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Fresh Water Reclamation in De-Inking Process using Distributed Control System

Rubini. T[1], Sughi. S[1], Dr. R. Mohana Priya[2], Mrs. N. Sudha[3]

[1]Student, [2]Assistant Professor, [3]Plant Engineer-Instrumentation
[1,2]Department of Electronics and Communication Engineering,
[1,2]Paavai Engineering College, Namakkal, Tamil Nadu, India
[3]Newsprint & Papers Limited, Kagithapuram, Karur, Tamil Nadu, India

ABSTRACT

The main objective of our project is to purify the waste water from the deinking process. Fresh water is nothing but water with less than 500 parts per million of dissolved salts. The industrial waste water treatment is to remove pollutants, remove toxicants, neutralize coarse particles, kill pathogens so that quality of discharged water is improved. In this condition the deinking agent is used to separate and remove the ink from pulp. Ink can be removed through a method called as flotation, in which the ink is first changed into fine particles that are then dispersed. In our project Back flushing filter /Auto filter RF3 is used to filter the dust particles from the waste water. Through this deinking process the fresh water get polluted, with the help of primary and secondary treatment the maximum percentage of water is get purified.

KEYWORDS: *Back flushing filter-Auto filter RF3, flotation*

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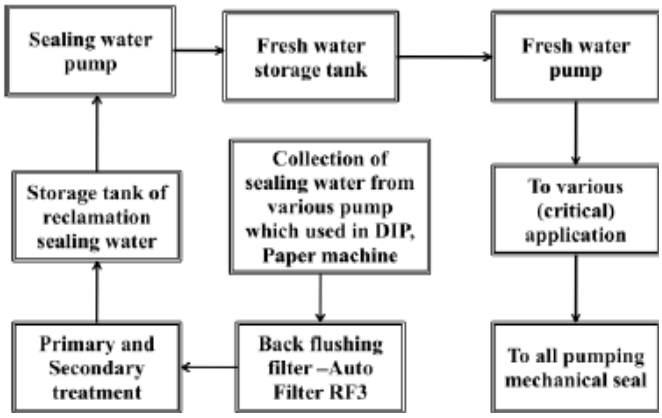
INRODUCTION

Water is a precious natural resources without which life cannot exist. As it is available in fixed quantum thus reclamation of this natural resource is very essential to meet the requirement of continuously increasing population. without effective planning and management per capita availability of utilizable water is going down. The increasing gap between available to water require, highlight the importance of waste water reclamation. Fresh water on the land surface does a major role on the water cycle in human life. De-inking process is the one in which the ink from the office waste and news-papers are removed in order to prevent it from dispersing into the pulp. Sodium soap is used for removing the ink. This sodium soap is processed in a container. The existing method has level controllers for controlling the level. But our proposed method has "load cell" for measuring and controlling the level. In this method the level is measured by measuring the weight of the sodium soap inside the container.

Working

Paper production is mainly a two step process in which a fibrous raw material is first converted into pulp, then pulp is converted into paper. Pulp making can be done either mechanically or chemically. The cleaning and screening is done to remove solid impurities (sand, lamination sheet, etc.) from the pulp. Using soap solution three stage of flotation process (valuable minerals are separated from worthless material) is done to remove wastage. Bleaching of wood pulp is the chemical processing to lighten its colour and whiten the pulp. The chemicals are coagulant strong cationic, flocculants anionic, flocculants cationic. Each and every stage of deinking process needs pure water.



Collecting the sealing water from various pump which is used in DIP, Paper machine. Further primary and secondary treatment is done after filtering.

We are using **Back flushing filter /Auto filter RF3** –is a fully Automatic, self –cleaning filter for extracting solid particles from low-viscosity fluids.

SOFTWARE REQUIREMENT

800 XA Control software-AC 800M control applications can be created in any of the five IEC 61131-3 dialects by using Engineering workstation, and then be downloaded to controllers using the Control Builder. Control applications can be distributed and executed on several controllers and communicate with each other on Control Network using named variable communication. Parts of the application can be downloaded to different controllers. The functionality range for control applications is wide, from binary control to closed loop control, with advanced functions like auto tuning PIDs, fuzzy control, etc. Pre-defined process objects like motor objects, valve objects, etc. are available. It is possible to build user-defined function blocks, and also to hide its content in order to protect the intellectual property. User-defined serial protocols can be developed in structured text with the support of special functions needed, e.g. for checksum calculation. Control Modules extend the IEC 61131-3 language to an object-oriented configuration method. The Control Module concept raises the abstraction level of engineering by hiding details in pre-defined control blocks. This enables reuse to a higher degree, making repetitive engineering very efficient. Analog input and output-Analog control voltage is 4 to 20 mAmp.8 input and output channel only accepted in one card.

Digital input and output-Digital control voltage is 24 volt DC signal, 16 input and output channel are connected in one card.

HARDWARE REQUIREMENT

Distributed control system-

It is a control system in which the control is distributed throughout the system instead of having central control mechanism by using central controllers a DCS divides the controlling task among multiple distributed system. A distributed control system (DCS) refers to a control system usually of a manufacturing system, process or any kind of dynamic system, in which the controller elements are not central in location (like the brain) but are distributed throughout the system with each component sub-system controlled by one or more controllers. The entire system of controllers is connected by networks for communication and monitoring. DCS is a very broad term used in a variety of industries, to monitor and control distributed equipment. Before the beginning of the DCS era there were pneumatic devices that controlled process and engineers manually turned valves on the site. Modeling of the systems was made possible by DCS as it allowed the ability to record and manages process from comfort of a computer screen.

DCS we are able to control processes remotely and gain a better understanding of how the process operate and how they can be improved to both increase safety and increase profit possibilities. The input modules receive information from input instruments in the process (or field) and transmit instructions to the output instruments in the field. Computer buses or electrical buses connect the processor and modules through multiplexer or de-multiplexers. Buses also connect the distributed controllers with the central controller and finally to the Human–machine interface (HMI) or control consoles.

DCS systems are deployed in operations where downtime due to a malfunction may cause material and personnel losses. To prevent them it's possible to include redundant solutions, within turn are increasing the investments to the control system. Redundancy and sophisticated diagnostics are nowadays standard built-in options for DCS and it's not necessary for them to write a custom program. Downtime is related with online and offline application changes. A typical DCS runs non-stop for years. In the case of DCS, the center for control is HMI because for the continuous control it's not possible to see the product (it's located in enclosed tangs, pipelines,). On the other hand in PLC control used for discrete control, the operator can see the product. Therefore, the operator must have as much information about the process on the screens to know to monitor and control it.

Auto Back-Flush Filter AutoFilt

HYDAC AutoFilt automatic back-flushing filters are designed for continuous or discontinuous filtration operation in all areas of industry and in water treatment. These automatic back-flushing filters are self-cleaning systems that separate solid particles from fluids. They make a great contribution to operational reliability and reduce operating and maintenance costs.

1. Temperatures up to +90 °C
2. Pressures up to 350 bar
3. Filtration ratings from 15 µm to 10,000 µm
4. Flow rates up to 10,000 m3/h

Features

- Separation of solid particles from low viscosity fluids
- Conical filter elements provide greater efficiency
- Variable housing design

Advantages

- Fully automatic operation
- Ready-to-operate unit
- Maximum utilisation of the filter area
- Remote monitoring possible with smart phone or tablet
- Self-diagnosis, system diagnosis, process monitoring
- Bidirectional communication of component activity
- Open connectivity to all commonly used customer interfaces (1x Ethernet,1x serial RS-232 C/RS 485)

Thus through our project we can get upto 75% of recycled fresh water which can be used in deinking plant and also a part of recycled fresh water is used for agricultural process this may reduce the water scarcity in industry and even can increase he ground water level.

Local Control Unit (LCU): This is denoted as local computer in Figure 3. This unit can handle 8 to 16 individual PID loops, with 16 to 32 analog input lines, 8 to 16 analog output signals and some a limited number of digital inputs and outputs.

Data Acquisition Unit: This unit may contain 2 to 16 times as many analog input/output channels as the LCU. Digital (discrete) and analog I/O can be handled. Typically, no control functions are available.

Batch Sequencing Unit: Typically, this unit contains a number of external events, timing counters, arbitrary function generators, and internal logic. Local Display. This device usually provides analog display stations, analog trend

recorder, and sometime video display for readout. Bulk Memory Unit. This unit is used to store and recall process data. Usually mass storage disks or magnetic tape are used. General Purpose Computer. This unit is programmed by a customer or third party to perform sophisticated functions such as optimization, advance control, expert system, etc.

Central Operator Display. This unit typically will contain one or more consoles for operator communication with the system, and multiple video color graphics display units. Data Highway. A serial digital data transmission link connecting all other components in the system may consist of coaxial cable. Most commercial DCS allow for redundant data highway to reduce the risk of data loss. Local area Network (LAN). Many manufacturers supply a port device to allow connection to remote devices through a standard local area network.

RESULT AND DISCUSSION

Recycled water can satisfy most water demands and it is used for non-portable purposes, such as agriculture, landscape, public parks, etc,. Water recycling through our project we can get up to 75% of recycled fresh water which can be used in deinking plant and also a part of recycled fresh water is used for agricultural process this may reduce the water scarcity in industry and even can increase the ground water level. Water recycling has proven to be effective and successful creating a new and reliable water supply without compromising public health. water recycling is a sustainable approach and can be cost effective in the long term, the treatment of waste water for reuse and the installation of distribution systems at centralized facilities can be initially expensive compared to such water supply alternative as imported water, ground water, or the use of gray water onsite from homes.

CONCLUSION AND FUTURE ENHANCEMENT

The demand for recycled fibre is globally increasing by more than 4% annually compared to around 2% for virgin fibres. This means that more paper needs to be recovered and recycled. As most countries in Europe already collect up to 63% (in 2006) of all consumed paper, this means that the raw material quality will decrease in these regions as also lower quality paper has to be recycled. At the same time higher quality of the final deinked pulp is demanded. A higher proportion of deinked fibre will also be used in especially magazine grade papers. Newsprint is already produced with 100% deinked pulp. Another trend is the lower use of fresh water or higher closure of water circuits in the mills which will also affect the deinking process (higher temperatures, more dissolved and colloidal substances in the process waters, etc.). All these trends signify that more deinking, bleaching and other recycling process chemicals are required to reach the same quality target. This will as a result require more work in order to find new chemicals and concepts that will help recycling mills to save raw material, chemical or energy costs.

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