

Instrumentation of Cold Soda Pulping Plant at APPM

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Though there is a small section of the Paper making community which still views Instrumentation with scepticism, with the influx of considerable number of qualified Engineers and Technologists in the Paper Industry, there has been a sharp rise in the number of instruments and in the general attitude towards instrumentation. This has been due to many factors.

There are certain equipments which cannot be operated without suitable instrumentation, as Indian Paper Industry is going in for increased sophistication in equipments and operation.

Paper making is going into the area where certain variables can be measured only through instruments and cannot be checked otherwise.

Of course, other general advantages as in other industries like uniform quality, saving in manpower etc., have helped to put up instrumentation high in the Managements' priority lists.

Actually, even the lay-out of the Mills is simplified by appropriate instrumentation.

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India has also come to a stage where it is able to manufacture many normal instruments like Flow Recorders, Temperature Recorders, Level Controls etc. It is also possible to, with about 50% imported components, manufacture instruments hitherto imported in its entirety. Pneumatically operated instruments are most predominantly used in paper industry and they are easily available in the country.

PROCESS GENERAL :

A brief description of our Cold Soda Process is given below in the Fig. 1. The debarked wood is chipped in a conventional disc chipper and screened to 15 mm to 25 mm. size. These chips are taken through the conical bottom of a silo and metered by a rotary table feeder by variable speed drive and passes through a magnetic chute for removing

any metal. The chips are conveyed through a pneumatic conveyor to a Sprout Waldron Fractionator driven by 100 HP Motor. By a remote operated flow control valve about 20% of the total caustic soda required for impregnation at the chip fractionator is added before the chute. The fractionator disintegrates the chips to match stick size before conveying to a Sprout Waldron Soaking Bin.

The soaking bin is fabricated at the Mills on the design of M/s. Sprout Waldron. The bottom of the bin consists of an imported discharge section with heavy duty set of screws driven at variable speeds. The Soaking Bin works as a continuous impregnation vessel and the impregnated chips can be discharged at any

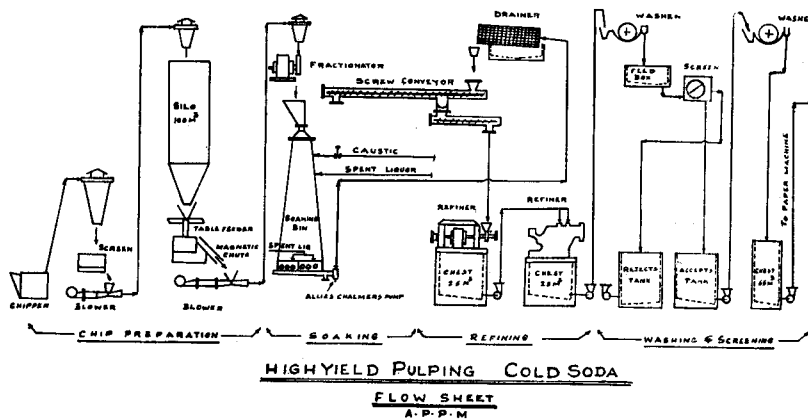


Fig. 1. High yield pulping—Cold Soda, Flow Sheet, APP Mills

rate by adjusting the feed, level in the vessel and speed of the discharge screws. The level is maintained automatically by the instrument.

The balance quantity of a caustic lye required for impregnation is added to the soaking bin along with the chips. The caustic lye required is approximately 4% to 6% of NaOH on O.D. chips. This is controlled by a conductivity cell.

The impregnated chips at 4 per cent to 5 per cent consistency are discharged on to a cross collecting screw conveyor feeding to a specially designed Allis Chalmers Pump and sends the chips to a rotary drainer. The spent liquor is drained into a sump and flows into a foam tank.

The spent liquor is utilised partly at the soaking bin for maintaining the liquor ratio and partly at the discharge section for reducing the consistency of chips.

The impregnated chips are discharged from the Drainer at 15 per cent to 16 per cent consistency and are lead continuously to a 36" single disc refiner driven by 1000 HP motor. The feed can be regulated by the unflow feed and excess is passed to a Soaking Bins. The Disc Refiner diffibrous the impregnated chips and discharges the stock by gravity into the chest. The stock is further diluted to 5 per cent consistency and is regulated by a Dezurick line consistency regulator before it is fed to a twin flow pressurised Refiner driven by 250 HP Motor. The feed pressure can be controlled by hydraulic cylinders from 0 to 2000 psig. The refined stock at 25° to 30° SR is washed on a voith vacuum filter and screened through a waterous centrifugal screen having 1.2 to 1.4 mm perforations. The screened pulp is further thickened on another Voith vacuum filter and stored in a 65 M³ storage chest.

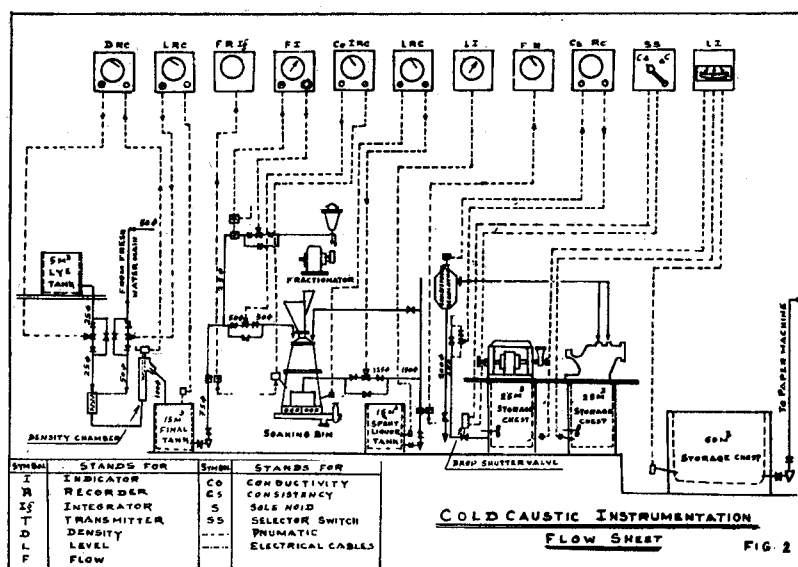


Fig. 2. Cold soda Instrumentation Flow sheet.

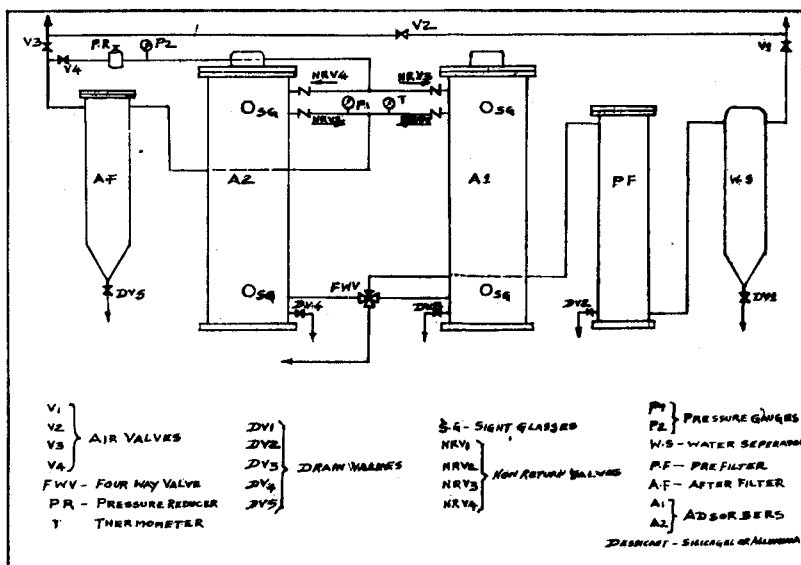


Fig. 3. Air dehydrator.

INSTRUMENTATION

The instrumentation was completely designed by us and most of the equipment was supplied by M/s Taylor Instruments (India) Ltd. The instrumentation flow diagram is shown in fig. 2 and a brief description is given below.

High concentration caustic lye from 9 Meter tank is diluted con-

tinuously with fresh water and is fed into the final lye tank. The density of the liquor going to the final lye tank is measured in the mixer cum bubble tube chamber and controlled by adjusting the caustic that is added before the density chamber cum mixer.

Concentrated caustic liquor (200 to 500 gms/litre) is brought down

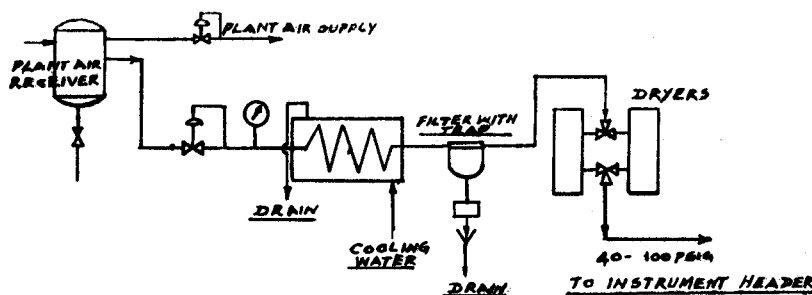


Fig. 4. Air Drying Instrumentation.

to 25 to 40 gms/litre before feeding in the final lye tank. Concentration can be varied by a setting in Instrument (DRC).

The level in the final lye tank is recorded by LRC. The caustic is pumped for addition before chip disintegrator and at the top of soaking bin. The flow is measured by a flow recorder cum integrator FRIG.

The flow of caustic added before the chip disintegrator is controlled by F.I. and the caustic concentration at live bottom bin (may vary from 10 to 15 gpl.) is controlled by a conductivity controller by adding caustic solution at the top of the chip bin.

The final level of bin is controlled by level recorder controller LRC by adding spent liquor at extraction point of the bin and the quantity added is measured by flow recorder F.R.

The out going consistency of pulp in storage Chest No. 1 to twin flow refiner is controlled by a dezurick in line motor operated consistency recorder regulator CSRC to about 4 to 4.5 per cent. The suction valve of the pump of the above chest can be remotely operated by a piston operated gate valve.

The levels of spent liquor tank, the two 25 M³ and one 60 M³ stock chests are measured by level indicators.

AIR DRYING

For the successful operation of pneumatic instruments care should be taken to provide oil free, moisture free compressed air. It is common experience that the small nozzles of relays of measuring and control instruments are clogged with moisture, oil, grit etc. Now-a-days Teflon ring compressors are available for production of oil-free compressed air. These are followed by air drying and filtering plants. It is becoming common practice to have a special compressor for instruments as such and separate air lines for instrumentation.

Some compressed air dryers have been made by us including water separator, pre-filter, adsorber, after filter with auxiliary non-return four way and other valves. We found that these things are working very well and have helped us in running our instrumentation trouble free and smoothly and are shown in fig. 3 and 4.

As a general rule each pneumatic controller, regulator, transmitter or positioner consumes air of 15 litre/min. and should be considered when sizing compressors and piping for Instrument work.

FITTING THE INSTRUMENTS INTO CIRCUITS

Unlike some industries the range of working of Pulp and Paper

Mill instruments is fixed not by experience but more on some guessed values and factors.

This complicates the tuning-in of the instrument in any process circuit.

This means that at the time of commissioning some instruments have to be sensitised or desensitised to get it within working range of the particular attribute. The location for getting a prompt sample indication, the response system to eliminate process and time lags etc. are areas where the Instrument Engineer has to use his ingenuity.

This problem is magnified since no Indian Instrument manufacturer has sufficient process know how and leaves everything to the Engineer in the Mill.

CONCLUSION

The advent of magnetic flow meters constructed with suitable corrosive resistant materials like Teflon etc. for offering uninterrupted flow in stock pipe lines, with no pressure drops, with no jamming of measuring impulse lines and quick speed of response of measurement and with the introduction of oxidation reduction potentials, continuous moisture profiler and basis weight profilers etc. is revolutionising paper industry.

But a note of caution had to be struck. Since most of the above mentioned instruments are sophisticated electronic type which are not manufactured in the country has to be imported at a heavy cost of foreign currency. To maintain them a number of internal spare parts have to be imported and to add to this some times unfortunately, the supplier will not send all the relevant information. As the demand for these equipment increases it is time for indigenous instrument industry to start manufacturing the same in the country at the earliest.