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Some experiences in trouble solving

P N Rao

ABSTRACT

Problems are mistakes committed during application engineering, selection of equipment, installation, commissioning, operation and maintenance. Solve them by identification and interpretation.

KeyWords: Drying rate; valve throttling; nozzlewear; de-inking cells; Data identification and interpretation

Introduction

As the Murphy's law goes, " If anything can go wrong, it will!" That is if brakes are not applied- if the mistakes are allowed to happen/if not corrected.

Drying curve is convex, interpreted by some as valve opening curve .

Identify sources of venting in cascade steam and condensate systems.

Problem of dissimilar diameter nozzles in centri-cleaners discussed.

Some peculiar problems investigated.

Problems galore! Ok. What are problems? These are mistakes committed, during application engineering, selection of equipment, installation, commissioning, operation and maintenance.

As the Murphy's law goes, " If anything can go wrong, it will!" That is if brakes are not applied- if the mistakes are allowed to happen/if not corrected.

Somemisconceptions carried through

It may not sound nice for good pulp & paper makers, but the truth is several misconceptions have been carried through by generations. This is because of lack of understanding, communication and training. Some beliefs are particularly strong.

As wet web enters drying section, it gets heated and drying rate increases. It attains a peak towards beginning/middle of last group of dryers; and as sheet dries subsequently, drying rate falls. This is because, moisture has to travel from sheet core to surface in Z direction, and then dry out. This implies time. The drying curve looks convex. The principle is interpreted by some operators as the need to keep dryer inlet valves fully open in the middle, tapering down towards dryer end. Traditionally, valve opening curve looked convex. This was passed on to generations. I have been witness to this since 50 years. It is difficult to explain the difference between drying rate curve to the older generation, but with the new educated crew, this is explainable.

Drying capacity must not be lost by low steam opening in the end. Further, it is better that the end dryers be at highest temperature for good free rosin setting. Fortunately, with the advent of cascade type steam and condensate systems, all isolating valves have to be fully open.

They are operated only for dryer isolation when required for maintenance. Not for any control purpose.

Coming to cascade system, systems are designed in such a way that venting occurs sometimes. If operators are not alert to the situation, venting leads to heavy loss. Controllable, by correct settings of main group and differential pressures. I had experience of one machine in north India, where steam draw has been reduced from 25 to 17 tph; and from 17 tph to 12 tph in a south Indian mill.

Similar problem is faced in centri-cleaners of older generation, which have still been in operation in several mills. Throttle the accepts, increase rejects, cleaning improves. That is the concept handed down by generations.

The valves provided are for isolation, not control. As the accepts valve is throttled, accepts flow is disturbed; and the central column rising is disturbed; and so the cleaning efficiency. It is physically difficult to maintain all accept-valves at the same opening level. With the result, pressure drops in cones vary; and flow happens into cone with the highest pressure drop; and direct discharge occurs.

Direct discharge is treated as a problem of the nozzle and nozzle is replaced. Now all nozzles do not have same diameter; and problems get copounded. Operators have to appreciate that minor wear of nozzle is not a problem-if all nozzles have same diameter.

Older stainless steel cones were made in several sections, with ceramic nozzles in the bottom. Pieces immediately preceding nozzles are made of cast steel of higher thickness. Once it happened that after commissioning of a new system, the intermediate section above the cast piece got cut; and total piece with nozzle fell out. This happened in a month. After another few days, one more cone. There was panic all round!

Dale Carnegie, the famous author of 'how to stop worrying and start living', said that if the problem is known, it is half solved. At this juncture, we have to recall with pleasure, contribution of 'Fiction' literature. We are indebted to the likes of Sir Arthur Conan Doyle and

Earl Stanley Gardiner, who created such great characters as Sherlock Holmes, and Perry Mason.

The first step in their endeavours to problem solving is collection of data. Then comes evaluation of data. The famous/notorious CIA of the USA has a director and two deputy directors. One collects the data and passes it on. A highly qualified specialist team under the second director disseminates this information and draws conclusions.

This means that any information must be duly respected and discussed. If information does not become data for analysis, precious clues may be lost. Observation of paper maker is that the consistency of discharge is rather high. Here, the paper maker, who has years of experience, must be respected. He may not have an immediate solution, but his observation is valuable!

This happens when bottom most nozzle diameter is low.

As per capacity of cone and pressure drop allowed, nozzle size has to be chosen. This was(there in the manual, given indirectly, as a range) not specifically suggested by manufacturer; but standard low opening nozzles were dispatched. This is similar to maximum diameter pump impeller despatch by manufacturer(sometimes) as standard-without trimming to the required diameter of duty point and range.

After cutting nozzles to correct size, the disc like wearing portion of liquid having all contaminants descended into the cast piece; and problem has disappeared.Thankfully, with modern fine centri-cleaners in banks, these problems do not arise.

Another so called valuable(!) advice passed on by operators is level control in centri-cleaner launders. It is easy to overflow from primary reject launder to secondary launder; and from secondary, to tertiary. This passes on cleaning load from secondary cetri-cleaners down the line. In some cases, these rejects are directed into couch pit. These are practices to be avoided.

Throttling of inlet valves of equipment is practised by several operators citing some not-exactly relevant reasons. Inlet to pumps; screens; cyclones...Example of a line feeding to a street of refiners is cited here. At the pump, delivery valve is say 75% open; just at the inlet to the first refiner, 75% open; at the inlet to second refiner, say 80% open... It may please be appreciated that intended capacity is not achieved; falls to less than 50%. All valves must be open fully excepting final accepts valve, used for control to get desired output level. Choice of correct pump, ACVFD ., are other solutions.

Since deinked wastepaper pulp is the source of most medium scale mills, a few observations connected with the operation of conventional deinking cells are discussed. (Cells in 1+5+2 formation mixing cell followed by 5 primary and 2 secondary cells) .

Problem plaguing mills is control of foam. Killing /Effective control of foam has been a problem. Importance of having as high a foam tank as possible is not appreciated.

Nowhere foam is fully killed by foam-killing nozzles. Since foam is not arrested in foam tank, head acting on pump to secondary cells fails to lift; foam overflows and pulp is lost. To my knowledge, simple, cheap and effective foam breakers are not available. I know of cases where overflow of primary cells is limited by this problem. In some cases, the discharge line for the foam is so small, that foam quickly builds up in the overflow chamber; and level becomes un-controllable. In several mills, extra discharge lines are provided; more overflow is allowed; and higher brightness is realized.

Problem is compounded by thinking of some operators that cleaning is best, if this is drained. If simple draining is acceptable, why secondary stage is provided?

In several mills, the ink removal scoop is removed in the second stage cells; and uncontrolled overflow is allowed by operators. This leads to heavy loss of fibres/yield.

In some mills, overflow weirs of the five primary cells are found at different levels. Foam overflows more where it is not required; and less, where required. From each cell, foam and liquid overflow; but pumps have same capacity. How is this capacity met? By keeping overflow levels in reverse order, so that accepts back-flow from bottom ports is smooth.

It is necessary to catch the ink sludge separately; dry it and burn. Let this not be mixed with other effluent. I understand that ink centrifuges are available, but they are power oriented-not exactly appreciated by small mills.

Another mis-conception. Occasionally we find heavy flow from high pressure oscillating shower nozzles. Since water is coming and shower is functioning, operators are not bothered. Nozzle wear is not suspected or attended to.

As nozzles wear, flow increases by square of nozzle area ; pressure delivered by pump drops correspondingly; and the operation point of pump (as seen from H-Q curve) shifts to right extreme-bad for cleaning operation; and very bad for pump-since it will be operating in the low efficiency range.As water from nozzle/needle frays, water droplets are developed, detrimental to wire. Solution? Check nozzles and replace them.

I had occasion to visit an old mill, now defunct. I was invited to study a paper machine. I took a round of the mill and saw another two-layer machine. The framing and ladders were dilapidated, but my interest took me to the top layer. Can you believe it? There is a water fall-flow from head box, that is. Head box is 10 mm or so higher on the drive side; and flow out of the head box was like a fall. How do you expect good sheet formation on that side? Indeed there were customer complaints on this issue. The team was not aware of the fact that something was really wrong (and they did not bother).

A mill in East India had problem with their yankee cylinder. Mill is still in operation. They reported that shell of the yankee is drawn in on tender side by 8 mm on the entire circumference; and since this is in the paper deckle, they had to give a cut of 8 mm and grind the cylinder. This happened a second time in another year's time, and I was called to study. The MS shell of 55 mm thick came down to around 40mm. The steam pressure is normal; MG press roll loading is in accepted limits. What can go wrong?

This is not a damage because of pressure. Some vacuum affair. I asked them, how they started and stopped the machine. When the machine is stopped, the MG press roll is lowered; and after a few rounds, steam is closed; and machine stopped. Everything appears fine, but all is not well. When the cylinder cools, inside vapour condenses; and vacuum forms. Air cannot enter cylinder. The trap did not have an air vent. Or there is no provision for air entering. There is so much pressure from outside on shell, that tenderside , straight opposite to condensate discharge spout is exposed; and metal caves in. This subject was discussed with the crew and after remedial measures, cylinder is safe , even after 10 years.Something likes this occurred in another mill on a cast iron cylinder and end cover just came out with torn shell.