do not affect the measurement system. With the level undergoing constant changing due to process conditions, Berthold Technologies Continuous and Point level systems are the answer to accurate and reliable chip digester level measurements. Problems with replacing intrusive probes and sensors are eliminated as the system is mounted outside the vessel.

Multiple Effect Evaporators

The Application

With spent cooking liquors or effluent being processed, energy consumption and other factors come into play. One of the most important parameters is the processing of the dry solids content using a minimum of washing requirements. As energy consumption is a concern, every part of this process must be closely monitored and measured for proper control and efficiency.

Application Problem

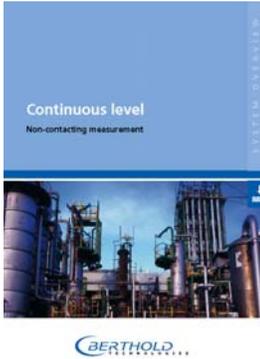
Having a reliable measurement of the solids in the liquor from the Black Liquor Flash Tank is of prime importance. Measurement of these solids and their proper control is essential in order to keep energy costs under control. Since the multiple effects evaporator configuration can require a great deal of energy, having an accurate solids measurement is important to reduce and maintain the right amount of energy needed for this process.

The Berthold Technologies Solution

Berthold Technologies' Density gauges can provide a stable and reliable solids measurement—and virtually eliminate maintenance problems caused by contacting and intrusive technologies. Using a patented process virtually guaranteeing temperature stabilization, Berthold Technologies density measurement systems can provide the necessary outputs for outstanding reliability and measurement repeatability. As with all Berthold Technologies products, maintenance, repairs and excessive downtimes are virtually eliminated.

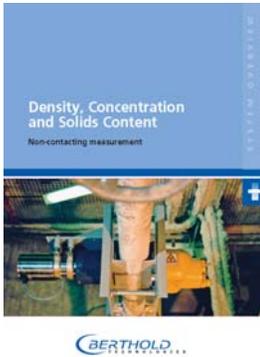


Continuous Level Measurement



Berthold Technologies has continuous level measurement platforms to fit the most demanding measurement requirement. If a traditional configuration is needed, then the LB 440 with remote electronics is the answer. If an integrated system with HART, Foundation Fieldbus or other protocols are required, then the LB 490/LB 490 Tower-Sens can meet the challenge. A patented internal process keeps the measurement stable—even in widely varying temperature changes common to most processes. Using the lowest source sizes in the industry thanks to superior sensitivity and proprietary detector technology, Berthold Technologies Continuous Level Measurement systems is the solution for any tough process level measurement.

Density, Concentration and Solids Measurement



Berthold Technologies specializes in density and solids measurements. Using highly sensitive scintillation detectors, a variety of platforms are available depending upon the operational requirement. From integrated electronics with HART, Foundation Fieldbus and other protocols, to the traditional remote electronics configurations, Berthold Technologies has the answer to the most challenging density measurement applications. Maintenance and downtime are virtually eliminated due to the non-contact and non-intrusive operation of the system.

Point Level , Bulk Flow , Microwave Moisture Measurements



Point level and bulk flow measurements are an important part of the Pulp and Paper process. It is important to have level measurements that can be relied upon—and yet be tough enough to survive the harsh conditions found in many of these processes. Similarly, reliable and consistent bulk flow measurements are key to insuring that processes are running efficiently and nothing is wasted. Wood chip moisture measurement is also a critical measurement as the entire process downstream can be affected. Berthold Technologies 4th generation microwave measurement systems are the solution to accurate and reliable moisture measurements—on line and in real time!

Retrofitting Older Nuclear Gauges



Due to the superior sensitivity of our detectors, older nuclear gauges (including those of competitors) can be easily retrofitted with new Berthold Technologies electronics. In many cases, the cost of disposing of sources is eliminated—and the benefits of new state of the art electronics can be quickly realized.

To download a copy of these brochures, just email your request to berthold-us@berthold.com



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