APPLICATION OF SPIN PLAN PC-PROGRAM

ver 2.0

by Itru Group Ltd

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Itru Group Ltd-International Textile Research Unit

APPLICATION OF SPIN PLAN PC-PROGRAM -2

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APPLICATION OF SPIN PLAN PC-PROGRAM-4

Description

This PC program has been developed through a research project carried out in spinning mill. With this PC-program it is possible to improve yarn quality and also increase production levels from card/comber to ring frames as well finding out the faulty processing stage from card/comber to ring frames .In addition to that it computes important fibre parameters,index of irregularity at each stage of processing . compute important fibre parameters,index of irregularity at each stage of processing,curves for short fibre content percentage,mean fibre length for leading and trailing hooks and drawing actual and optimum DRAFT CURVE through" Knowledge Based Problem Analyses and Problem Solving Techniques"developed by ITRU GROUP LTD.

This program makes use of the Itru Fibre Tester UAK-1 & evenness tester instruments to be more valuable to the spinning mills by determining short fibre content by fibre number, mean fibre length,index of irregularity and new conception of draft curve related yarn quality and spinning performance.

This PC-program for use to compute

- **Index of irregularity for each stage of processing**
- **Mean fibre length by fibre weight curve for leading and trailing hooks from the Itru Fibre Tester UAK-1 span-length values to determine the fibre orientation degree and fibre breakage**
- **Short fibre content curve for leading and trailing hooks to determine over-stretched fibres and unsuitable drafting conditions such as field of friction of drafting forces,ratch settings.**
- **The complete actual draft curve in accordance with the actual fibre length growth and linear irregularity at each stage of processing so that optimum spectrogram curves could be obtained at each stage. We call this parameters as DRAFT CV and draft lengths for each process. Optimum linear irregularity value at each stage of processing to achieve optimum quality of yarn according to the requirements of yarn quality as well as identifying faulty running section in spinning process**

Keywords

Draft curve, draft length ,draft angle ,spinning plan,spectrograph,drafting waves,span length,fibre properties,mean fibre length,fibre hooks,trailing hooks,leading hooks,spinning, fibre fineness ,yarn count,sliver count,drafting,ratch setting,knowledge based ,textile research.

The purpose of Spin Plan ver 2.0 Pc-Program and this research work could be summarized as follows

A-Analyzing the existing draft organization of ring spinning process and identifying the faulty running processing stages from card/comber to ring frames and improving yarn quality level

A-Revising a new drafting organization to increase production volumes from card to ring frames with the help of Spin Matrix ver 1.0 Pc-Program to optimize each stages of spinning process.

A-Identifying faults in drafting zones from card//comber to ring frames

A-Complete Analyses of drafting waves from card/comber to ring frames

A-Complete Analyses of fibre properties from card/comber to ring frames

Methods

2,5 and 50 % Span-length Fibre Length Measurement of Slivers to and fro (leading and trailing) , Evennes Tester anf Counr Testers are necessary for slivers , rovings and yarn. Itru Fibre Length and Neps Tester could be useful (fully aotomated) fibre lengthj and Neps Tester or Itru Fibre Length Tester Software could be used with Canon Lid Scanners for measurements of sllivers. In this case you only need to purchase a canon lid scanner and our software. For further information please get in touch with us.

Fibre Length Measurement from Slivers (Itru Fibre Tester Software + Canon Lid Scanner)

Read more<http://itru.net/ffis/fibretesterver21.pdf>

1.1 Test Data Input Values

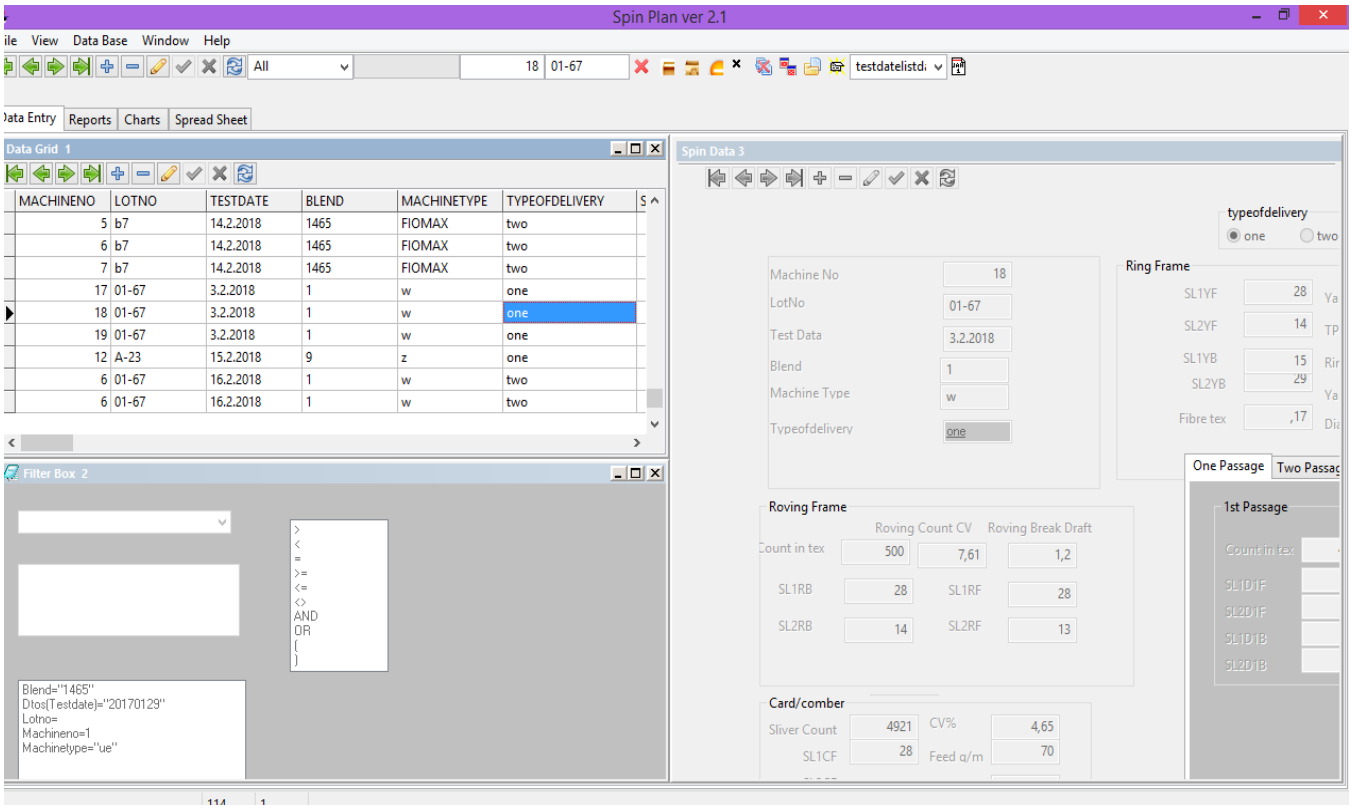
Test Data Input values consists of following parameters

Machine Data	**Number**	**Lot No**	**Test Date**	**Machine Type**
Fibre Properties	**Fibre Graph 2,5 % Weighted Span Length in mm**	**Fibre Graph 50% Weighted Span Length in mm**		
Sliver/Yarn Count	**Tex**			
Break Draft				
Number of Doublings				
CV % Evenness				

Test Data are in details shown below . Spin Plan Pc-Program are designed up to 4 passages after carding/combing.

1.2 Program Structure

1. Data Entry



Data Entry Page contains Data Grid (Data Base in Grid :All records) , Filter Box to Filter records and Spin Data (for one record) . You only enter the records once and + button copies the records data and you only change the changed parameters. Double click on these windows to maximize.

Windows : Cascade -Tile Vertically- Tile Horizontally opened windows. Data can be edited inserted on Data Grid and SpinDat windows . One can see the changes on another windows.

New-Adds a new record to the data base

Add-Adds a selected record to the data base.

Edit-Edits selected record in the data base.

Delete-Deletes selected record from the data base.

it would take a lot of time for entering all the records so Filter Box is used for copying records for the same date. For this purpose the copying records in Filter Box is used. With the help of Filter Box and Copying Record button the last day of Machine Card Index Data is completely copied to the new Data .So the operator only enters the end of Counter Readings of each shifts.

Press Apply Button which loads dates worked
Select the Last Date from Combobox

Press Filter Selected Date Tool bar button which is on the right of date string Button loads the selected date which is the last day of ring frame spinning geometry test.

Load DBF loads data base table Default table spinbgeı.dbf
Save DBF saves data base table
Pack Table Purge Deleted : Removes the Deleted the deleted records from the database
Delete :Deletes the records on the grid. Therefore be careful
Empty : Clears the table

Apply : Filter the records according to database parameters.
Lotlist : Make lists for date,lot,machine type and date.

And all the records for that day are listed and when Copy Record button is pressed all the record is copied

With filter box you can filter records Apply button applies filtering command such Machine No=1 and Lotno='A-25' filters the records with Machine no=1 and Lotno=A-25

Insert (+) command copies the selected record. Use the same date of record when copying otherwise you will damage the date base. . If there is a holiday change the date time from computer so that correct date is entered. There are also many filtering logic are available i.e and ,or , >>, <= ,(,) <> etc. . One can use any combinations of these

2.0 File Manager and Report

2.1 Single Report

```
RING SPINNING SPIN PLAN Report
Date of Report : 17.2.2018
Technical Data
Machine No/LotNo/Test Date : 1 :25-83:1.2.2018

Technical Data
Machine No                              : 1
Lot No                                  : 25-83
Test date                               : 1.2.2018
Machinetype                             : s4
SL1YF          SL1-F Ring                                :          28,000 mm
SL2YF          SL2-F Ring                                :          14,000 mm
SL1YB          SL1-B  Ring                               :          29,000 mm
SL2YB          SL2-B  Ring                               :          15,000 mm
Y1             Yarn Count                                :          20,000 Tex
TPM            Yarn Turns per meter                      :         803,000 TPM
BR1            Ring Frame Break Draft                    :           1,200
CV1            Yarn CV%                                  :          11,330 CV%
MTEX           Fibre Fineness                            :           0,152 Tex
Y2             Roving Count                              :         500,000 Tex
SL1RF          SL1F-Roving                               :          28,000 mm
SL2RF          SL2F-Roving                               :          13,000 mm
SL1RB          SL1B-Roving                               :          28,000 mm
SL2RB          SL2B-Roving                               :          14,000 mm
CV2            Roving CV%                                :           4,200 CV%
BR2            Roving Frame Break Draft                  :           1,130
Y3             Roving Count Fed                          :        4500,000 Tex
SL1D3F         SL1F-3rd Passage Drawframe                :          28,000 mm
SL2D3F         SL2F-3rd Passage Drawframe                :          14,000 mm
SL1D3B         SL1B-3rd Passage Drawframe                :          28,000 mm
SL2D3B         SL2B-3rd Passage Drawframe                :          14,000 mm
Y5             3th Passage Count Fed                     :        4921,000 Tex
ND3            3th Passage Number of Doublings           :           6,000
```

BR4	3th Passage-Break Draft	:	1,000 mm
CV4	3th Passage CV%	:	3,000 CV%
SL1D2F	SL1F-2nd Passage Drawframe	:	28,000 mm
SL2D2F	SL2F-2nd Passage Drawframe	:	14,000 mm
SL1D2B	SL1B-2nd Passage Drawframe	:	28,000 mm
SL2D2B	SL2B-2nd Passage Drawframe	:	13,000 mm
Y6	2nd Passage Count Fed	:	4921,000 Tex
ND2	2nd Passage Number of Doublings	:	6,000
BR5	2nd Passage-Break Draft	:	1,350 mm
CV5	2nd Passage CV%	:	3,780 CV%
SL1DF	SL1F-1st Passage Drawframe	:	27,000 mm
SL2DF	SL2F-1st Passage Drawframe	:	14,000 mm
SL1DB	SL1B-1st Passage Drawframe	:	29,000 mm
SL2DB	SL2B-1st Passage Drawframe	:	14,120 mm
Y7	1st Passage Count Fed	:	4921,000 Tex
ND1	1st Passage Number of Doublings	:	6,000
BR6	1st Passage-Break Draft	:	1,350 mm
CV6	1st Passage CV%	:	3,540 CV%
SL1CF	SL1F-Card	:	28,000 mm
SL2CF	SL2F-Card	:	14,000 mm
SL1CB	SL1B-Card	:	28,000 mm
SL2CB	SL2B-Card	:	14,000 mm
Y8	Card Fed G/m	:	4921,000 G/m
CV7	Card CV%	:	6,000 CV%
D1	Ring Frame Front Roller Diameter	:	1,450 mm
Notes		:	Machine Test

RING SPINNING SPIN PLAN Report
Date of Report : 17.2.2018
Technical Data
Machine No/LotNo/Test Date : 1 :25-83:1.2.2018

:Process	: SL1F:	SL2F:	SL1B:	SL2B:	CVNF%:	SFNF%:	SFNB%:	LGAVE
:Ring	: 28,00:	14,00:	29,00:	15,00:	38,21:	5,51:	3,82:	22,51
:Roving	: 28,00:	13,00:	28,00:	14,00:	42,31:	7,57:	5,51:	22,03
:4th Drawframe	: 28,00:	14,00:	28,00:	14,00:	38,21:	5,51:	5,51:	22,08
:3rd Drawframe	: 28,00:	14,00:	28,00:	13,00:	38,21:	5,51:	7,57:	22,03
:2nd Drawframe	: 27,00:	14,00:	29,00:	14,12:	36,19:	5,30:	5,46:	22,10
:1st Drawframe	: 28,00:	14,00:	28,00:	14,00:	38,21:	5,51:	5,51:	22,08
:Comber-Card	: 28,00:	14,00:	28,00:	14,00:	38,21:	5,51:	5,51:	22,08

Draft Information:

	:Material-Tex :	Drafts
Ring Delivery	: 20,00 :	21,89
Ring Break Draft Delivery	: 437,88 :	1,20
Roving Delivery	: 500,00 :	7,96
Roving Break Draft Delivery	: 3982,30 :	1,13
Drawframe 4th.passage Delivery	: 4500,00 :	6,56
Drawframe 4th.passage Break Draft Delivery	: 29526,00 :	1,00
Drawframe 3rd.passage Delivery	: 4921,00 :	4,44
Drawframe 3rd.passage Break Draft Delivery	: 21871,11 :	1,35
Drawframe 2nd.passage Delivery	: 4921,00 :	4,44
Drawframe 2nd.passage Break Draft Delivery	: 21871,11 :	1,35
Drawframe 1st.passage Delivery	: 4921,00 :	4,14
Drawframe 1st.passage Break Draft Delivery	: 20362,76 :	1,45
Comber-Card Delivery	: 4921,00 :	142,25
Comber-Card Feed	: 700,00 :	335116,63

Draft Index Analyses

	: LNCV :	Cut Length in m :	Index:	Req CV%
Ring	: 9,94 :	0,02 :	1,30:	9,94
Roving	: 4,78 :	0,58 :	2,41:	2,95
4th Drawframe	: 1,49 :	5,22 :	5,16:	1,30
3rd Drawframe	: 0,79 :	34,26 :	6,80:	0,65
2nd Drawframe	: 0,38 :	205,58 :	6,37:	0,33
1st Drawframe	: 0,18 :	1233,47 :	7,13:	0,17
Card/Comber	: 0,09 :	7400,82 :	10,58:	0,09

Itru Spin Plan computes the required CVL value(coefficient of variation between cut lengths)Off -Standard process could be identified by comparison of Req CVL with LNCVL in this case there is a problem in Roving Process.(2,95 and 4,78) . This can be also be seen LNCVL and LN Cut-Length Chart that should be a straight line. Problem analyses and problem solving algorithms described the solutions for the problems.

: Process	: Draft Slope :	Draft Angle
Ring-Roving	: 0,22 :	12,61
Roving-4th Passage	: 0,53 :	28,01
4th Passafe-3rd Passage	: 0,34 :	18,64
3rd- Passage-2nd Passage	: 0,40 :	21,87
2nd-Passage-1st Passage	: 0,42 :	22,71
1st Passage-Card/Comber	: 0,41 :	22,14
1st Passage-Card/Comber		
1st Passage-Card/Comber		

Draft angle shows the inclination of the process to quality. Yarn quality has been deteriorating at roving process. Greater the draft angle higher the short and long term variations and imperfections in the yarn.

Total Drafts
1st Passage-Card/Comber

Ring	:	26,27
Roving	:	9,00
Drawframe4	:	6,56
Drawframe3	:	6,00
Drawframe2	:	6,00
Drawframe1	:	6,00
Total	:	335116,63

This suggests that total draft in roving should be reduced.

Spectrograph Information:Main Mechanical Faults-

			:	Lamda
1st Passage-Card/Comber				
Ring.....	:	Front Roller -Ring	:	8,48
.....	:	Middle Roller Ring	:	185,71
Roving.....:		Back Roller-Ring -Roving Delivery	:	222,85
.....	:	Roving Middle Roller	:	1774,95
.....	:	Roving Back Roller -Drawframe2 Delivery	:	2005,69
Drawframe 4th.	:	Drawframe 4th Middle Roller	:	13160,00
.....	:	Drawframe 4th Back Roller	:	13160,00
Drawframe 3rd.	:	3rd.Passage Drawframe Middle Roller	:	58488,89
.....	:	Back Roller -2.pasaj Delivery	:	78960,00
Drawframe 2nd.	:	Drawframe 2 Middle Roller	:	350933,32
.....	:	Drawframe 2 Back Roller	:	473759,98
Drawframe 1st.	:	1st passage Drawframe Middle Roller	:	1960386,12
.....	:	1st passage Drawframe Back Rol -Card Delivery	:	2842559,87

Spectrograph Information:Drafting Waves-

			:	Lamda
1st Passage-Card/Comber				
.....	:	Ring Front Draft	:	12,00
.....	:	Ring Break Draft	:	262,73
.....	:	Roving Front Draft	:	315,27
.....	:	Roving Break Draft	:	2511,04
.....	:	Drawframe 3rd Front Draft	:	2837,47
.....	:	Drawframe 3rd Break Draft	:	18617,59
.....	:	Drawframe 2nd. Front Draft	:	18617,59
.....	:	Drawframe 2nd-Break Draft	:	82744,84
.....	:	Drawframe 1st- Front Draft	:	111705,54
.....	:	Drawframe 1st-Break Draft	:	496469,06
.....	:	Card/Comber-1st Drawing	:	670233,25
.....	:	Roving-Ring	:	2773379,00
.....	:	Roving-3rd.Passage	:	4021399,50
.....	:	4th-3rd Passage	:	572034048,00

RING SPINNING SPIN PLAN Report
Date of Report : 17.2.2018
Technical Data
Machine No/LotNo/Test Date : 1 :25-83:1.2.2018

Knowledge Based Problem Analyses /Problem Solving

Fibre Breakage in Roving-Leading
Check Roll settings front and back.It may be too wide and too close
Check Roll Pressures
Check drafting waves with spectrograph forward and reverse
Check drafting rollers bearings
Check aprons top and bottom
Check shore hardness of top rollers
Check diameter of top rollers
Cary out Draft Rollers Setting Test as instructed by Itru
Roving sliver may be too fine or too coarse!!
Fed sliver may be too fine or too coarse!!
Fibre friction may be too high check humidity and static electricity of fibres!!
Too much short fibre . Check with spectrograph!!

Drawframe 3rd passage Leading
Fibre Breakage in Drawing-Leading
Check Roll settings front and back.It may be too wide and too close
Check Roll Pressures
Check drafting waves with spectrograph forward and reverse
Check drafting rollers bearings
Check shore hardness of top rollers
Check diameter of top rollers
Cary out Draft Rollers Setting Test as instructed by Itru
Drawframe sliver may be too fine or too coarse!!
Fed sliver may be too fine or too coarse!!
Fibre friction may be too high check humidity and static electricity of fibres!!
Too much short fibre . Check with spectrograph!!
Check carding machine with Card Fibre Transfer Test!!
Check combing machine if it is a combed yarn as instructed by Comber Data pc-program by Itru !

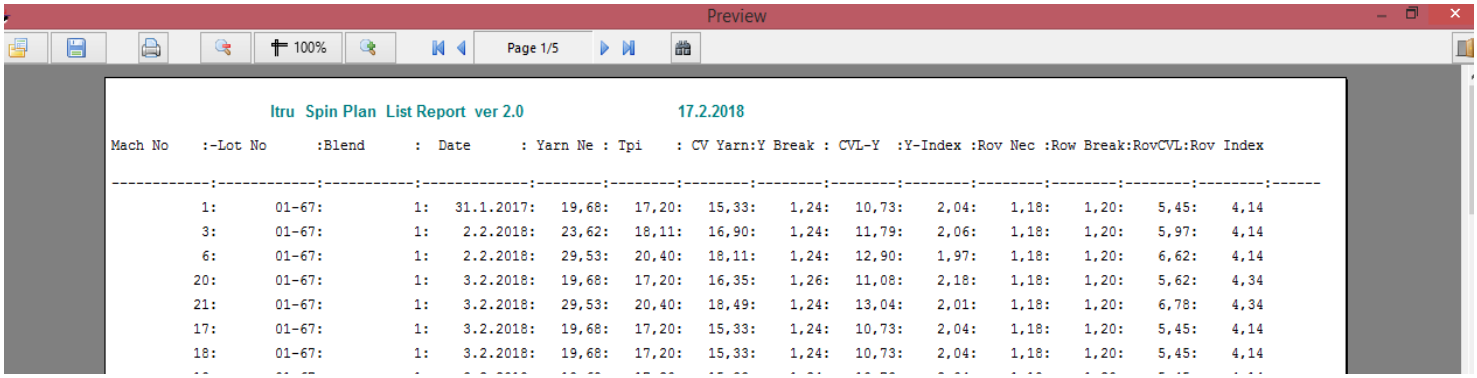
Drawframe 3rd Passage Trailing
Fibre Breakage in Drawframe-Leading
Check Roll settings front and back.It may be too wide and too close
Check Roll Pressures
Check drafting waves with spectrograph forward and reverse
Check drafting rollers bearings
Check shore hardness of top rollers
Check diameter of top rollers
Cary out Draft Rollers Setting Test as instructed by Itru
Drawframe sliver may be too fine or too coarse!!
Fed sliver may be too fine or too coarse!!
Fibre friction may be too high check humidity and static electricity of fibres!!
Too much short fibre . Check with spectrograph!!
Check carding machine with Card Fibre Transfer Test!!
Check carding machine doffer,cylinder and taker-in!!
Check combing machine if it is a combed yarn as instructed by Comber Data pc-program by Itru !

2.2 Summary List Reports

a) Select Filtering box then press Apply button
b) Press File Manager button after these one can get the functions of items shown below:

Reports are given

1) Technical Data/ Summary List- FM-RS
2) Draft Index /Lot List FM-RS
3) Process Contrıl/Lot Sum List FM-RS
4) Type of Blend List
5) Type of Blend Sum List
6) Test Date List
7) Test Date Summary List
8) Lot Blend Type Summary
9) Lot Blend List



Itru Spin Plan List Report ver 2.0 17.2.2018

Mach No	:-Lot No	:Blend	: Date	: Yarn Ne	: Tpi	: CV Yarn:Y	Break : CVL-Y	:Y-Index	:Rov Nec	:Row Break:	RovCVL:Rov	Index
1:	01-67:	1:	31.1.2017:	19,68:	17,20:	15,33:	1,24:	10,73:	2,04:	1,18:	1,20:	5,45:	4,14
3:	01-67:	1:	2.2.2018:	23,62:	18,11:	16,90:	1,24:	11,79:	2,06:	1,18:	1,20:	5,97:	4,14
6:	01-67:	1:	2.2.2018:	29,53:	20,40:	18,11:	1,24:	12,90:	1,97:	1,18:	1,20:	6,62:	4,14
20:	01-67:	1:	3.2.2018:	19,68:	17,20:	16,35:	1,26:	11,08:	2,18:	1,18:	1,20:	5,62:	4,34
21:	01-67:	1:	3.2.2018:	29,53:	20,40:	18,49:	1,24:	13,04:	2,01:	1,18:	1,20:	6,78:	4,34
17:	01-67:	1:	3.2.2018:	19,68:	17,20:	15,33:	1,24:	10,73:	2,04:	1,18:	1,20:	5,45:	4,14
18:	01-67:	1:	3.2.2018:	19,68:	17,20:	15,33:	1,24:	10,73:	2,04:	1,18:	1,20:	5,45:	4,14

3 Pc-program Outputs and How to use the pc-program

Spinning Plan (Draft Organization) has effects upon end break rate and yarn quality and production levels. Upto 20 % of increase in production and quality improvement can be achieved with proper Draft Organization (Spin Plan) and this pc-program helps you to achieve your targets.

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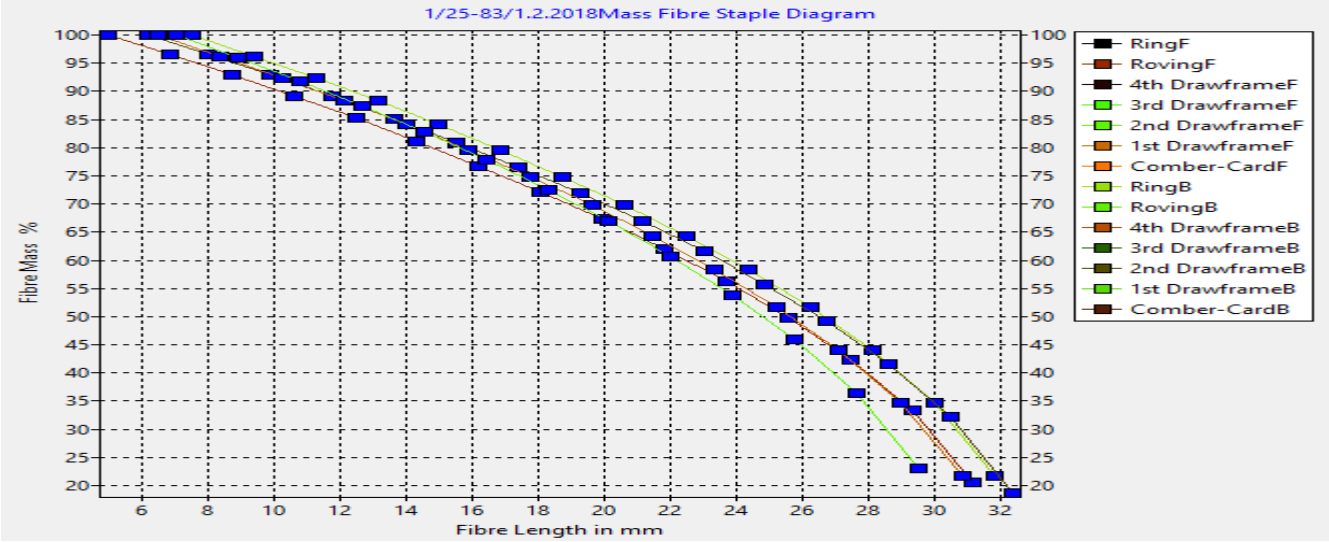
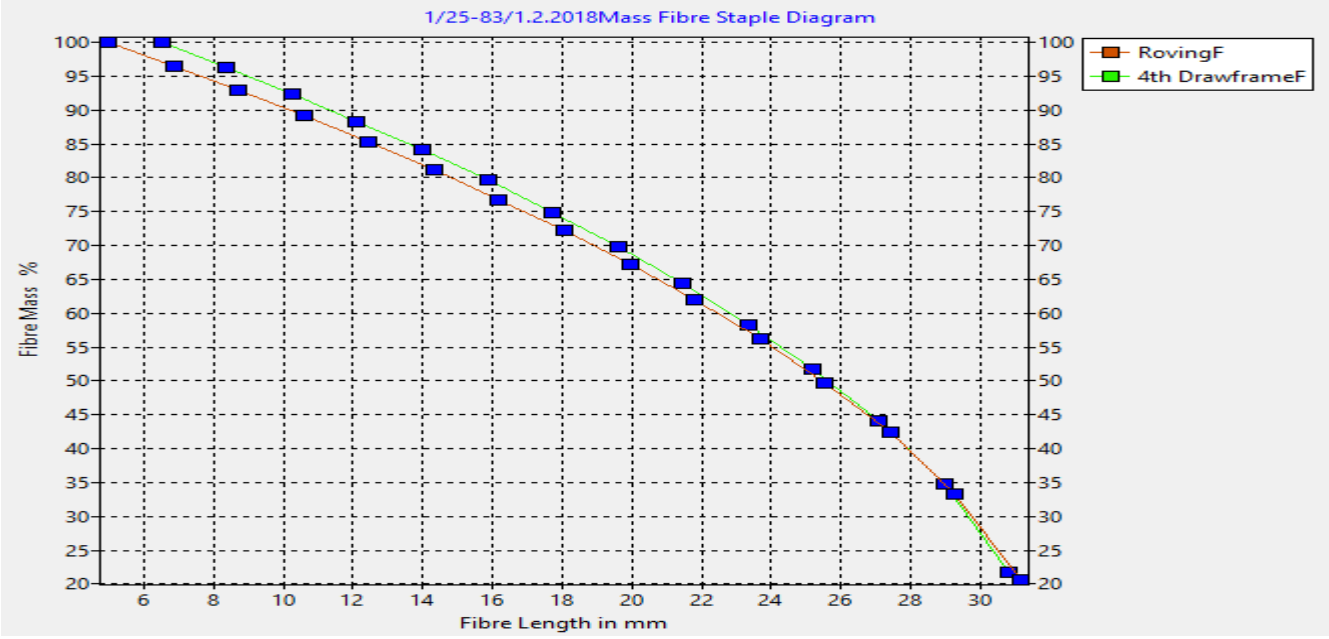
3.1 Charts

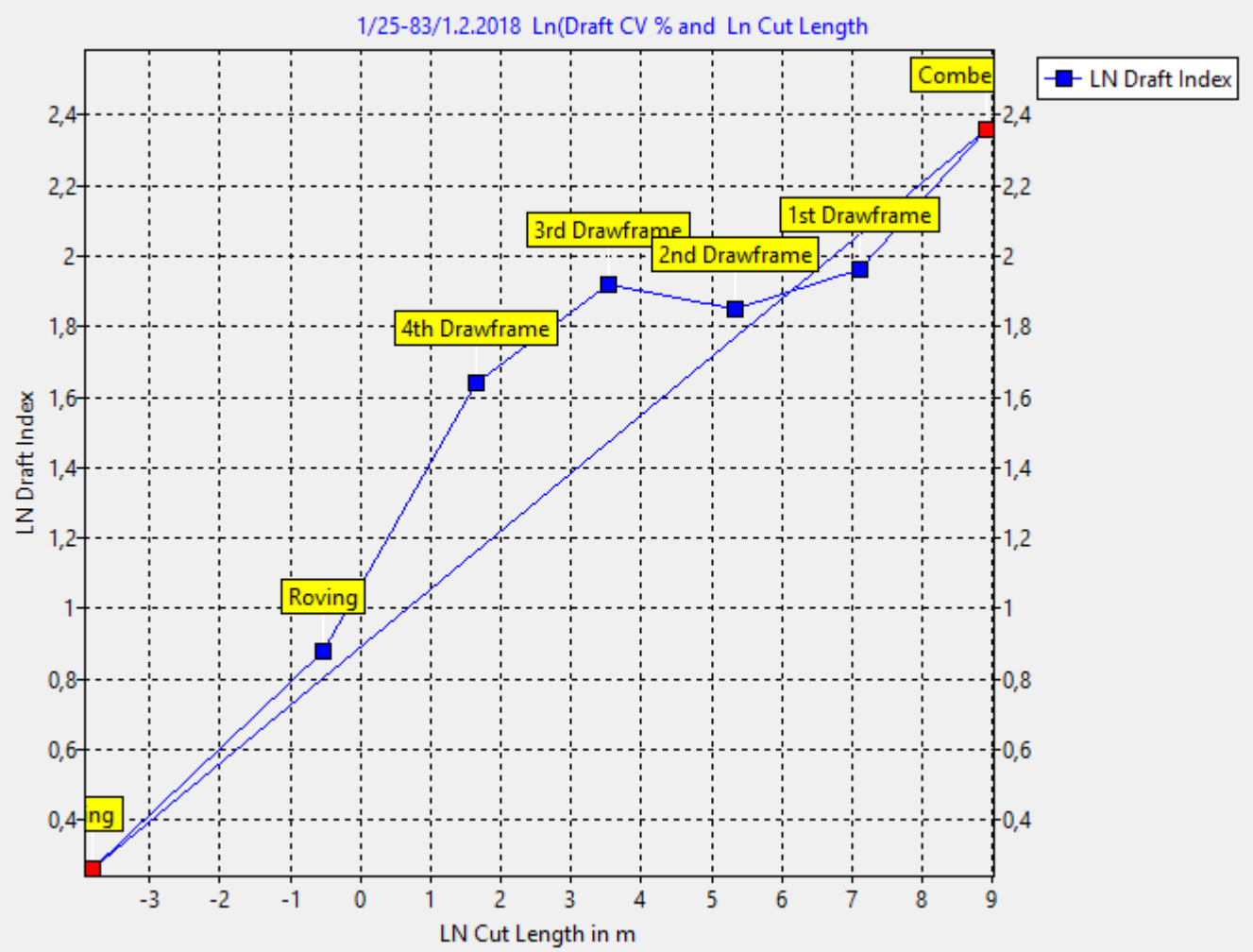
Fibre Mass Staple Diagrams of 4 passage carded Spinning Process -Special Process





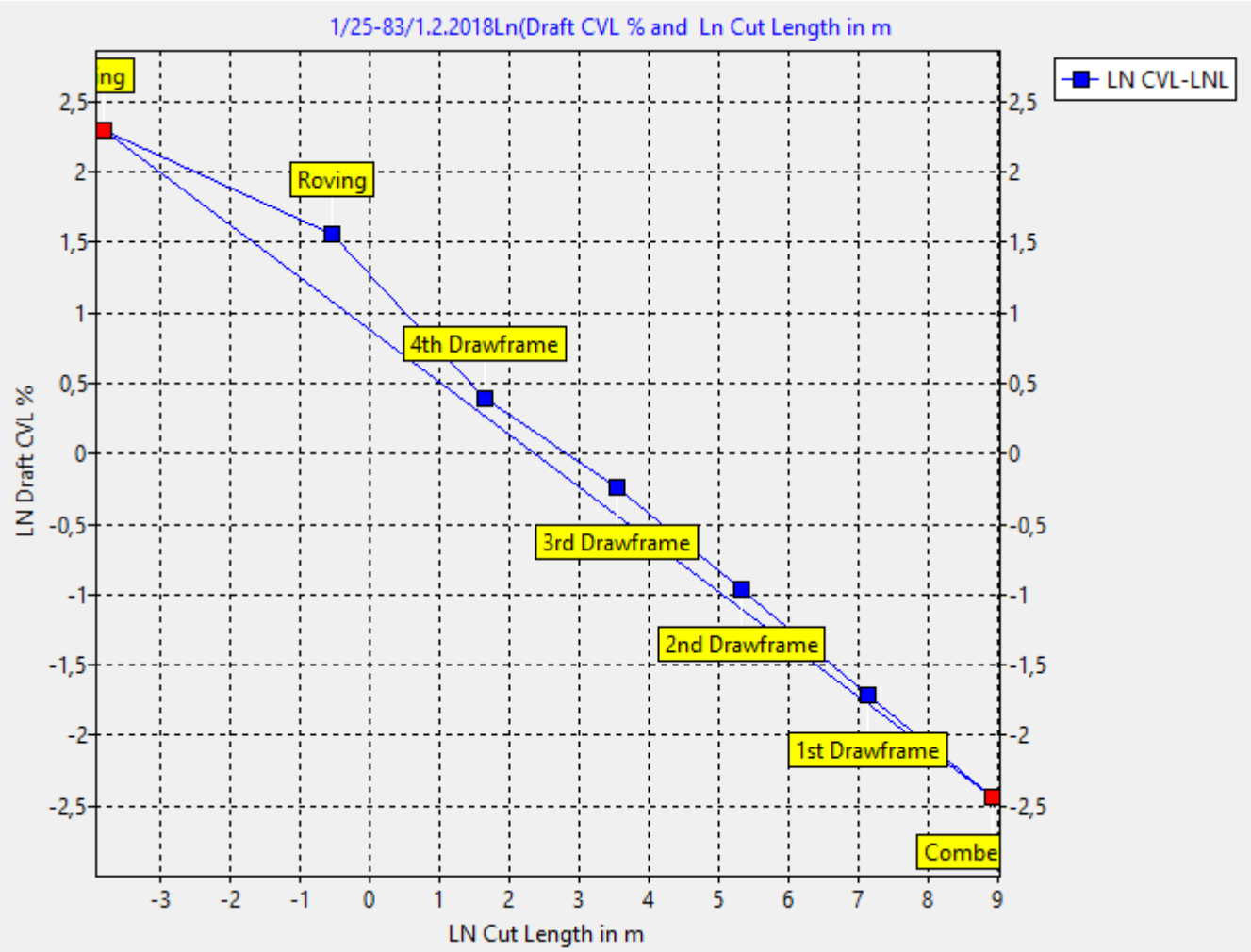
Roving Leading-4th Passage Leading comparison an increase in short fibre content.

Draft Index



Draft Index shows that 3rd and 4th passages should be improved in terms of actual CV values.

LN Variations Between Lengths and Cut Lengths for each process. (Draft CVL Cut Length)



LN CVL and LN Cut Length Chart shows that there is a deviation in the process at roving.

3.2 Technical Data Input for Spin Plan Pc-Program

An example for carded/combed yarn spin plan one passage after card/combing

Technical Data

Machine No		: 16	
Lot No		: 17-64D	
Test date		: 1.2.2018	
Machinetype		: ue	
SL1YF	SL1-F Ring	:	28,000 mm
SL2YF	SL2-F Ring	:	14,000 mm
SL1YB	SL1-B Ring	:	29,000 mm
SL2YB	SL2-B Ring	:	15,000 mm
Y1	Yarn Count	:	20,000 Tex
TPM	Yarn Turns per meter	:	713,000 TPM
BR1	Ring Frame Break Draft	:	1,250
CV1	Yarn CV%	:	12,510 CV%
MTEX	Fibre Fineness	:	0,130 Tex
Y2	Roving Count	:	738,000 Tex
SL1RF	SL1F-Roving	:	28,000 mm
SL2RF	SL2F-Roving	:	13,000 mm
SL1RB	SL1B-Roving	:	28,000 mm
SL2RB	SL2B-Roving	:	14,000 mm
CV2	Roving CV%	:	5,520 CV%
BR2	Roving Frame Break Draft	:	1,240
Y6	Roving Count Fed	:	6216,000 Tex
SL1DF	SL1F-1st Passage Drawframe	:	28,000 mm
SL2DF	SL2F-1st Passage Drawframe	:	14,000 mm
SL1DB	SL1B-1st Passage Drawframe	:	28,000 mm
SL2DB	SL2B-1st Passage Drawframe	:	14,000 mm
Y7	1st Passage Count Fed	:	6216,000 Tex
ND1	1st Passage Number of Doublings	:	5,000
BR6	1st Passage-Break Draft	:	1,570
CV6	1st Passage CV%	:	4,780 CV%
SL1CF	SL1F-Card	:	28,000 mm
SL2CF	SL2F-Card	:	14,000 mm
SL1CB	SL1B-Card	:	28,000 mm
SL2CB	SL2B-Card	:	14,000 mm
Y8	Card /Comber Feed G/m	:	70,000 G/m
CV7	Card/Comber CV%	:	6,250 CV%
D1	Ring Frame Front Roller Diameter	:	30,000 mm

SLY1 : 2,5 % Weighted Span Length measured front or back side of the sliver from Fibre Graph Itru Fibre Tester UAK-1

SLY2: 50 % Weighted Span Length measured front or back side of the sliver from Fibre Graph Itru Fibre Tester UAK-1

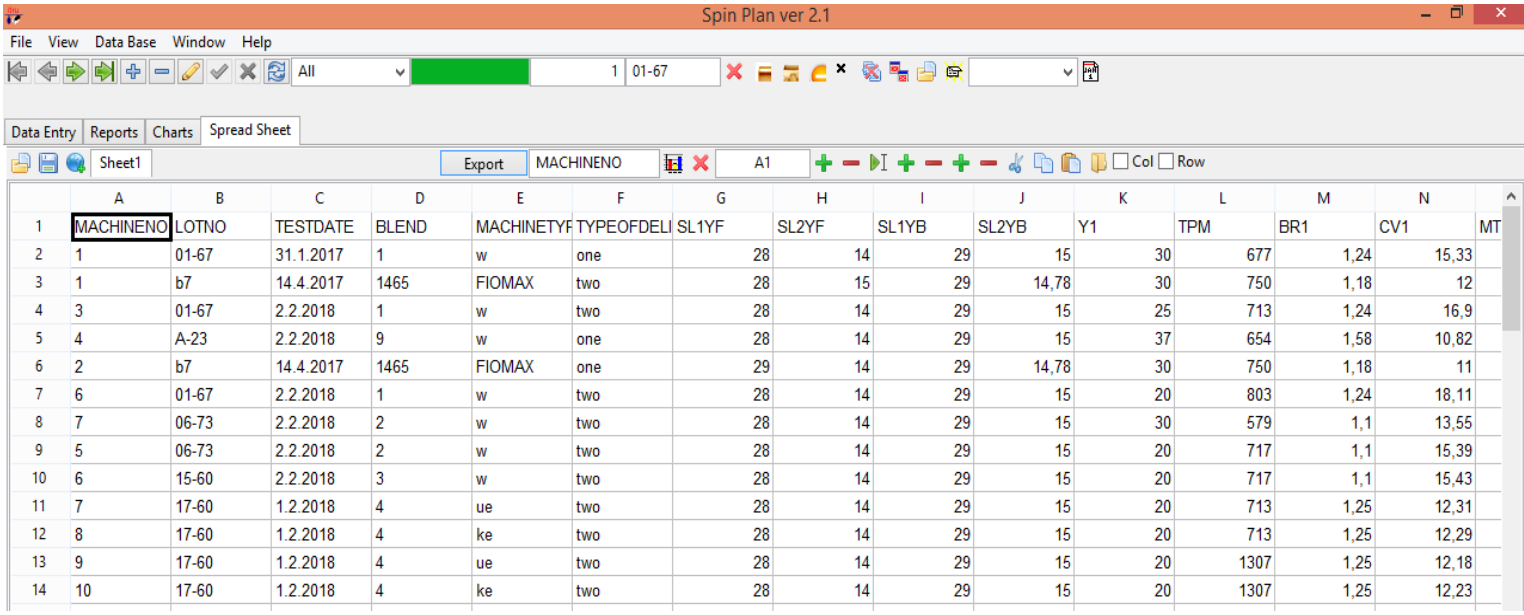
Data Entry changes according to the number of draw frame passages after card/comber. There can be upto 4 passages after carding or combing.The program is for combed yarn and carded yarn spinning.

Technical Data

An example for carded/combed yarn spin plan two passages after card/combing

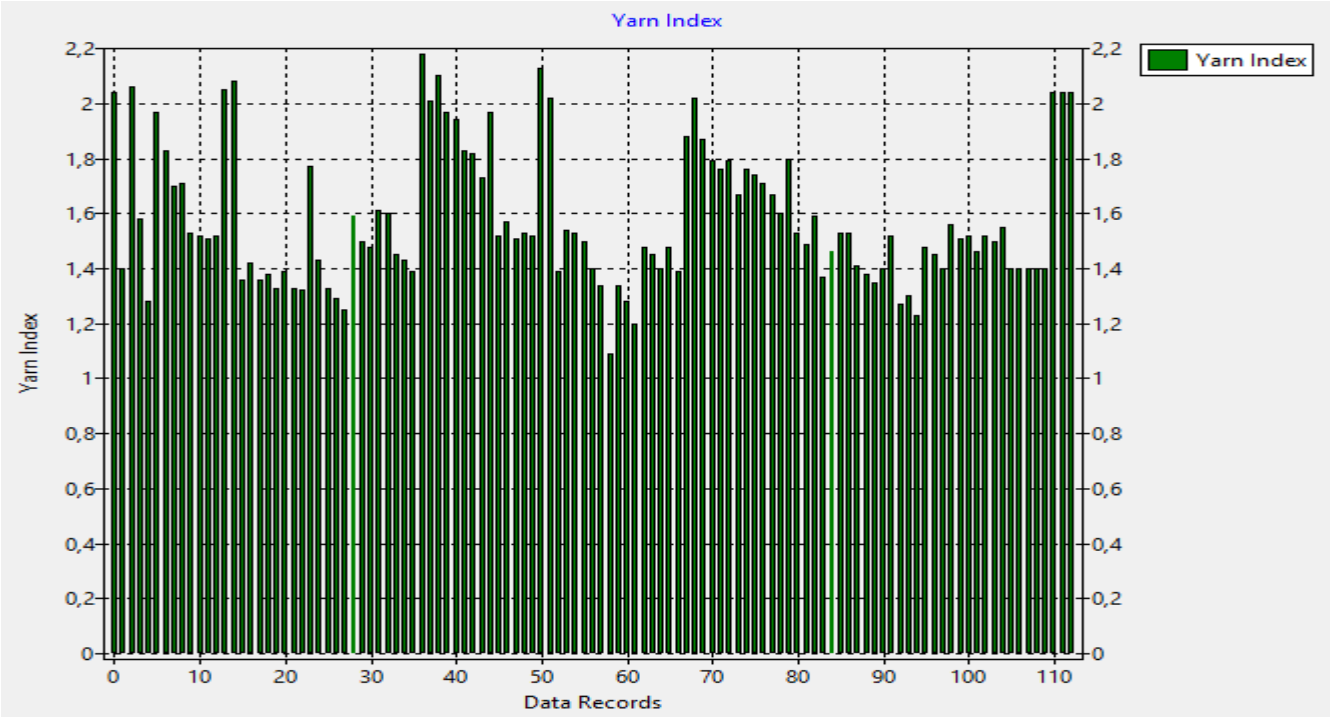
Machine No		4
Lot No		A22
Test date		1/31/00
Machine type		w
SLY1YF	SLY1-F Ring	28,000 mm
SLY2YF	SLY2-F Ring	14,000 mm
SLY1YB	SLY1-B Ring	29,000 mm
SLY2YB	SLY2-B Ring	15,000 mm
Y1	Yarn Count	20,000 Tex
TPM	Yarn Turns per meter	803,000 TPM
BR1	Ring Frame Break Draft	1,24
CV1	Yarn CV%	18,110 CV%
MTEX	Fibre Fineness	0,169 Tex
Y2	Roving Count	500,000 Tex
SLY1RF	SLY1F-Roving	28,000 mm
SLY2RF	SLY2F-Roving	13,000 mm
SLY1RB	SLY1B-Roving	28,000 mm
SLY2RB	SLY2B-Roving	14,000 mm
CV2	Roving CV%	7,610 CV%
BR2	Roving Frame Break Draft	1,2
Y3	Roving Count Fed	4921,000 Tex
SLY1D2F	SLY1F-2nd Passage Drawframe	28,000 mm
SLY2D2F	SLY2F-2nd Passage Drawframe	14,000 mm
SLY1D2B	SLY1B-2nd Passage Drawframe	28,000 mm
SLY2D2B	SLY2B-2nd Passage Drawframe	14,000 mm
Y4	2nd Passage Count Fed	4921,000 Tex
ND2	2nd Passage Number of Doublings	8
BR3	2nd Passage-Break Draft	1,450 mm
CV3	2nd Passage CV%	4,490 CV%
SLY1DF	SLY1F-1st Passage Drawframe	28,000 mm
SLY2DF	SLY2F-1st Passage Drawframe	14,000 mm
SLY1DB	SLY1B-1st Passage Drawframe	28,000 mm
SLY2DB	SLY2B-1st Passage Drawframe	14,000 mm
Y5	1st Passage Count Fed	4921,000 Tex
ND1	1st Passage Number of Doublings	8
BR4	1st Passage-Break Draft	1,450 mm
CV4	1st Passage CV%	4,810 CV%
SLY1CF	SLY1F-Card	28,000 mm
SLY2CF	SLY2F-Card	14,000 mm
SLY1CB	SLY1B-Card	29,000 mm
SLY2CB	SLY2B-Card	14,000 mm
Y6	Card Fed G/m	700,000 G/m
CV5	Card CV%	4,700 CV%
D1	Ring Frame Front Roller Diameter	27,000 mm
Notes		Test6

3.3 Spread Sheet and Spread Sheet Charts



	A	B	C	D	E	F	G	H	I	J	K	L	M	N	
1	MACHINENO	LOTNO	TESTDATE	BLEND	MACHINETYP	TYPEOFDELI	SL1YF	SL2YF	SL1YB	SL2YB	Y1	TPM	BR1	CV1	MT
2	1	01-67	31.1.2017	1	w	one	28	14	29	15	30	677	1,24	15,33	
3	1	b7	14.4.2017	1465	FIOMAX	two	28	15	29	14,78	30	750	1,18	12	
4	3	01-67	2.2.2018	1	w	two	28	14	29	15	25	713	1,24	16,9	
5	4	A-23	2.2.2018	9	w	one	28	14	29	15	37	654	1,58	10,82	
6	2	b7	14.4.2017	1465	FIOMAX	one	29	14	29	14,78	30	750	1,18	11	
7	6	01-67	2.2.2018	1	w	two	28	14	29	15	20	803	1,24	18,11	
8	7	06-73	2.2.2018	2	w	two	28	14	29	15	30	579	1,1	13,55	
9	5	06-73	2.2.2018	2	w	two	28	14	29	15	20	717	1,1	15,39	
10	6	15-60	2.2.2018	3	w	two	28	14	29	15	20	717	1,1	15,43	
11	7	17-60	1.2.2018	4	ue	two	28	14	29	15	20	713	1,25	12,31	
12	8	17-60	1.2.2018	4	ke	two	28	14	29	15	20	713	1,25	12,29	
13	9	17-60	1.2.2018	4	ue	two	28	14	29	15	20	1307	1,25	12,18	
14	10	17-60	1.2.2018	4	ke	two	28	14	29	15	20	1307	1,25	12,23	

All the database is exported to built in spread sheet and can be saved and opened as excel and open office document. From the spread sheet charts are plotted.



4.1 The Procedure of Application in Mil

Spin Plan R&D project application is a rough adjustment of spinning mill and a starting point of Technical Data /Machine Settings R&D Project.

Therefore , to apply this project following table should be prepared .

Lot no	*Blend*	*% of Total Production*	*% of Mixes*	*Blend Fibre Tex*	*Spinning Index*

When the above Table is filled Spin Plan should be started from the highest production % of lots to lower ones respectively.

For each lot Technical Data Input Values should be gathered to enter the Pc-Program

This involves following Tests

-Fibre Length Tests from Card to Ring Frames front and back side of the sliver
-CV% Evenness Tests
-Count Tests at each stage of processing

4.2 Outputs of Spin Plan ver 1.0 Pc-Program

a) Fibre Growth Analyses
b) Drafts
c) Draft Index Analyses
d) Spectrograph Analyses
i) Mechanical Faults
ii) Drafting waves
e) Performance Control
f) Summary report
g) Fibre Analyses chart
i) Mean Fibre Length by number(Average of Leading and Trailing Hooks)
ii) Short Fibre Content by Fibre Number
iii) Coefficient of variation of fibre length distribution)
h) Draft Analyses chart
i) Draft Curve
ii) Index Curve
iii) Draft Slope
iv) Draft Angle
v) Total Draft

4.3 Fibre Analyses , Hooked Fibres

Fibres leaving the carding machine are not always straight and some hooks on them . There are many kinds of hooked fibres in spinning process. But mainly leading and trailing hooks. And these hooks change their directions according to the Processing Draft Organization .

Front end of the sliver coming out from the carding machine can be denoted as Leading (Front-F) and trailing (back side) of the as Back-B. And according to this fibres direction and hence hook direction can be summarized as below.

Process	Direction	Measurement for Spin Plan
Card	F	2,5 % SLY
Card can delivery	B	2,5 % SLY
1st passage Draw Frame Delivery	B	2,5 % SLY
1st Passage Draw Frame Can Delivery	F	2,5 % SLY
2 nd passage Draw Frame Delivery	F	2,5 % SLY
2 nd passage Draw Frame Can Delivery	B	2,5 % SLY
Roving Delivery	B	2,5 % SLY
Roving bobbin Delivery	F	2,5 % SLY
Ring Front Roller Delivery	F	2,5 % SLY

Changes of Hooks in Carded Ring Spinning System

Trailing Hooks are mainly produced by Carding Machine and fibres are always longer after 1st passage of drafting due to removing of hooks. So Fibre Transfer Ratio in carding has great influence on hooked fibre content .

4.4 Revising of Existing Spin Plan and Correcting Faulty Running Process

Main lots are analyzed by Spin Plan Pc-Program. In order to carry out fully functional work ,all the process summary data should be collected. The faults have been identified by Spin Plan Pc-Program could be better used in Process Summary Technical Data and for improvement purposes as well.

Process Summary Pc-Program also assist the R&D Project of Technical Data/Machine Settings Process Optimization Workings.

Process Defects could be summarized as

a) Mechanical defects
b) Drafting Waves in draft zones at each stage of processing

Mechanical defects are caused by the rotating parts of and settings of each machinery in the processing stage and could be analyzed by Spinning Mill Data Bank Pc-Programs from Carding to Ring /Rotor frames.

Drafting waves on the other hand caused mainly by uncontrolled movement of fibres in draft zones. This fault cause variation in the evenness of the final product and may cause cloudy appearance on the fabric. Length of drafting waves are usually longer than mechanical defects . Spin Plan Pc-Program identifies both of these defects and helps to improve yarn quality.

-Draft Curve identifies the faulty running processing stage

-Spectrograph analyses identifies the faulty running draft zone and mechanical defect.

-Summary report suggests the recommendation for process improvement

5.1 An Example of Evaluation of Main Lots by Draft- Draft Length Curve

Process defects of main lots have been analyzed by Spin Plan Pc-Program

To confirm the results 10 spectrograph for each lot have been obtained and then compared with Draft Curves.

Process Defect Analyses from Draft Curve :

lot no	Ne	Faulty Running Process	Defect Observation
A-/67	20 (30 tex)	Roving	Significant
A-/68	20 (30 tex)	2nd Passage and Roving	Significant
A-73	20 (30 tex)	Roving	Significant
A-61	20 (30 tex)	Roving	Significant
A-60	20 (30 tex)	Roving	Significant
A-43	20 (30 tex)	Roving	Slight
A-81	20 (30 tex)	No defect	Non

Table : Faulty Running Processing stages identified by Spin Plan pc-program Draft Curve

Comparison of Spectrograph and Draft Curve Analyses

Wave Length from Spectrograph	Tex	From Spectrograph	Draft Curve
1-2 and 10-12 meter	30	Roving	Roving
1,5-3 and 14-22 meter	20	Roving	Roving

Determination CV % values of Each Stage of Processing from Draft Curve

CV% of each stage of processing could be found out by Actual Draft Curve and ideal Draft Curve. Too low and too high CV% values at each stage of processing may lead to unevenness of yarn due to following reasons :

-Low CV % in cards,draw frames may be due to too much fibre parallelism and fibre breakage and may lead to high unevenness in yarn

Too high CV% in slivers may be due to high content of short fibre and in correct setting of ratch setting

To optimize CV % Values for each stage of processing Draft CV- Draft Curve could be plotted and from this curve required CV values for each stage of processing could be obtained. So ratch setting distances could be adjusted according to these values.

6 Stages of Spin Plan Pc Program

6.1 Factors Effecting Production Level and Cost in Spin Plan Pc-Program

Factors effecting the production volumes from Card to Ring Frame could be summarized as

a) Sliver count range gram per meter
b) Number of doublings (time to feed can)
c) Machine speed m/min
d) Efficiency %

Spin Plan Tests are carried out to optimize above factors with the help of Spin Plan Pc-Program and Spin Matrix ver 1.0 Pc-Program .

Depending upon the type of raw material and mill balance Spinning Plan always should be re-tested after each lot changes. Draft Curve as will be outlined in later will give significant information about the processing count range limits.

6. 2 Determination of Effects of CV Machine , Draft CV of Roving ,Neps in Roving, Roving Draft , Ring Draft variables on Yarn Neps in Polyester/Cotton Blends by Spin Matrix pc- Program

Test Data File :

Test No	CV Machine	Draft CV Roving	Roving Neps/gram	Roving Draft	Ring Draft	Ring Neps
1	14.040	6.525	68.000	7.500	33.330	300.000
2	14.290	6.710	74.000	7.650	34.090	330.000
3	14.600	6.630	71.000	7.820	34.880	340.000
4	15.230	6.710	93.000	8.000	35.710	405.000
5	14.990	6.740	72.000	8.200	35.690	424.000
6	16.420	6.860	86.000	8.420	35.700	452.000

Variables

x1	CV machine
x2	Draft CV roving
x3	roving neps
x4	roving draft
x5	ring draft
y	ring neps

Function : y = b1.x1 + b2.x2 + b3.x3 + b4.x4 + b5.x5

Parameter- Projection

Parameter	Projected	Std.Dev	t Student	Prob(>|t|)
b1	- 74.32	29.72	-2.50	0.24
b2	-100.64	46.19	-2.18	0.27
b3	3.85	1.09	3.53	0.18
b4	415.84	85.23	4.88	0.13
b5	- 41.18	16.20	2.54	0.24

Correlation Y-(Neps) and x-variables

CV machine	y 0.9126
Draft CV roving	y 0.8809
Roving	y 0.6557
Roving	y 0.9818
Ring draft	y 0.9252

Correlation between x-variables

1->2	0.872
1->3	0.710
1->4	0.931
1->5	0.796
2->3	0.610
2->4	0.881
2->5	0.774
3->4	0.561
3->5	0.664
4->5	0.906

Average Values:

CV machine	14.93
Draft CV roving	6.70
roving neps	77.33
roving draft	7.93
ring draft	34.90

Variables	Averages	Constants	% Contribution of variables
CV machine	14,93	-74,32	16,28
Draft CV roving	6,7	-100,64	9,89
roving neps	77,33	3,85	4,37
roving draft	7,93	415,84	48,38
ring draft	34,9	-41,18	21,08
ring neps	375		

From The above summarized Table one can see that Roving Draft has most significant role in effecting neps in Ring Spun Yarn . Roving Draft CV value has also effect upon neps in Yarn . Therefore , it is clear that Processing Organization i.e. SPIN PLAN has enormous effect upon yarn quality and should be determined by extensive Test Plans aided by SPIN PLAN and SPIN MATRIX PC-Program.

7 SPIN PLANVer 2 .0 Pc-Program Output Results Summary

Fibre Analyses
Draft Information
Draft Index Analyses and Required CVL values for each process.(Variation between Lengths)
Total Drafts Spectrograph Information
Drafting Waves
Knowledge Based Problem Analyses /Problem Solving Draft Index Curves
Fibre Mass Staple Curves

7.1 Fibre Analyses

Fibre Analyses							
	SLY1 F	SLY2 F	SLY1 B	SLY2 B	CVNF%	SFNF%	SFNB%
Ring	28	14	29	15	38,21	5,51	3,82
Roving	28	13	28	14	42,31	7,57	5,51
1st Drawframe	28	14	28	14	38,21	5,51	5,51
Card/Comber	28	14	28	14	38,21	5,51	5,51

7.2 Draft Information

	Material-Tex	Drafts
Ring Delivery	25	16,94
Ring Break Draft Delivery	423,47	1,24
Roving Delivery	500	8,2
Roving Break Draft Delivery	4100,83	1,2
Drawframe 1st passage delivery	4921	5,52
Drawframe 1st passage break draft delivery	27150,35	1,45
Card /Comber Delivery	4921	121,93
Card/Comber Feed	600	1653,76

7.3 Draft Index Analyses

	Draft CV%	Cut Length in m	Index
Ring	11,79	0,02	2,06
Roving	5,97	0,46	4,14
1st Drawframe	2,01	4,57	8,21
Card	0,89	36,52	8,02

Total Drafts

Process	Total Draft
Ring	21
Roving	9842
Drawframe 1st	8000
Total	1653761

7.4 Spectrograph Information

Mechanical Defective Items Analyses

Process	Item	Lamda
Ring	Front Roller -Ring	8,48
.....	Middle Roller Ring	143,68
Roving	Back Roller-Ring -Roving Delivery	178,16
.....	Roving Middle Roller	1461,22
.....	Roving Back Roller -1st Passage Delivery	1753,46
1st pas D/F	1st passage Middle Roller	9674,28
.....	1st Passage Back Roller -Card Delivery	14027,7

7.5 Drafting Waves

Lamda max Ring :12cm

Drafting Waves
Ring Main Draft
Ring Break Draft
Roving Main Draft
Roving Break Draft
1st Passage-Main Draft
1st Passage Break Draft
Card/Comber Delivery

Draft Slope	Draft Slope	Draft Angle
Roving-Ring	0,22	12,59
Roving-1st passage	0,48	25,43
Card-1st Passage	0,39	21,41

7.6 Knowledge Based Problem Analyses /Problem Solving

Knowledge Based Problem Analyses /Problem Solving

Fibre Breakage in Roving-Leading
Check Roll settings front and back. It may be too wide and too close
Check Roll Pressures
Check drafting waves with spectrograph forward and reverse
Check drafting rollers bearings
Check aprons top and bottom
Check shore hardness of top rollers
Check diameter of top rollers
Cary out Draft Rollers Setting Test as instructed by Itru
Roving sliver may be too fine or too coarse!!
Fed sliver may be too fine or too coarse!!
Fibre friction may be too high check humidity and static electricity of fibres!!
Too much short fibre . Check with spectrograph!!

7.7 Draft CV- Draft Length Chart

Draft Curve : Draft CV% -Cut Length Chart deviation from straight line indicates the faulty process . In this case Roving process is deteriorating the yarn quality.

Fibre Staple Curve :It can be seen that In Roving Frame an increase CVN% is indication of fibre breakage

7.8 Fibre Length Mass Staple Curves for trailing and leading Hooks from 2,5 and 50% Span lenghts

Fibre Growth Curve for trailing and leading Hooks should also be carried out with UAK-1 for 1% SL , Effective Length and SFN % since long fibre breakage could only be identified by 1% SL from Staple Diagram.

8 Process Improvement for Spin Plan

STEP 1- For existing Draft Organization

Draft Curve :

Correct the faulty running process as outlined from the Draft Curve

Fibre Curve :

Correct the fibre breakage . An increase in CVN% is a indication of fibre breakage.

Spectrograph of Yarn :

a) Mechanical Defect

Correct the main defects in the processing

b)Wave lengths of all drafting waves of all processing stages could be seen in yarn spectrograph and computed in the pc-program . Correct the faults in relation to computed values.
Itru Fibre Tester UAK-1 plots Spectrograph curve for any stage of processing compare UAK-spectrograph with Evenness Tester and check the drafting waves.

Knowledge Based Problem Analyses /Problem Solving

Take necessary remedial action according to suggestions given in Process Control section of the Pc-Program.

STEP 2:
Change Technical Data Input at least 6 times and make yarn from these different drafting organization . Make a matrix table for the test results . Analyze the test results with Spin Matrix ver 1.0 Pc-Program and find out the optimum solution for new test.

Carry out above test as outlined at step 1

STEP 3

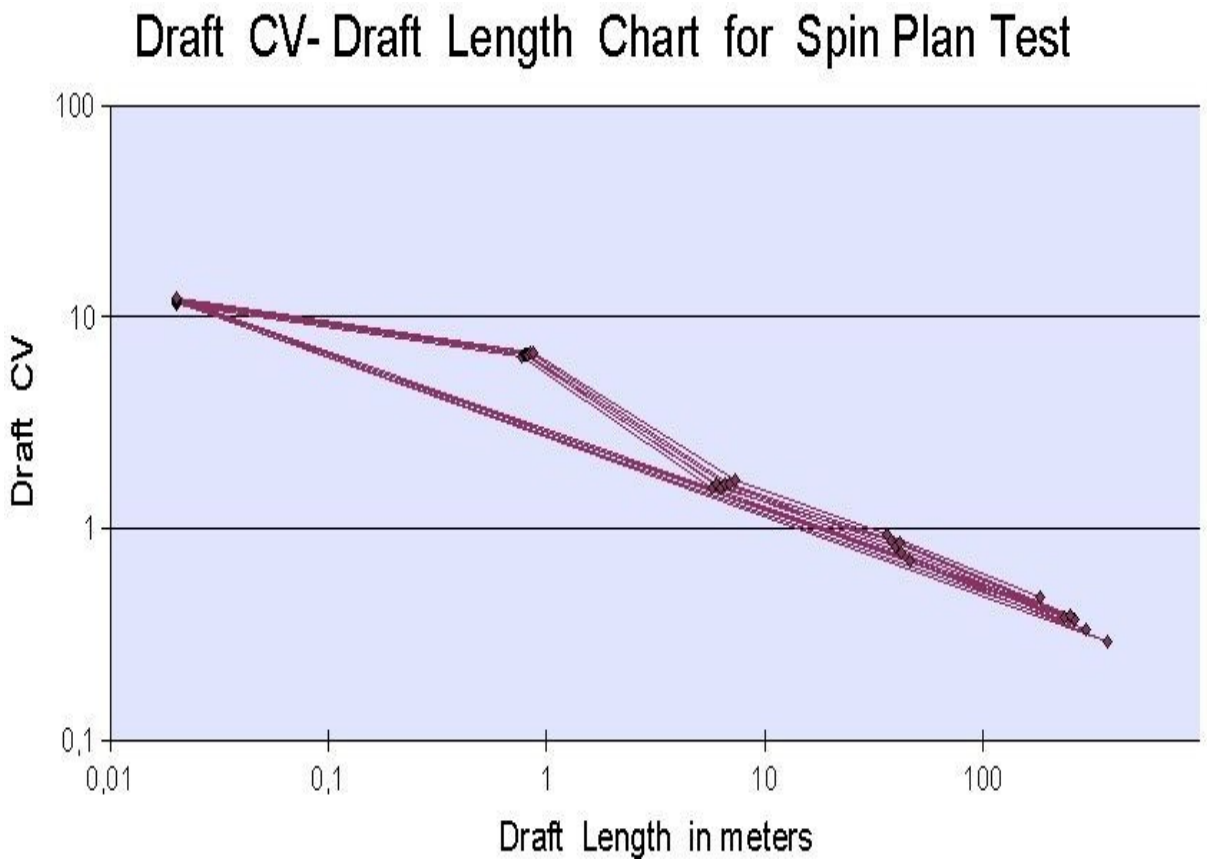
Carry out Technical Data/Machine Settings Test Plans to fine gauge the spinning process for further improvement in relation to SPINNING PERFORMANCE INDEX. In order to carry out Technical Data/Machine Settings you must SPINNING MILL DATA BANK SYSTEM should have been already in the mill.

9 Spin Plan Test

Spin Plan Pc-Program could be used to optimize the draft organization with Spin Matrix ver 1.0 Pc-Program. For this at least 6 tests are required to optimize and improve the quality and increase the production from card to ring frames.

Draft Information	Test1		Test2		Test3		Test4		Test5		Test6	
	Material-Tex	Drafts	Material-Tex	Drafts	Material-Tex	Drafts	Material-Tex	Drafts	Material-Tex	Drafts	Material-Tex	Drafts
Ring Delivery	20	31,06	20	31,77	20	32,53	20	33,29	20	34,09	20	34,94
Ring Break Drafts Delivery												
Roving Delivery												
Roving Break Drafts Delivery												
Draw Frame 2.nd Delivery												
Draw Frame 2.nd Break Drafts Delivery												
Draw Frame 1.st Delivery												
Draw Frame 1.st Break Drafts Delivery												
Card Delivery												
Card Feed	700	16403,2	700	13105	700	11745	700	10545	700	11072	700	8093,7

Draft Index Analyses	Test 1			Test 2			Test 3			Test 4			Test 5			Test6	
Test1	Draft CV	CL m	Index	Draft CV	CL m	Index	Draft CV	CL m	Index	Draft CV	CL m	Index	Draft CV	CL m	Index	Draft CV	CL m
Ring	11,64	0,02	1,65	11,77	0,02	1,69	11,87	0,02	1,72	12,11	0,02	1,79	12,05	0,02	1,77	12,19	0,02
Roving	6,53	0,77	3,24	6,71	0,79	3,51	6,64	0,81	3,48	6,71	0,82	3,61	6,74	0,84	3,78	6,86	0,87
Draw Frame 2.pasage	1,56	5,77	4,69	1,62	6,02	5,31	1,56	6,3	5,1	1,61	6,6	5,82	1,61	6,92	6,21	1,71	7,29
Draw Frame 1.passage	0,7	46,17	5,78	0,76	42,15	5,52	0,87	37,78	8,05	0,82	39,57	6,06	0,86	41,55	8,06	0,93	36,45
Card	0,29	369,3	5,43	0,33	295,05	4,96	0,37	264,42	5,25	0,38	237,41	5,5	0,39	249,28	4,97	0,47	182,22



From the Draft CV- Draft Length of 6 Tests were plotted as shown above .In all 6 tests it is clear roving frame is the main part for deteriorating the yarn quality.

9.1 An Example of Spin Plan Research Project Test Result (100 % Viscose Yarn)

Draft Information	Test1 Standart Spin Plan		Test4	
Process	Material-Tex	Drafts	Material-Tex	Drafts
Ring Delivery	20		20	
Roving				
2nd Passage Drawing				
1st Passage Drawing				
Card				
Card Feed				

Comparison of Standard Spin Plan and Test-4 Spin Plan in Yarn Quality

Test No	Ne	Tpi	U%	CV%	Thin	Thick	Neps	H%	Ne	Ne CV%	Rkm	Min	Rkm CV%	E%	E CV%
1	30	18,1	9,61	12,15	1	14	28	5,33	30,2	0,91	16,79	14,67	12,49	13,96	13,44
4	30	18,1	9,7	12,26	0	16	33	5,62	29,2	0,7	16,93	15,76	7,86	13,84	12,15

10 Technical Terms and Definitions

Terms	Definitions
Draft CV%	CV% of evenness computed according to draft length
Draft Length	Length of material corresponds to draft CV%
Lamda Maximum	Length of maximum amplitude of yarn from spectrograph
Draft Angle	Angle of Draft Curve
Draft Curve	Curve of Draft CV-Draft Length of each process
Index	Index of Irregularity computed from CV % of yarn and fibre mtex
Fibre Fineness	Fibre fineness in mtex measured from the ring frame front roller coming out
Drafting Waves	Faults in yarn caused by non-controlled fibres in draft zone of processing
Draft	Ratio of reduction in mass per unit length at each process
Break Draft	Draft at back zone of drafting system
Doublings	Number of cans for feed
Heads	Number of Laps for comber feeding
SLY1 Front	Leading end measurement of 2,5 % Span Length in mm
SLY2 Front	Leading end measurement of 50 % Span Length in mm
SLY1 Back	Fibres Trailing end measurement of 2,5 % Span Length in mm
SLY2 Front	Fibres Trailing end measurement of 50 % Span Length in mm
LM	Mean Fibre Length in mm by number or by weight
SFN	Short Fibre Content % by weight
CVN	Coefficient of Fibre Length Variation by number

If you need any terms should be added here please e-mail to itru@itru.net