

DRAW FRAME AUTOLEVELLER

Autoleveller is an additional device which is meant for correcting the linear density variations in the delivered sliver by changing either the main draft or break draft of the drafting system, according to the feed variation.

There are two types of Autolevelling systems. They are

- Open loop system
- closed loop system

Most of the drawframe autolevellers are open loop auto levellers.

In open loop autolevellers, sensing is done at the feeding end and the correction is done by changing either a break draft or main draft of the drafting system.

In closed loop system, sensing is at the delivery side and correction is done by changing either a break draft or main draft of the drafting system.

Most of the earlier card autolevellers are closed loop autolevellers. But the latest cards have sensing at the feed rollers and as well as at the delivery calendar rollers. We can say, both closed loop and open loop systems are being used in such autolevellers.

Open loop system is very effective, because the correction length in open loop system is many fold lower than closed loop system. But in case of closed loop system, it is confirmed that the delivered sliver is of required linear density. In case of openloop system, since the delivered material is not checked to know whether the correction has been done or not, Sliver monitor is fixed to confirm that the delivered sliver has the required linear density

Let us discuss about an autoleveller system which is being used in most successful drawframes like RSB-951, RSB-D-30 etc.

This system is an electronic levelling system. The major componenets in the system are

- Scanning roller
- signal converter
- levelling CPU
- servo drive(servo motor and servo leveller)
- Differential gear box(Planetary gear box)

Function of the scanning roller is to measure the variation in the feed material. All slivers fed to the machine pass thro a pair of scanning rollers. One of the scanning roller is moveable. These scanning rollers are loaded either by a spring loading system or a pneumatic loading system. Pneumatic loading is always better, because the pressure in kgs will be always same(consistent), irrespective of the sliver feed variation. But in the case of spring loaded, the pressure on scanning rollers may vary depending upon the feed variation.

The variations in sliver mass of the incoming slivers displace the scanning roller. The distance moved by the scanning is proportional to the sliver mass fed. This displacement of scanning rollers are transformed into volatage by a signal converter and is fed to an Electronic Levelling processor. With analogue system, electronic levelling processor is a servo amplifier, but in the case of digital system, it a CPU.

It is the Electronic Levelling processor which furnishes the correct target value to the servodrive.(servo motor and servo leveller).

Delivery speed of the machine and electric signal values arrived at by the slivers fed are the two important signals for the correction.

Servo drive takes the information and is converted in such a way that servomotor RPM and direction is decided for appropriate correction.

Planetary gearing (Differential gearing) with its controlled output speed drives the middle and back roller. i.e. Sliver entry of the drafting system

Because the servo motor RPM and direction varies according to the feed variation, and the servo motor and servo leveller generates a control speed of the planetary gearing, the required change in main draft is accomplished, compensating for the weight variation of the sliver fed.

If the slivers fed are too heavy, the entry speed is reduced i.e draft increased

If the slivers fed are too light, the entry speed is increaed i.e. draft reduced

Delivery speed (the front roller speed) remains constant and hence the production remains constant.

POINTS TO BE CONSIDERED:

Mechanical draft or nominal draft should be selected properly. Before switching on the autoleveller, gears should be selected such that, the wrapping average (linear density of sliver) should be less than plus or minus 3%.

If the feed variation indicated in the A% display of sliver fed is continuously showing more than -5% or +5%, then the mechanical draft selected is not correct.

If the mechanical draft selected is correct, then the indication in A% display of sliver fed should be between -5% red lamp and 0% green lamp or +5% red lamp and 0% green lamp. In other words, green lamp(0% variation indication) should be on atleast for 80% of the running time.

Autoleveller is meant for correcting continuous long term variation in the feed sliver medium term variation

seldom occurring abnormal variations in the sliver feed due to deviations in carding and comber short term variations in the sliver feed variations like comber piecings

Scanning rollers should be selected properly. In some drawframes like DX7-LT OR DXA7-LT, the scanning roller is same for all sliver weights and all types of material. But in case of RSB drawframes, there are different sizes of scanning rollers. It depends on sliver weight feed and the type of material processed.

Scanning roller pressure is not a constant. It depends on the material being used. It is selected so that minimum A% is achieved in the sliver. For the same material if the scanning roller pressure is changed, the linear density of the delivered material will also change. Hence enough care should be taken so that whenever the pressure is changed, the wrapping should be checked and adjusted.

Following are the two important parameters for Quality Levelling

Levelling action point (time of correction)

Levelling intensity

Both feed variation sensing and correction are being done when the machine is running (continuous process) at two different places (i.e. sensing is at one place and correction is at another place). Hence the calculated correction should be done on the corresponding defective material. This is decided by Levelling action Point. The time required for the defective material to reach the correction point should be known and correction should be done at the right time.

Levelling action point depends upon

break draft

main draft roller setting

delivery speed

Levelling Intensity is to decide the amount of draft change required to correct feed variation. The correlation between mass and volume for different fibres is not same. Therefore the levelling intensity may be different for different fibres. Levelling intensity is selected based on the following trial.

Wrapping of the delivered sliver should be checked with "n", "n+1", "n-1" sliver at the feeding side. The sliver weight of the delivered sliver should be same for all the three combinations or should be the minimum.

This can be checked if the sliver is checked at UT 3 (Uster) or premier tester 7000 for mass variations (U%).

If Levelling correction point and levelling intensity is selected properly, then the CV% of 1 meter will be less than 0.5, if the sliver is tested in UT-3 instrument.

ADVANTAGES OF AUTOLEVELLER:

All variations are corrected

Count C.V.% will be consistent and good, hence the yarn will be suitable for knitting

Off counts will be very very less in the yarn, hence off count cuts will come down drastically in autoconers

Thin places in the sliver, hence in the yarn will be low

Ring frame breaks will come down, hence

pneumfil waste will be less

fluff in the department will be less, therefore uster cuts will be less

fabric quality will be good because of lower number of fluff in the yarn

labour productivity will be more

machine productivity will be more

idle spindles will be less

RKM C.V.% will be low, because of low number of thin places.

Workability in warping and weaving will be good, because of less number of thin places and lower end breaks in spinning and winding.

Sliver U%, hence yarn U% will be good

Production calculated will be more accurate in autoleveller drawframe compared to non autoleveller drawframe

Variation in Blend percentage will be very less, if both the components are autolevelled before blending, hence fabric appearance after dyeing will be excellent.

IMPORTANT:

As long as the autolevelling system is set properly and all the components are working properly, the above said benefits can be achieved. Otherwise, the negative impact will be very big compared to working without autoleveller. If the autoleveller malfunctions, it is better to run the machine without autoleveller.