FAQ : Evenness

9. What is the relation between CV% and U%? Also write difference between both.

   Answer:

   C.V. % = 1.25 X U%

   - The irregularity U% is proportional to the intensity of the mass variations around the mean value.
   - The U% is independent of the evaluating time or tested material length with homogeneously distributed mass variation.
   - The larger deviations from the mean value are much more intensively taken into consideration in the calculation of the coefficient of variation C.V. %.
   - C.V. % has received more recognition in the modern statistics than the irregularity value U%.
   - The coefficient of variation C.V.% can be determined extremely accurately by electronic means, whereas the calculation of the irregularity U% is based on an approximation method

10. While testing ring yarn in Uster evenness tester the peak observed around 9 cm in regularity trace. What will be the probable cause of the peak, explain.

    Answer:

    The probability of faults is due to damaged front roller cots or roller in the R/F drafting zone.

    Explanation:

    The front roller diameter is 27 mm so the circumference of the front roller is (3.14 * 2.7 = 8.6 cm i.e. approximately 9 cm). so the causes of the fault is due to front roller or cots in the R/F drafting zone.

11. Calculate the limit irregularity for a 20 Tex cotton yarn spun from 150 mtex fibres. If the actual measured CV% is 23.2%, what is the Index of Irregularity?

    Answer:

    The average no. of fiber in yarn cross section = (20 * 1000) / 150 = 134

    For cotton limit irregularity $CV_{lim} = 106 / \sqrt{134} = 9.15\%$

Index of irregularity $= CV_{act} / CV_{lim} = 23.2 / 9.5 = 2.54\%$

12. Two roving each with a CV of 8% are fed into a spinning zone. If the spinning unit adds a CV of 18%, what will be CV of the output yarn?

Answer:

CV% yarn w/o addition of CV in R/F is $= CV\% / \sqrt{n} = 8 / \sqrt{2} = 5.7\%$

CV % of output yarn $= \sqrt{(5.7+18)} = 18.88\%$

13. On a draw frame Polyester and Cotton slivers are blended on a 6-ends-up system with a draft of 6 to get a 20 ktex sliver with approximately 67:33 P/C blend by weight. Input cotton sliver of 1.2 denier cotton fiber have a CV of 4% and polyester sliver of 1.5 denier have a CV of 3%. Drafting introduces additional CV of 2%. Calculate the Index of Irregularity, neglecting the variability of fibres.

Answer:

Sliver Linear density $= 20$ kTex $= 20,000$ Tex

Polyester $= 20000 \times 0.67 = 13400$ tex

Cotton $= 20000 \times 0.33 = 6600$ tex

No. of cotton fibres in the sliver cross section $= (6600 * 9)/1.2 = 49500 = N_1$

No. of polyester fibres in the sliver cross section $= (13400 * 9)/1.5 = 80400 = N_2$

Total no. of fibres $= 49500 + 80400 = 129900 = N_T$

$CV_{lim} = 100 / \sqrt{N_T} = 100 / \sqrt{129900} = 0.28$

$CV_{doub} = \sqrt{(NcVc^2 + NpVp^2)} / (Nc + Np)$

Nc & Np are no. of cotton and polyester sliver ends

$CV_{doub} = \sqrt{(2 * 4^2 + 4 * 3^2)} / (2+4) = 1.37\%$

Actual CV% of input sliver

$CV_{actual} = \sqrt{(CV_d^2 + CV_{draft}^2)} = \sqrt{(1.37^2 + 2^2)} = 2.427$

Index of Irregularity = CV_{act} / CV_{lim} = 2.427 / 0.28 = 8.66

14. The U% of single yarn is 17.3%. The expected CV% of a 3 ply yarn made from these single yarn will be,

Answer:

CV of single yarn is = 1.25 * U%

$= 1.25 * 17.3 = 21.625 \%$

CV% of 3 ply yarn   = CV of single yarn / $\sqrt{n}$ where n = no. of doublings

$= 21.625 / \sqrt{3} = 12.5\%$

15. A yarn produced by blending two fibres X and Y whose particulars are given below:

	X	Y
Fineness	2 denier	21 micron
Blend %	50	50

Find out the i) The denier of fiber Y is (take density of fiber Y as 1.31 g/cm³) ii) The average denier of the blend iii) The limit irregularity of a 200 denier yarn spun from this blend is

Answer:

i)   The denier of the fiber Y is

Denier = a * 900000 * fiber density   1 micron = 1/1000 mm

Where 'a' is fiber cross sectional area in square centimeter.

Fiber cross sectional area of fiber Y is

$= (\pi * d^2) /4$

$= (3.14 * 0.0021^2) / 4 = 0.00000346$ cm²

Denier = 0.00000346 * 900000 * 1.31

$= 4$

ii)   The average fiber denier of the blend is

$$\text{Average fiber denier} = [(2 * 50) + (4 * 50)] / [(50 + 50)]$$
$$= 3 \text{ denier}$$

iii)   The limit irregularity of 200 denier yarn spun from this blend is

Limit irregularity for blend is $Vr^2 = 118.8^2 / N$
Where N is no. of fiber in the yarn

$$Vr^2 = [118.8^2 / (200/3)]$$
$$Vr = 14.55$$

16. Calculate the CV% of the combed sliver which is fed in finisher draw frame. CV% of the Draw frame sliver is 1.85% and No. of doubling is 6.

Answer:

The formula is

$$\text{CV\% of doubling} = \text{CV\% of single} / \sqrt{n} \qquad \text{where } n = \text{no. of doublings}$$
$$1.8 = \text{CV\% of single} / \sqrt{6}$$
$$\text{CV\% of singles} \quad = 4.41\%$$

i.e. CV% of comber sliver is 4.41%.

17. Two roving having 7.8 CV% are fed in to the ring frame making yarns and ring frame adds CV% 4.8 then what will be the final yarn CV%. Three of the same yarn doubled in the doubling machine means what will be CV% of the doubled yarn?

Answer:

CV of ring yarn (exclude of CV% added in R/F) = CV% of roving / $\sqrt{n}$
$$= 7.8 / \sqrt{2} = 5.52$$

CV% of ring yarn with added CV% in Ring frame $= \sqrt{(5.52^2 + 4.8^2)} = 7.32$

CV% doubled yarn having 3 single of above yarn $= 7.32 / \sqrt{3} = 4.23$

18. The following table gives the relevant processing details used in the production of a 32-tex yarn spun from 152 mm, 0.5 tex man-made fibre on a semi-worsted system, together with the CV% of each product.

Process	Draft	Doublings	Tex	CV%
1st Drawing	8.0	8	20,000	3.4
2nd Drawing	9.37	6	12,800	2.8
3rd Drawing	5.7	2	4,500	5.5
Roving	10.0	1	450	7.5
Spinning	14.1	1	32	14.9

Calculate the Index of Irregularity (I) and addition of irregularity at each stage.

Answer:

a) 1st Drawing output   : $N1 = 20000/0.5 = 40000 = CVlim = 100/\sqrt{N1} = 0.5\%$

    $I1 = 3.4 / 0.5 = 6.8$

b) 2nd Drawing o/p   : $N2 = 12800/0.5 = 25600$, $CVlim = 100/\sqrt{N2} = 0.625\%$

    $I2 = 2.8/0.625 = 4.48$

c) 3rd Drawing o/p   : $N3 = 4500/0.5 = 9000$, $CVlim = 100/\sqrt{N3} = 1.054\%$

    $I3 = 5.5/1.054 = 5.52$

d) Roving   : $N4 = 450/0.5 = 900$, $CVlim = 100/\sqrt{N4} = 3.33\%$

    $I3 = 7.5/3.33 = 2.25$

e) Spinning   : $N5 = 32/0.5 = 64$, $CVlim = 100/\sqrt{N5} = 12.5\%$

    $I3 = 14.9 / 12.5 = 1.192$

19. A draw frame is fed with 8 cotton slivers of 0.25 Nm with mean CV of sliver is 2.5%. What is the extent of the irregularity which is produced by the drafting elements of the draw frame? The CV of output sliver is also 2.5%.

Answer:

CV of doubling $= 2.5 / \sqrt{N} = 2.5/\sqrt{8} = 0.88$

$CV_{output} = (CV_{doub}^2 + CV_{add}^2)^{1/2}$ or $CV_{add} = (CV_{o/p}^2 - CV_{dou}^2)^{1/2}$

$$= (2.5^2 - 0.88^2)^{1/2} = 2.34\%$$

20. A 6 yard of D/F sliver weighs 21 gram. Calculate the approximate yarn count produced from sliver given. (Assume the nominal draft in Simplex and ring frame).

    Answer:

    Sliver Count in Ne = 3.24 / wt of sliver = 0.15

    Roving count (Nominal draft in S/F is 10) = (0.15 * 10) = 1.5 Ne

    Ring yarn count (nominal draft in R/F is 35) = (1.5*35) = 52.5^s Ne.

21. Define Thin, Thick, and Neps measured in Electronic capacitance testers.

    Answer:

    Thin places   : -50% that is the mass per unit length (cross section) at the thin place is 50% or less of yarns mean value (> 4 mm length)

    Thick places   : + 50% if the counter is actuated, the mass per unit length (cross section) at the thick place is 150% or more of yarns mean value (> 4 mm length)

    Neps   : +200% the thick place based on 1 mm length, is 300% of the yarn mean value or more.

22. What is Deviation Rate (DR %)?

    Answer:

    It indicates the ratio of the total length of yarn irregularities determined on the basis of the yarn irregularity signals averaged over certain length (small reference length) which exceeds the preset level to the total measured yarn length.

    DR % = Σ d / L * 100

    It shows correlation with the evaluation by the naked eye of the appearance of fabric.

23. Mention the online yarn monitoring system used in rotor spinning and what kind of information we may obtain from 'corolab-7'?

Answer:

Schlafhorst has incorporated yarn monitoring system on the rotor spinning machines using an opto-electronic sensor '*Corolab7*'

- It measures yarn diameter online and can provide details about the evenness, imperfections, detection of faults etc.

Uster polyguard is an online yarn supervisory attachment for the automatic rotor spinning machines

- Based on capacitive measuring principle.
- Gives detail information for all the rotor heads.