

# FABRIC SETTING VER 3.0 APPLICATION

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Fabric Setting new version does not only analyse your problems but also helps you to solve your problems with Knowledge Based Expert Systems

## 1. What's New in Fabric Setting Version 3.0

Fabric Setting Pc-Program ver 3.0 is user friendly and very simple to use and apply to weaving shed. without any problem.

New additions for Fabric Setting ver 3.0 covers following headings

- ✓ -Elliptical Shed Formation for constant warp stretch for sensitive articles as well as avoiding over stretched i.e slack ends
- ✓ -New Fabric Weight gram square per meter projection algorithms
- ✓ -New Fabric Construction algorithms including Fabric Thickness projection
- ✓ -Comprehensive Warp Breaks Analyzes with new terms and definitions such as Beat-Up Factor, Abrasion Factor, Fatigue Factor
- ✓ -Estimation of Warp Breaks according to Article Construction
- ✓ -More comprehensive Reed Data, Number of Heald Frames Required Analyzes
- ✓ -Developed Problem Analyzes /Problem Solving Algorithms for Fabric Weaving according to Fabric Data and Machine Data
- ✓ -Optimization and standardization warp stops and weft stops per article woven in the shed and identifying off-standard running articles and looms within each article
- ✓ -Loom Optimization of Fabric Setting according to according to Fabric Data and Stoppages of warp and weft.
- ✓ New Fabric Type Development with Fabric Construction Data such as Fabric Thickness , Fabric Gram Square per meter and Firmness Factor
- ✓ Technical Support for Air-Jet Weft Stops Location Diagram who make use of Fabric Setting ver 3.0
- ✓ Technical Support for End Break Optimization from Bale to Fabric Delivery

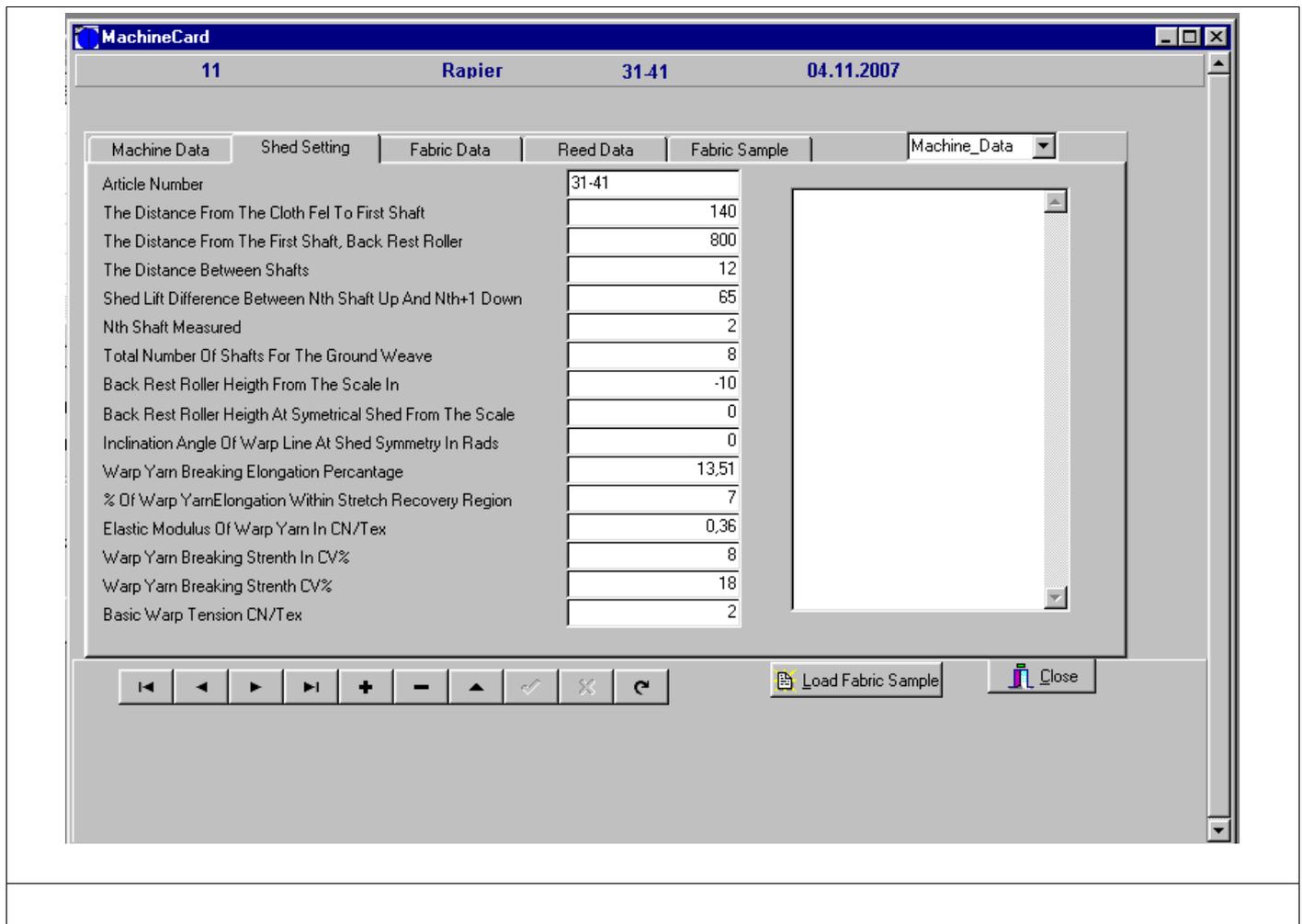
## 2.0 Fabric Setting Input Data

Fabric Setting ver 3.0 has input data to control not only weaving machines but also warp yarn quality in accordance with Weaving Performance. Therefore, the system brings quality control on spinning, winding, warping, sizing and weaving shed.

There is a Machine Card for each loom in the weaving shed. Machine Card consists of

- Machine Data Parameters
- Shed -Setting and Warp Yarn Tensile Parameters
- Fabric Data
- Reed Data

- Fabric Sample Data (Scanned Image of the Fabric) 10x10 cm
- Technical Information Notes for each machine



With this system Weaving Machine and the article on that machine are controlled effectively and all the looms running the same article are standardized. Therefore, effects of machine influence on the weaving performance is minimized so that better control on weaving shed is achieved.

## 2.1 Output Values

Output values of Fabric Setting is divided into two categories

- For each machine Technical Analyses
- Article Analyses SQL(Structured Query Language) Analyses

Technical Analyses covers following headings

**Shed Lift Analyses:**

This part checks the shed geometry .Each heald shaft displacement from the central line is computed.

```

-----
Shed lift from Central Line Analyses
-----
Shaft Number---:Upper Shed-----:Lower Shed-----:Upper Shed-----:Lower Shed-----:
.....:Straight .....:Straight.....:Elliptical.....:Elliptical.....:
1          :          35,116:          46,178:          40,605:          53,397
2          :          38,357:          50,441:          42,118:          55,387
3          :          41,598:          54,703:          43,527:          57,239
4          :          44,840:          58,966:          44,840:          58,966
-----
Tension ratio for lower shed to upper shed      :          1,315
Basic warp tension in cN/Tex                    :          3,000
Warp yarn elastic modulus in cN/Tex             :          3,000
Warp yarn breaking strength in cN/Tex           :          14,000
Warp yarn breaking elongation %                 :          4,000
Warp yarn elongation % in elastic region         :          3,000
Work capacity of warp yarn in cN/Tex            :          28,000
Shed Type                                       : Unbalanced shed tighter lower shed
-----

```

**Warp Stretch Analyzes**

----- % Of Warp Stretch Analyses -----		
Warp stretch by shed opening	:	1,371
Warp stretch by basic warp tension	:	1,000
Warp stretch total	:	2,371
Warp tension at maximum shed opening cN/tex	:	7,112
Basic warp tension in cN/tex	:	3,000
----- % Yarn Strength Variation in cN/tex -----		
Minimum	:	169,419
Mean	:	206,689
Maximum	:	244,104
----- Tensile Comments -----		
Shed setting parameters are OK for warp stretch		
Minimum yarn strength for this article should be at least 105,004 cN		
Mean yarn strength is OK for the shed setting check now only weak places		
-----		

Warp yarn quality is checked according to shed setting parameters.

### Fabric Construction Analyzes

----- Fabric Construction -----		
Ends per cm	:	40,000
Picks per cm	:	36,000
Warp count in tex	:	14,764
Weft count in tex	:	14,764
Maximum square set of average count warp and weft	:	38,349
Tightness factor (maximum ends or picks/cm)	:	35,135
Firmness factor	:	1,091
Beat up Factor	:	3,781
Total number of heald shaft	:	4,000
Fabric weight gram per square meter	:	129,185
Type of weave	:	Plain
Average Fabric Thickness in mm	:	0,263
Fatigue (End Break) Factor	:	7,148
Abrasion Factor	:	1,891
Upper Limit WST	:	11,407
-----		

### Fabric Construction-Problem Analyses/Problem Solving

This section recommends possible problems before the article is set on the loom. So that necessary

measures could be taken.

```

-----
Fabric Construction-Problem Analyses/Problem Solving
-----
This article would exhibit a significant beat-up force and Weaving Resistance
Therefore ,main parameter is to check Cloth Fell Distance L -Against.....
Following Parameters to Reduce reduce Warp breaks
1.Check the cloth fell distance according to your existing shed settings
  -Carry out .....
  -Carry out .....
Warp Stretch
  -Carry out .....
  -Carry out .....
warp and Weft yarn
  -.....
  -Make sure that warp stretch is within limits
2.Time the shed .....
  -Carry out..... Stretch constant
  -Carry out .....
3.Reduce Weaving Resistance
  -
  -
This article would exhibit a significant abrasion therefore

1.Check the coefficient of friction of warp yarns
  -
  -

2
3
4-Change the loading and unloading cycle per weave repeat
5-Check the reeds per cm and dent thickness
6-
7-
For more detailed information see THE INSTRUCTIONS FOR USE
    
```

**Reed -Ends Analyses**

Recommended drop wire weight, ends per dent and reed dent thickness and warp count .are outlined for a possible construction and checked with actual reed specifications as outlined below. Reed Dent Specifications could be effectively used to avoid reed marks and optimization of reed selection before you actually weave the fabric.

```

-----
Reed No of Heald Shafts
-----
Reed-Dent-Number of Heald Frames and Drop Wire Analyses-:
-----:
Dents Per cm           :           20,000:
Ends Per cm            :           40,000:
Ends Per dent          :           2,000:
Actual Dent Thickness in mm :         0,145:
% of Warp Yarn Space Per cm..... :       52,514:
% of Free Space for dent per cm... :       47,486:
Total Dent Space in mm for dent/cm. :         4,749:
Minimum Dent Thickness in mm :         0,237:
Warp Count Nec Actual   :           40,000:
Minimum Warp Count Nec For the Reed :       24,315:
Test Number---:Dent Thickness mm--:Minimum Warp Count-:
.....:-----:.....:-----:
0      :           0,199:           34,048:
1      :           0,174:           29,011:
2      :           0,149:           25,015:
3      :           0,124:           21,790:

No of Heald Shafts needed 8
.....:-----:.....:-----:

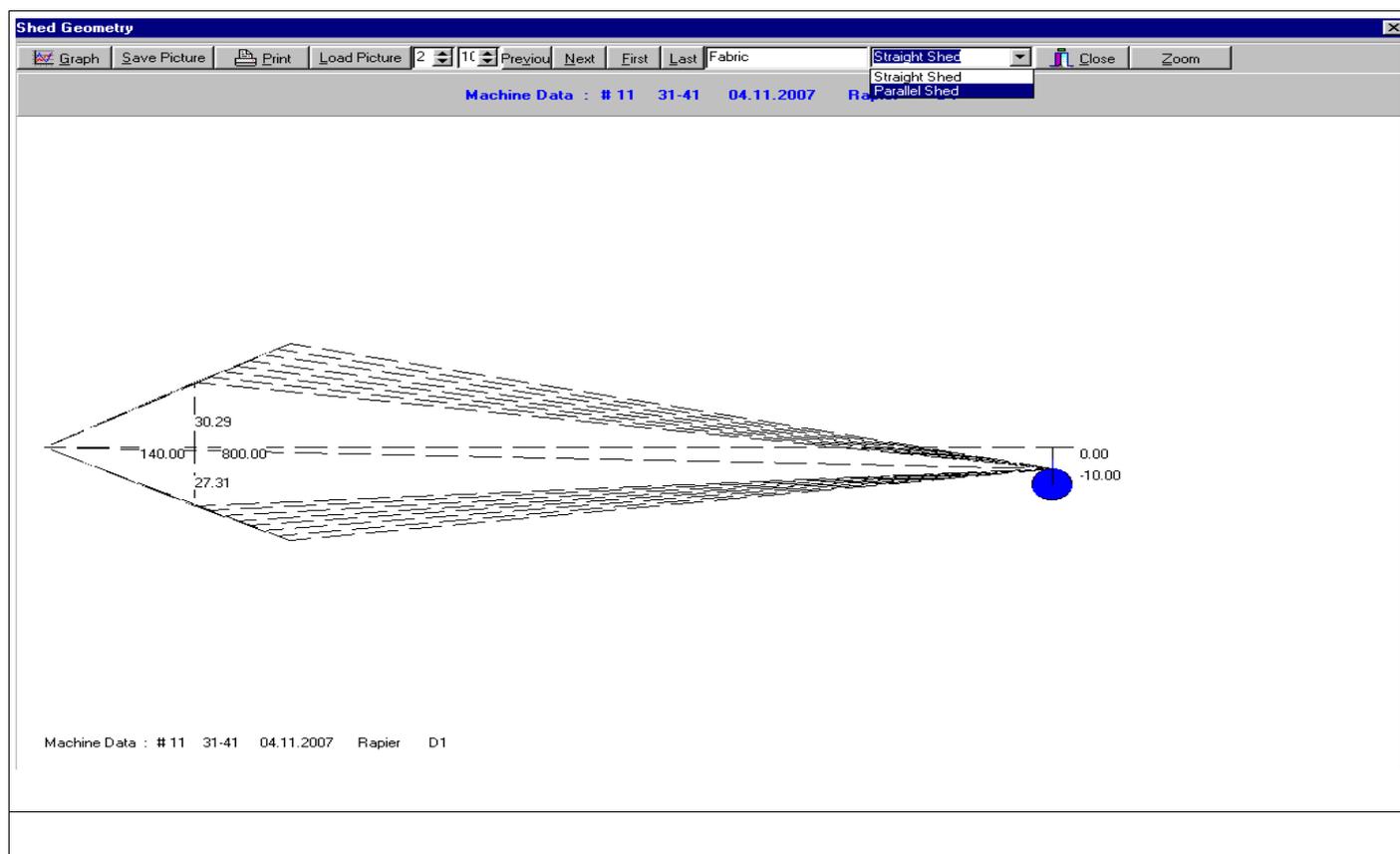
Drop wire weight is 2-2.8 gram
-----
-----
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```

**Shed Geometry**

Shed-Setting Geometry for is plotted for Straight Shed and Parallel Shed to see the warp ends displacement for each shaft .

**Elliptical Shed Formation gives detailed information about the each shaft displacement from the central line to have constant warp stretch for each heald shaft.**



## Article Analyzes

Article Analyzes covers the SQL analyzes for an input an output data for data based ,spread sheet formats and charts. For any sql statements .

## Stoppages and their Causes Data Base Interactive Knowledge Based

This is an interactive system for problem solving

## Knowledge Based Fabric Quality Analyzes Technical Support

The mills who use our Fabric Setting Pc-Program have supported by our Knowledge Based Fabric Quality Analyzes System to improve their fabric quality.

## Knowledge Based Weft Stops Analyzes For Air-jet Looms Technical Support

This support is given to mills who use air-jet looms technical information given by the loom Weft Stop Location System is prepared to identify the causes of weft stops.

### **3. Process Optimization of Weaving Shed with Fabric Setting Pc-Program**

Process Optimization of Weaving shed controls and check lists should be based upon

- Weaver Performance
- Loom Fixer Performance
- Article Performance

Therefore, Modern Management of a Weaving Shed Report by Itru Group Ltd plays an important factor to control these factors and could effectively help to make use of this system as well as . Te Time Studies ver 1.0 to control weavers and loom performances in more controlled manner.

( Ref : <http://www.itru.net/ffis/time-studies.htm> and <http://www.itru.net/otime.htm> )

#### **3.1 Fabric Construction Analyses of Woven Fabrics**

Any type of woven fabric consists of interlacing of warp and weft yarns in different weave types. Fabric structure and its construction depend upon the design of interlacing and type of warp and weft yarns. These can be summarised as

- Warp Yarn Parameters
- Weft Yarn Parameters
- Interlacing (Fabric Structure Parameters)

Fabric construction parameters should be in accordance with the Loom Shed Setting Parameters in order to achieve higher production levels and minimum fabric defects . The production levels of any type of weaving machine depends upon mainly stoppages of warp and weft yarns. Higher the end break rate lower the efficiency ,higher the operative work load and lower the fabric quality. Therefore, Shed Settings play a significant role in determining the rate of end break since shed settings is the main factor effecting the warp tension and warp elongation per loom cycle.

Warp yarn breaks as

- Warp tension is greater than lowest yarn strength
- Warp extension due to Shed opening is greater than lowest yarn elongation
- Abrasion resistance of warp ends lower then total number of loading unloading cycle per weave repeat
- Warp tension and warp elongation at beat up is greater than lowest yarn strength and elongation.

-Fatigue behaviors of warp yarns can not meet the required work capacity

Fabric structure completely effects all the above mentioned parameters.

### **3-2 Basic Warp Tension , Warp Yarn Tensile Properties and Warp Tension at Shed Opening and Beat- up**

Basic Warp Tension is measured at Shed Closure which is pre-tension applied to warp ends to avoid over slacked ends and it is the minimum warp tension for each loom cycle. .When the shed is opened warp tension increases and yarn extends and when the shed starts to close reed starts to beat the pick and this causes an increase in warp tension and also extension of warp sheet.

Warp Yarn Tensile Properties should be measured in order to have proper weaving these are

-Mean Strength in cN/tex

-Breaking Elongation %

-Recovery Elongation %

-Elastic Modulus

-CV % Warp Yarn Strength

Therefore, Stress -Strain Curves of Warp Yarns are plotted for at least 20 single readings and above mentioned parameters are obtained.

Therefore, Fabric Setting Pc-program requires Tension Measurement Device and Tensile Tester which can plot the Load-Elongation Curves.

### **3.3-Shed Setting Parameters in Relation to Warp Yarn Tensile Properties**

There are mainly 3 types of arrangements of heald frames to form a shed.

-Straight Shed

-Parallel Shed

-Elliptical Shed

Elliptical shed gives constant for warp tension and stretch to upper and lower shed. This is very important in clicking of weft yarn around warp ends in air-jet weaving due to slack ends and also in low tensile properties of warp yarns at any type of loom type.

### 3.4-Correlation of Fabric Setting Output Parameters and End-Break Rate and Weaving Mill Performance Test with Fabric Setting Pc-Program

With Fabric Setting Pc-Program 4 main parameters were developed to estimate and take measure to lower end break rate which are

- Fabric Firmness
- Beat-up Factor
- Abrasion Factor
- Fatigue Factor

could be called as Warp Break Parameters.(WBP)

Type of raw material plays the most significant role determining the correlation coefficient R with these parameters such as 100% cotton, polyester/cotton mix , polyester/viscose blends etc.

The procedures carried in the mills will start from the running articles parameters and end break rate per 100,000 picks inserted.

There is close correlation between the WBP and End Breaks per 100,000 picks inserted. WST for any type of Fabrics. The following Table for Cotton Fabrics for Rapier looms.

#### 100 % Cotton Material

<i>Article #</i>	<i>Firmness Factor</i>	<i>Beat-up Factor</i>	<i>Abrasion Factor</i>	<i>Fatigue Factor</i>	<i>End Break / 100,000 Picks</i>
Plain	1,091	3,985	1,992	7,939	10,9
Twill 2/2	0,851	3,21	1,052	1,688	6,8
Plain	1,066	3,339	1,55	5,174	8,5
Twill ½	1	3,827	0,74	0,934	5,3
Plain	1,171	4,483	2,241	10,045	15,8
Correlation R with WST	0,78	0,77	0,94	0,96	

WST=End Break /100,000 Picks

So at each mill these factors are plotted against Fabric Defects per 100, meter and end break rates and necessary measures could be taken in spinning, winding, warping ,sizing ,drawing in and weaving.

More technical information is given to technical personnel when application of the pc-program in actual mill running conditions. For example if an article has low Fatigue Factor and high end break rate compare to other article then needs attention for maintenance and checking.

Test your articles with Fabric Setting ver 3.0 is also possible . We will send you a detailed information about the off-standard running articles For this purpose following information is necessary

**Off-Standard Running Articles Analyzes Test By Fabric Setting Pc-Program Correlation Charts**

-Type of Loom (Air-Jet, Rapier and Projectile)	
-Type of warp material (Cotton, Polyester, Viscose, Wool, Linen, Silk and blends etc)	
-Warp Count in Nec	
-Ends per cm	
-Type of weft material (Cotton, Polyester, Viscose, Wool, Linen, Silk and blends etc)	
-Weft count in tex	
-Picks per cm	
-Type of weave( Plain, Twill, Hopsack , Warp Rib, Weft Rib and Sateen	
-Total Number of picks over ends per weave repeat (number of interlacing per weave repeat) such as 2 picks over 1 end is 2/1 Twill	
-WST (End breaks per 100,00 picks)	
-FST ( Filling stops per 100,000 picks)	
-Defects per 100 meter	

If you are interested in checking your articles running performance please get in touch with us.

**Make use of Correlation Charts of Firmness, Beat-up ,Abrasion, Fatigue with End-Break Rate**

This charts could be used to estimate end breaks per 100,000 picks inserted. Off-standard running styles(articles) could be obtained from these curves and necessary measures could be taken.

Fabric Setting first analyzes the article and according to encountered problems gives suggestion for loom setting optimization

-Beat -up factor

-Abrasion

-Fatigue and Firmness Factor

For any type of loom there is a close correlation between end break rate for warp stops and weft stops in relation to article type per 100,000 picks inserted. Therefore, warp and weft stops also depends on the type of loom i.e projectile, rapier and air-jet. One can not compare the warp stops of projectile looms with air-jet even running the same article .Each loom type should has its own standards for warp and weft stops.

2<sup>nd</sup> step is to carry out machine test per article to improve warp and weft stops. And improve fabric quality. This should be carried out per article type and per loom type with the Correlation Table shown before to identify off standard running and standardize the articles for warp and weft stops.

### 3.5-Fabric Weaving Problems and Remedies

Fabric Setting ver 3.0 Pc-Program according to Shed Setting Data and Fabric Structure and Warp Yarn Tensile Properties outlines the possible weaving problems before the article set on the loom so that necessary measures could be taken in

- Spinning
- Winding
- Warping
- Sizing
- Drawing-in
- Weaving sections

According to possible encountered problems before weaving Fabric Construction or Shed Setting Parameters or Warp Yarn Data parameters could be well optimized.

### 3.6-Fabric Weight Gram Per Square Meter Measured and Projected for Different Type of Raw Material and Weave Types and Product Development

Fabric Setting ver 3.0 estimates the Fabric Weight gram per sq meter before you weave any type of article .If one knows the firmness Factor FF and Fabric Weight Gram per sq meter keeping the weft or warp constant or changing both same Fabric Porosity can be achieved This applies to Fabric Thickness as well. Fabric Firmness and Thickness could be correlated together with

- Bending
- Tearing
- Shearing
- Tensile properties of woven fabrics.

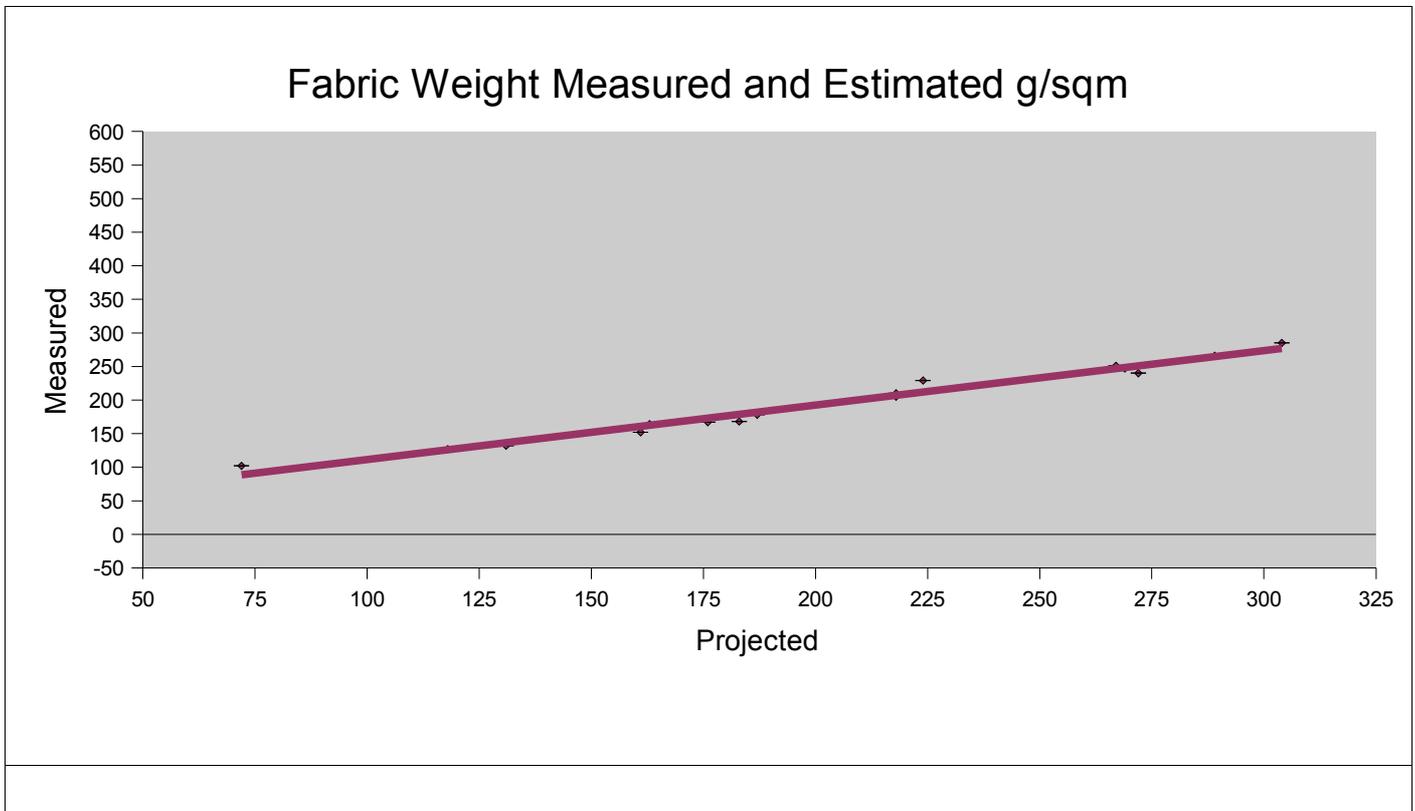
Fabric weight gram per square meter calculations need warp and weft crimp percentages for any type of fabric structure .However, Fabric weight is computed without having any information about warp and weft crimps . Warp and Weft crimp values were purely computed from Fabric Construction Data for different type raw materials and different type of weave structures.

The following table summarises the measured and calculated Fabric weight g/sq-m for different articles and different fabric constructions.

<i>Article #</i>	<i>Epcm</i>	<i>Ppcmm</i>	<i>Warp Nec</i>	<i>Weft Nec</i>	<i>Type of Weave</i>	<i>G/sq-m measured</i>	<i>Estimated G/sq-m</i>
A29	36	20	14	14	Twill 3/2	289	266
A81	26	26	16	24	Plain	187	178
A82	30	30	24	24	Plain	176	167
A95	36	18	16	12	Plain	272	240

Article #	Epcm	Ppcmm	Warp Nec	Weft Nec	Type of Weave	G/sq-m measured	Estimated G/sq-m
B04	32	14	12	8	Twill 2/2	304	285
B83	36	18	14	14	Twill 2/2	267	251
C08	28	26	30	30	Plain	118	127
C14	36	18	20	12	Twill 2/1	218	210
C62	24	19	15	12	Plain	218	205
C63	39	29	30	20	Twill 2/1	183	168
C63-A	36	26	30	20	Twill 2/1	163	164
C23	36	20	40	76,0027	Plain	72	102
D68	30	32	24	30	Plain	161	152
E04	28	26	14	14	Twill 2/2	269	247
E09	40	36	40	40	Plain	131	132
E21	45	24	24	16	Sateen 1/4	224	229

Measured and projected gram square per meter  $R=0,989$  with a very high correlation. This approximation can show that for any type of weave and any type of material fabric weight could be very well estimated without measuring their crimp % this applies to warp and weft weights as well.



Warp Yarn Tensile Properties and Fabric Properties such as

- Fabric Weight
- Fabric Firmness Factor
- Fabric Thickness

could be used to estimate Fabric Tensile Properties for new product development. Fabric Porosity could be very correlated with Fabric Thickness together with Fabric Firmness and Weight . Beat up factor could be correlated with Fabric Tensile Properties and Fabric Resistance.

For technical textiles product development Fabric Strength Tester would be very beneficial for the mills to have better values with the above parameters

#### **4-Systems Requirements for Fabric Setting Pc-Program**

In order to have efficiency of Fabric Setting Pc-Program following testing devices should be provided.

- Yarn Tension Measurement Device for measurement of Basic Warp Tension
- Warp Yarn Tensile Properties and Load-Elongation Curves should be tested at any laboratory.
- Minimum Pentium III MS-Windows Operating System Win98 and later with USB outlet

Abrasion tester is optional but could be useful.

#### **5- Summary and Conclusions Order Form for Fabric Setting ver 3.0**

Fabric Setting Pc-Program could be effectively used for any weaving mill to achieve better mill performance level. Full technical support and training could be provided for those who apply the system

#### **How to Set up Fabric Setting Pc-Program in Your Mill**

Fabric Setting Pc-Program without any doubt will bring discipline and order to your weaving shed in many respects as well as improving your fabric quality and stoppages and their causes. The program has Input Data which is inserted in data base with numerical ,text and scanned images of the actual fabric being woven on the machine.

The Input Data is based upon the Machine Number, Loom Type, Article Type and Fabric and Shed Setting parameter. The procedures applying to your system are as follows.

- 1- Order the software
- 2- Set up the software on one of the mills computer . Print out Input Data and check each loom according to Type of loom and type of article being woven. All the looms within same loom type running same article should have same Input Data .This work will show you the differences between machinery running the same article. At first do not make any changes that you notice the differences
- 3-Carry out Stoppages and their Causes Machine Tests for all the articles and for all the weavers in the Mill (At least 15 looms and minimum 120 mins testing time per test)
- 4- Send us your Fabric Data and Shed Data together with Test Results

5- A performance report will be send to you. Apply the the report in the mill . State the progresses and problems .

6- You could also send 2 Technicians one for Problem Solving one for Product Development to Itru Training Centre in Istanbul for 2 days for process improvement and Product Developments.

Carrying out steps at least 1 to 5 will help you identify and solve your many problems and improve productivity and fabric quality.

**How to Order:**

**Order Form For Fabric Setting ver 3.0 for Windows 98 and XP**

Delivery Information:

Name :  
Company:  
Adress 1:  
Adress 2:  
City:  
State:  
Zip Code:  
Country:  
Voice Phone:  
E-Mail :

- 1) Simply fill in this form and delivery information and mail to: [itru@kilim.com.tr](mailto:itru@kilim.com.tr)
- 2) Send an e-mail to [itru@kilim.com.tr](mailto:itru@kilim.com.tr) that you have transfered the cost of Fabric Setting ver 3.0 Pc-Program to Itru Group Ltd .
- 3) Delivery :After receiving payment of USD 4495 (including portage and packing) Banktransfer to the name of ITRU GROUP LTD.YAPI KREDI BANKASI A.S 399 SIRINEVLER SUBESI-ISTANBUL-TURKIYE-A/C NO: 69392862