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Controlling of ph level in sugar manufactoring unit

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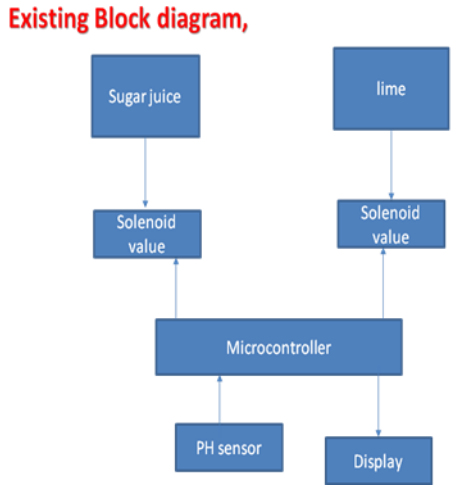
Abstract: Neutralizing pH value of sugar cane juice is the important craft in the control process in the clarifying process of sugar cane juice, which is the important factor to influence output and the quality of white sugar. On the one hand, it is an important content to control the neutralized pH value within a required range, which has the vital significance for acquiring high quality purified juice, reducing energy consumption and raising sucrose recovery. On the other hand, it is a complicated physical chemistry process, which has the characteristics of strong non linearity, time-varying, large time-delay, and multi- input. Therefore, there has not a very good solution to control the neutralized pH value. In this process we maintain PH value by adding lime with sugar juice. The flow of lime and sugar is controlled through variable frequency drive. This method is able to maintain PH quickly and accurate**.**

1.Introduction:

Clarifying process is a core link in the course of sugar production, it has the characteristics of strong non-linearity, multi-constraint, strong coupled, time-varying, large time-delay, and multi-input. The technology is complicated, which results in great difficulty in the course of modeling and optimization control. With the existing technological process and equipment, it is a key problem how to utilize directional information and adjust processing parameters in real time on site to keep the optimum state of production, improving the quality of the purified juice. It is a complicated physical-chemistry process to neutralize the juice, and the pH value needs the manual regulation in the actual production process, so its control effect is insufficiently stable, i.e. sometimes pH excessively is high and sometimes it excessively is low, and the result is not

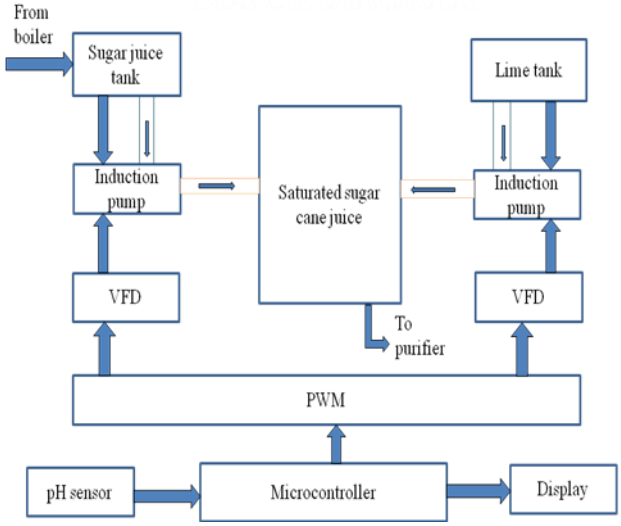
good. The retention time of juice in the clarifiers has a great effect on the juice and its components. If the juice is refractory or contains a large proportion of suspended matter it may be logical to hold the juice in the clarifier for a longer period of time. However excessive capacity clarifiers that hold juice for long periods result in higher levels of inversion.

2.Existing System:



This existing pH control system uses solenoid valves to control the flow of both sugarcane juice and lime. In this system pH compensation process is too slow. It is not difficult to control the juice and lime flow level using solenoid value, because it is used only to turn on and off the valves.

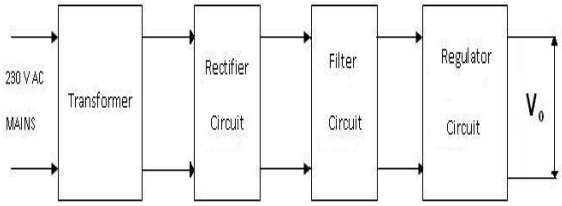
3.Proposed System:



In this proposed system, instead of solenoid valves, Induction pump with Variable Frequency Drive (VFD) is used. VFD is used to control the speed of the Induction pump thereby controlling the flow of both sugarcane juice and lime. Time consumption is very less compared to existing system.PH compensation process is too fast.It is easy to control the flow level of lime and sugar juice by control frequency of induction pump.

4.Hardware Requirements:

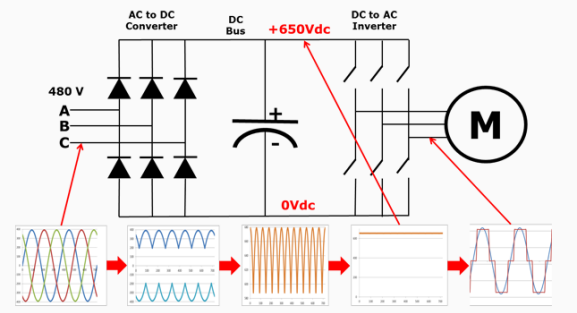
4.1.Power Supply:



Power Supply is an important part of a circuit. It provides required supply to different blocks of the circuit from input

230V AC. The main blocks include transformer, rectifier circuit, filter circuit, and regulator circuit. For our project we require + 5 Volt and +12 Volts supply. +5 Volts is given to Micro-controller board.

4.2.Variable Frequency Drive:



A Variable Frequency Drive (VFD) is a type of motor controller that drives an electric motor by varying the frequency and voltage supplied to the electric motor. Other names for a VFD are variable speed drive, adjustable speed drive, adjustable frequency drive, AC drive, micro drive, and inverter. Frequency (or hertz) is directly related to the motor's speed (RPMs). In other words, the faster the frequency, the faster the RPMs go. If an application does not require an electric motor to run at full speed, the VFD can be used to ramp down the frequency and voltage to meet the requirements of the electric motor's load. As the application's motor speed requirements change, the VFD can simply turn up or down the motor speed to meet the speed requirement.

4.3.Induction Pump:

The principle of induction pump without moving parts and sealing offers pump's design which efficiency is nearly 82%, which are high above all ordinary pumps.The way of liquid propulsion especially suitable for watercrafts propulsion and for pump designing is explained in the text below. This kind of propulsion is especially suitable for submarines. The advantage on classic MHD generators is absence of contacts at all. These contacts are usually affected by electrochemical corrosions which limit operational time of the ordinary MDH pump or submarine propulsion device significantly. This kind of propulsion without contacts offers practically infinite operational time completely without the maintenance and absence of sealing enables submarine to submerge much deeper. Nuclear submarine supplied with the kind of propulsion would be able to stay submerged as much as they are energy in its nuclear reactor. The advantage of the pump is its ability to work as asynchronous generator too, and in the case it can be used for increase of existing hydro power plans for quarter (25%) without any investment in dam or expansion of accumulation lake. In these days when the climate become wormer and precipitation decreases this is good way to extend usage of existing hydro power plants, which are only duly ecological sources of electric energy in used today. The induction pump is also suitable for pumping of extremely hot liquid metals, corrosive liquids like melted salt and various acids.

4.4.MICROCONTROLLER-ATMEGA8:

The ATmega8 provides the following features: 8 Kbytes of In-System Programmable Flash withRead-While-Write

capabilities, 512 bytes of EEPROM, 1 Kbyte of SRAM, 23 general purpose I/O lines, 32 general purpose working registers, three flexible Timer/Counters with compare modes, internal and external interrupts, a serial programmable USART, a byte oriented Two wire Serial Interface, a 6-channel ADC (eight channels in TQFP and QFN/MLF packages) with 10-bit accuracy, a programmable Watchdog Timer with Internal Oscillator, an SPI serial port, and five software selectable power saving modes. The Idle mode stops the CPU while allowing the SRAM, Timer/Counters, SPI port, and interrupt system to continue functioning. The Power down mode saves the register contents but freezes the Oscillator, disabling all other chip functions until the next Interrupt or Hardware Reset. In Power-save mode, the asynchronous timer continues to run, allowing the user to maintain a timer base while the rest of the device is sleeping. The ADC Noise Reduction mode stops the CPU and all I/O modules except asynchronous timer and ADC, to minimize switching noise during ADC conversions. In Standby mode, the crystal/resonator Oscillator is running while the rest of the device is sleeping. This allows very fast start-up combined with low-power consumption. The ATmega8 is supported with a full suite of program and system development tools, including C compilers, macro assemblers, program simulators, and evaluation kits.

5. SOFTWARE TECHNIQUES:

5.1.Code Vision AVR:

The AVR is a modified Harvard architecture8-bitRISC single chip microcontroller which was developed by Atmel in 1996. The AVR was one of the first microcontroller families to use on-chip flash memory for program storage, as opposed to one-time programmable ROM, EPROM, or EEPROM used by other microcontrollers at the time.

Program memory: Program instructions are stored in non-volatileflash memory. Although the MCUs are 8-bit, each instruction takes one or two 16-bit words.

The size of the program memory is usually indicated in the naming of the device itself (e.g., the ATmega64x line has 64 kB of flash while the ATmega32x line has 32 kB).

There is no provision for off-chip program memory; all code executed by the AVR core must reside in the on-chip flash. However, this limitation does not apply to the AT94 FPSLIC AVR/FPGA chips.

5.2. Embedded C

Embedded C is used for microcontroller programming. There is a large and growing – international demand for programmers with 'embedded' skills, and many desktop developers are starting to move into this important area. Because most embedded projects have severe cost constraints.

5.3. AVRDUDE AVR PROGRAMMER

USBasp - USB programmer for Atmel AVR controllers.USBasp is a USB in-circuit programmer for Atmel AVR controllers. It simply consists of an ATMega8 and a couple of passive components. The programmer uses a firmware-only USB

driver

Features

- Flash Burner for AVR Series from ATMEL
- Communication - USB
- Auto Erase before writing and Auto Verify after writing
- Freeware AVR GCC C Compiler
- ISP Programming FRC Socket
- Connects through AVR DUDE
- Device Support

6.Conclusion:

To overcome the difficulty of neutralizing pH value in the sugar refineries, VFD is used to control the flow of both sugarcane juice and lime. The research indicates that this method has good control results and abilities for anti-disturbances. This will build a good foundation for implementation in real-time control in the future.

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