PROCESS PARAMETERS IN DRAW FRAME

INTRODUCTION:
Drawframe is a very critical machine in the spinning process. It's influence on quality, especially on evenness is very big.If drawframe is not set properly, it will also result in drop in yarn strength and yarn elongation at break.The faults in the sliver that come out of drawframe can not be corrected . It will pass into the yarn.
The factors that affect the yarn qulity are

1. the total draft
2. no of drawframe passages
3. break draft
4. no of doublings
5. grams/meter of sliver fed to the drawframe
6. fibre length
7. fibre fineness
8. delivery speed
9. type of drafting
10. type of autoleveller
11. autoleveller settings

- The total draft depends upon
    1. material processed
    2. short fibre content
    3. fibre length
- following are some facts derived from trials
    1. wider back roller setting will result in lower yarn strength
    2. wider back roller setting will affect yarn evenness
    3. wider back roller setting will increase imperfections
    4. higher back top roller loading will reduce yarn strength
    5. higher back top roller loading will reduce end breakage rate
    6. wider front roller setting will improve yarn strength
- Higher draft in drawframe will reduce sliver uniformity, but will imrprove fibre parallelisation. Somtimes the improvement in fibre parallelisation will overcome the detrimental effects of sliver irregularity.
- Most of the improvement in fibre parallelization and reduction in hooks takes place at first drawframe passage than at second passage.
- Better fibre parallelisation generally results in more uniform yarns and a lower end breakage rate in spinning.
- Higher the weight of sliver fed to drawframe, lower the yarn strength, yarn evenness, and it leads to higher imperfections in the yarn and more end breakages in ring spinning
- Irregularities arise owing to the instability of the acceleration point over time. The aprons and rollers are used in the drafting zone to keep the fibre at the back roller velocity until the leading end is firmly gripped by the front roller, but individual fibre control is not achieved.
- Drafting wave is caused primarily not by mechanical defects as such but by the uncontrolled fibre movement of a periodic type resulting from the defects. As the fibre-accelerating point moves towards the front rollers, the draft increases(and vice versa), so that a periodic variation in linear density inevitably results.
- With variable fibre-length distribution(with more short fibre content), the drafting irregularity will be high.
- More the number of doublings , lower the irregularity caused due to random variations. Doublings does not normally eliminate periodic faults.But it reduces the effects of random pulses. Doubling does not have any effect on Index of Irregularity also, since both the irregularities are reduced by square root of the number of doublings.
- Fibre hooks influences the effective fibre length or fibre extent. This will affect the drafting performance. For carded material normally a draft 7.5 in both breaker and finisher drawframe is recommended. Seven of a draft can be tried in breaker, since it is a carded material.
- For combed material, if single passage is used, it is better to employ draft of 7.5 to 8.
- If combers with four doublings are used, it is better to use two drawframe passages after combing. This will reudce long thick places in the yarn.
- In case of two drawframe passage, first drawframe passage will reduce the periodic variation due to piecing. Therefore the life of servomotor and servo amplifier will be more , if two drawframe passage is used. Quality of sliver will also be good, because of less and stable feed variation.

- For synthetic fibres (44 mm to 51 mm), 8 of a total draft can be employed both in breaker and finisher passage.
  The number of doublings depends upon the feeding hank and the total draft employed. Most of the modern drawframes are capable of drafting the material without any problem, even if the sliver fed is around 36 to 40 grams per meter.
- Especially for synthetic fibres with very high drafting resistance, it is better to feed less than 38 grams per meter to the drawframe.
- Break draft setting for 3/3, or 4/3, drafting system is as follows
  1. For cotton, longest fibre +(8 to 12 mm)
  2. For synthetic fibre, fibre length + (20 to 30% of fibre length)
- Break draft for cotton processing is normally 1.16 to 1.26. For synthetics it is around 1.42 to 1.6
- To meet the present quality requirements , finisher drawframe should be an autoleveller drawframe.
- Since the drawframe delivery speed is very high the top roller shore hardness should be around 80 degrees. It should not be less than that.
- It is advisable to buff the rubber cots once in 30 days(minimum) to maintain consistent yarn quality.
- Coiler size should be selected depending upon the material processed. For synthetic fibres, bigger coiler tubes are used. This will help to avoid coiler choking and kinks in the slivers due to coiling in the can.
- Speed of the coiler will also affect the coiling. Speed of the coiler should be selected properly. In drawframes like RSB D-30(RIETER) , any coiler speed can be selected through the variator type pully. Since, the option is open, there is also more probability for making mistakes. One should take enough care to set the coiler speed properly.
- Whenever coiler speed is adjusted, the diameter of the coil is also changed. Hence it is necessary to check the gap between the sliver and can. If it is more than 5 mm, then turn table position (can driving unit) should be altered so that the gap between coil outer and can inner is around 5 mm.
- Pressure bar depth plays a major role in case of carded mixing and OE mixings. If it is open, U% will be affected very badly.It should always be combined with front roller setting. If the pressure bar depth is high,Creel height should be fixed as low as possible (esepcially for combed material).
- Top roller condition should be checked properly. While processing 100% polyester fibres, fibre scum should be removed by a wet cloth from the top roller atleast once in a shift. 3
- Sliver funnel size should be selected properly. Very wide funnel will affect the U%. But very small funnel will end up in more sliver breaks at the front.
- If the department humidity variation is very big, then corresponding correction to be made for checking the wrapping of sliver (sliver weight). Otherwise, there will be unwanted changes in the drawframe which will affect the count C.V.% of yarn.
- Most of the Autoleveller drawframes are working on the principle of OPEN LOOP control system. Sliver monitor should be set properly. Whenever there is a problem in sliver weight, this will stop the machine. Sometimes sliver monitor may malfunction. If it is found malfunctioning , it should be calibrated immediately.

AUTOLEVELLING:

- Most of the modern autolevllers are open loop autolevellers. This system is effective on short, medium and to some extent long tem variations.
- Mechanical draft should be selected properly in autoleveller drawframes.
  To decide about the mechanical draft, drawframe should be run with autoleveller switched off.If the sliver weight is correct, then the mechanical draft selected is correct. Otherwise, the gears should be changed so that the sliver is weight is as per the requirement without autolevller.
- Intensity of levelling and timing of correction are two important parameters in autolevellers.
- Intensity of levelling indicates the amount of correction. i.e If 12% variation is fed to the drawframe the draft should vary 12% , so that the sliver weight is constant.
- Timing of correction indicates that if a thick place is sensed at scanning roller, the correction should take place exactly when this thick place reaches the correction point(levelling point)
- Higher the feed variation, higher the correction length. e.g. if feed variation is 1 %, and if the correction length is 8 mm, if feed variation is 5% the correction length will be between 10 to 40 mm depending upon the speed and type of the autoleveller.
- Higher the speed, higher the correction length
- Whenever the back roller setting, guide rails setting, delivery speed,break draft etc are changed, the timing of correction should also be changed.
- U% of sliver will be high, if timing of correction is set wrongly

- If intensity of levelling selected is wrong , then 1 meter C.V % of sliver will be high.
- Most of the modern autolevellers can correct 25% feed variation. It is a general practice to feed 12% varition both in plus and minus side to check A%. This is called as Sliver test. The A% should not be more than 0.75%. A% is calculated as follows
  If no of sliver fed to drawframe is N, Check the output sliver weight with "N", "N+1", "N-1" slivers. then
  A% = ((gms/mt(N-1) - gms/mt(N))/ gms/mt(N)) x 100
  A% = ((gms/mt(N+1) - gms/mt(N))/ gms/mt(N)) x 100
- Life of servo motor and servo amplifier will be good, if
  1. it is used for carded material
  2. feed variation is less
  3. motor is checked for carbon brush damages, bearing damages etc periodicall
  4. if the delivery speed is less