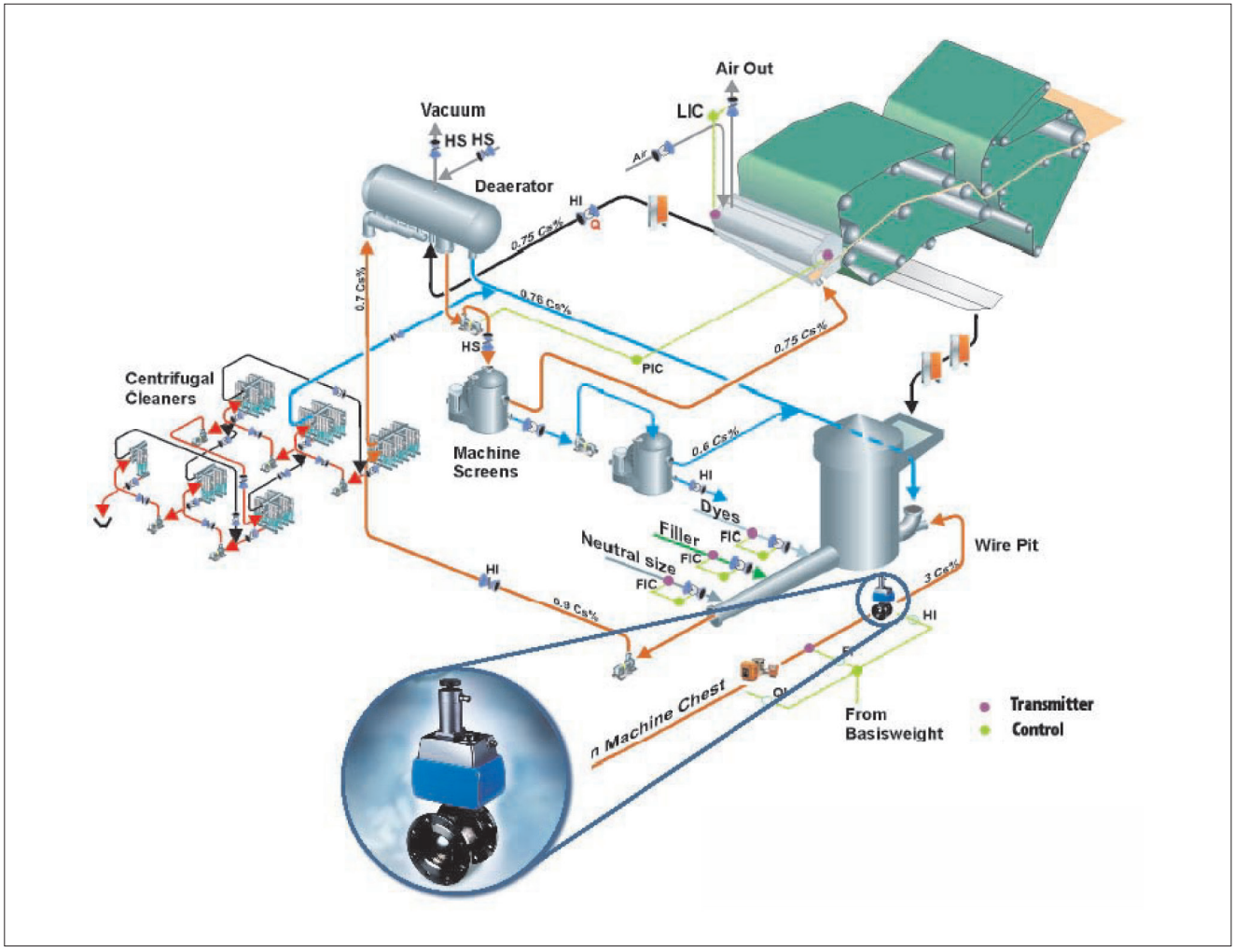
nelesACE™ basis weight control valve



- High resolution actuator attains up to 14100 discrete repeatable positions within the 90° operating range
- Faster adjustment of valve travel during grade changes = minimal downtime
- Ensures reliability, low maintenance and long service
- Handles a wide range of flow rates for different production requirements
- Compatible with virtually all leading Quality Control Systems
- The same actuator can be used with the full range of valve sizes

Pulp stock entering the wet end of the paper machine is fed through a series of process components. It is mixed with additives to form a slurry which is uniformly spread on the paper machine wire to form the sheet. The consistency of the pulp stock is the key factor in determining both the quality and grade of the paper.

Basis weight is measured at the dry end of the machine. This measurement is fed back, via the host computer, to the wet end of the machine, where the appropriate adjustments are made to produce a sheet that meets the customer's specification.

The performance of the basis weight control valve is therefore critical. It must be accurate and able to respond to precise setpoint changes. Response time must be quick. For example, if there is no stuffing box, irregular pumping may cause pressure surges which the valve must correct immediately.

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Basis weight control is one of the most critical applications for valves used in a paper machine, because virtually all sheet properties depend to a greater or lesser extent on basis weight.

The role of nelesACE as the final control element is critical, because basis weight depends on the ability of the control valve to compensate rapidly and accurately for fluctuations in stock flow.

Three actual case histories

1) Improving the production of a paperboard machine

This machine produces paperboard in the 230 - 370 g/m^2 range; there are normally several grade changes per shift, with a minimum of 7 grade changes per week.

The previous basis weight control solution tended to overshoot during grade changes. As a result, some 500 kg of stock per grade change had to be circulated back to broke. With the new nelesACE, the valve can be operated at variable speeds during a grade change which means that overshoot can be avoided. This will increase monthly production by 15 000 kg.

Another improvement is the reduction in flow variability. nelesACE can control the 90° travel movement more accurately than the previous control valve. The ability to attain 14 100 steps per 90° travel means that even the smallest deviations between set and measured flows can be controlled. With the previous control valve, typical flow variation was +- 0.2 l/s; with nelesACE it is reduced to +- 0.03 l/s. This means that the flow setpoint can be reduced, which results in direct savings in the consumption of pulp stock, more uniform quality of paperboard and better runnability.

2) Improving the production of a drying machine

In this case, nelesACE was installed to stabilize the basis weight control loop where problems had occurred with the previous control solution. Since the installation of nelesACE, sheet breaks have been reduced from 19 to 3 on Line 2, from 6 to 0 on Line 3 and from 12 to 1 on Line 4, over similar periods of time.

At the same time, basis weight deviation has decreased from 5 to 3-1 g/m^2. Good working conditions are 3 g/m^2 deviation or less. With nelesACE, the best basis weight deviation was 0,37 %, with maximum deviation at 1,4 %.

Prior to installation of nelesACE, deviation was 4 %. On this machine, they are working with a 900 g/m2 basis weight set point. With these improvements, linearity of the cellulose weight improved from 80,7 % to 89 %; stability increased from 86,8 % to 87,5 %, and production increased from 900 t to 980 t/day in Factory A (Drying Machines Line 1 and 2).

According to operators in the Drying Machine Area, the installation of nelesACE provides better basis weight control, reduced deviation (in both flow and basis weight), increased stability and greater precision of the mass flow as a result of speed variability on the Drying Machine.

3) Improving the production of a magazine paper machine

This machine produces online coated magazine paper in the 45 - 65 g/m² range; annual production is approx. 135 000 t. Basis weight control was originally carried out using two parallel valves: a DN200 segmented valve for coarse control and a second DN80 segmented valve for fine control. In addition, it was necessary to employ inlet pressure control. Pressure control was implemented using a main line control valve and a smaller pressure control valve with circulation pipelines. Basically, this rather complicated system worked very well, but with the larger flow changes it was necessary to overshoot the coarse control valve and then run it back to meet the required valve position, a procedure that was carried out manually.

nelesACE replaces both the coarse and fine control valves, and is more accurate than the earlier solution. The typical reduction in flow control variability is now about 25 %. nelesACE is also faster and grade changes can be made automatically. In addition, because increased speed also helps to compensate for inlet pressure variation, an inlet pressure control system is no longer required.

Savings

The capital savings achieved with the use of nelesACE can be summarised as follows: a one valve system replaces approx. 4 valves + pipelines, wiring and configurations. In terms of operational costs, a 25 % reduction in flow variability results in savings in both fiber and additives, whilst also increasing quality and runnability.

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