# FROM STRINGER TO RACQUET- TUNER.

## *STRINGER OR RACQUET TUNER?*

1. The difference between a stringer and a racquet-tuner:
* A stringer masters the stringing-technical skills.

* A racquet-tuner can adjust the stringjob to the type of play and possible arminjuries of the player.

2. It is quite difficult for many stringers to choose the right tensions for main- and cross-strings for a certain stiffness and a certain racquet.

WE WILL TRY TO SIMPLIFY THIS MATTER.

THE BASIS OF THIS SYSTEM IS THE TYPE OF PLAY AND A POSSIBLE ARM-INJURY OF THE PLAYER.

WE MAKE THE FOLLOWING CLASSIFICATION:

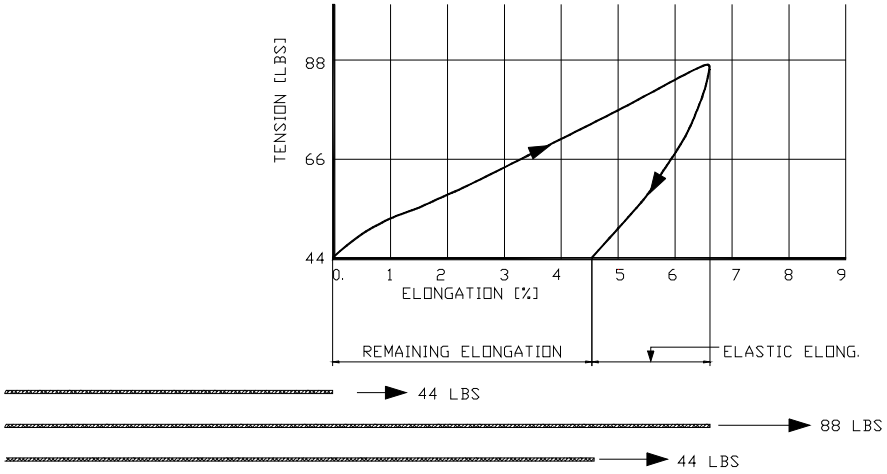
*LADY/ MAN,*
*COMFORT PLAY / POWERFUL PLAY*
*WITH SPIN / WITHOUT SPIN*
*ARMINJURY.*

THE RACQUETTUNER CAN „TUNE“ THE RACQUET WITH THE CHOICE OF THE STRING AND THE STRINGING TENSION.

# * THE MAJOR QUALITY OF STRINGS.

## THE ELONGATION CHARACTERISTIC

THE MOST IMPORTANT PROPERTY OF A STRING




### MORE ELASTIC ELONGATION:

* BETTER BALL ACCELLERATION.
* BETTER RECOVERY AFTER SPIN STROKE.

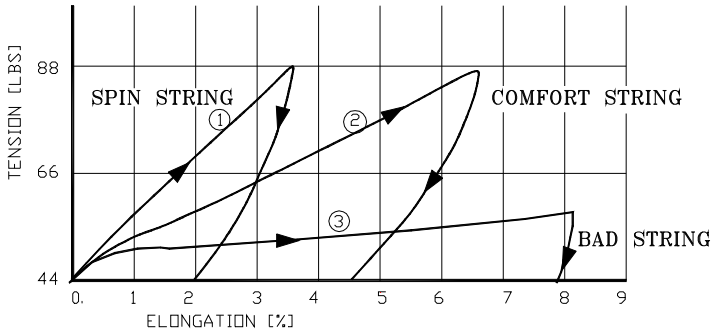
### MORE REMAINING ELONGATION:

* MORE LOSS OF TENSION.

### MORE TOTAL ELONGATION:

* LONGER BALL CONTACT:
  - BETTER COMFORT.
* WORSE DURABILITY.

## DIFFERENT STRINGS
## DIFFERENT ELONGATION




### MAIN DIFFERENCES:

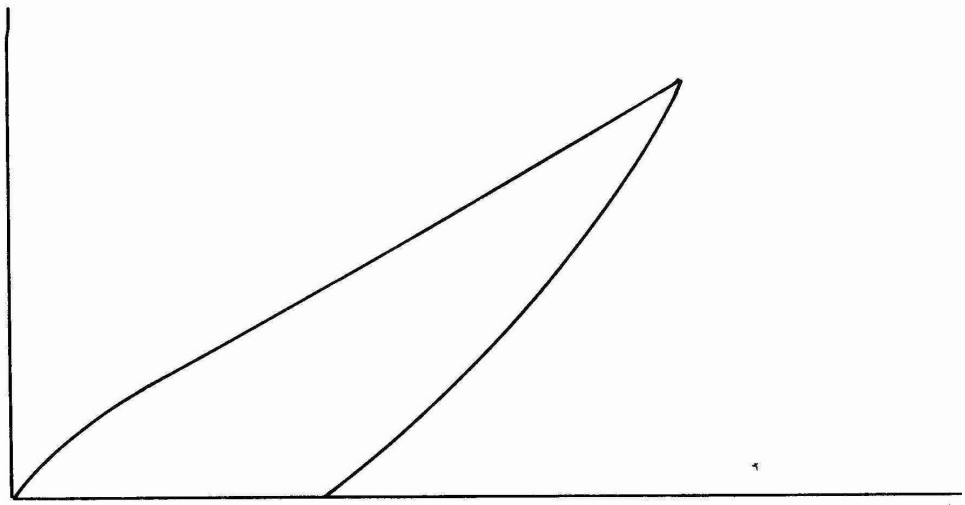
* NYLON STRINGS: THE REMAINING ELONGATION.
* NYLON AND GUT: GUT HAS MORE ELASTIC ELONGATION.

TO MEASURE THE ELONGATION QUALITY (DEMO).

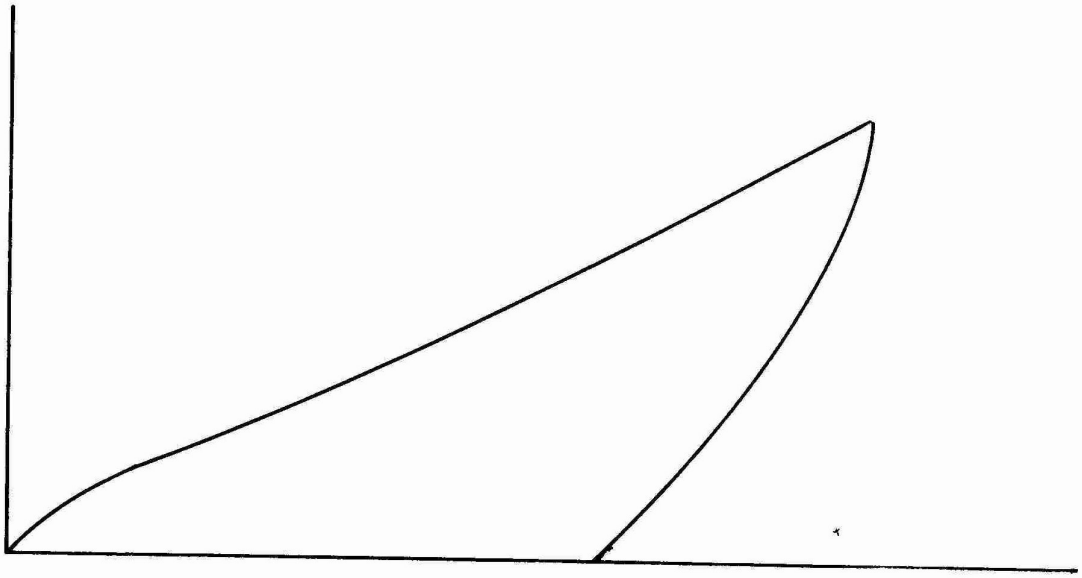
# CLASSIFICTION OF STRINGS BASED ON THE ELONGATION.

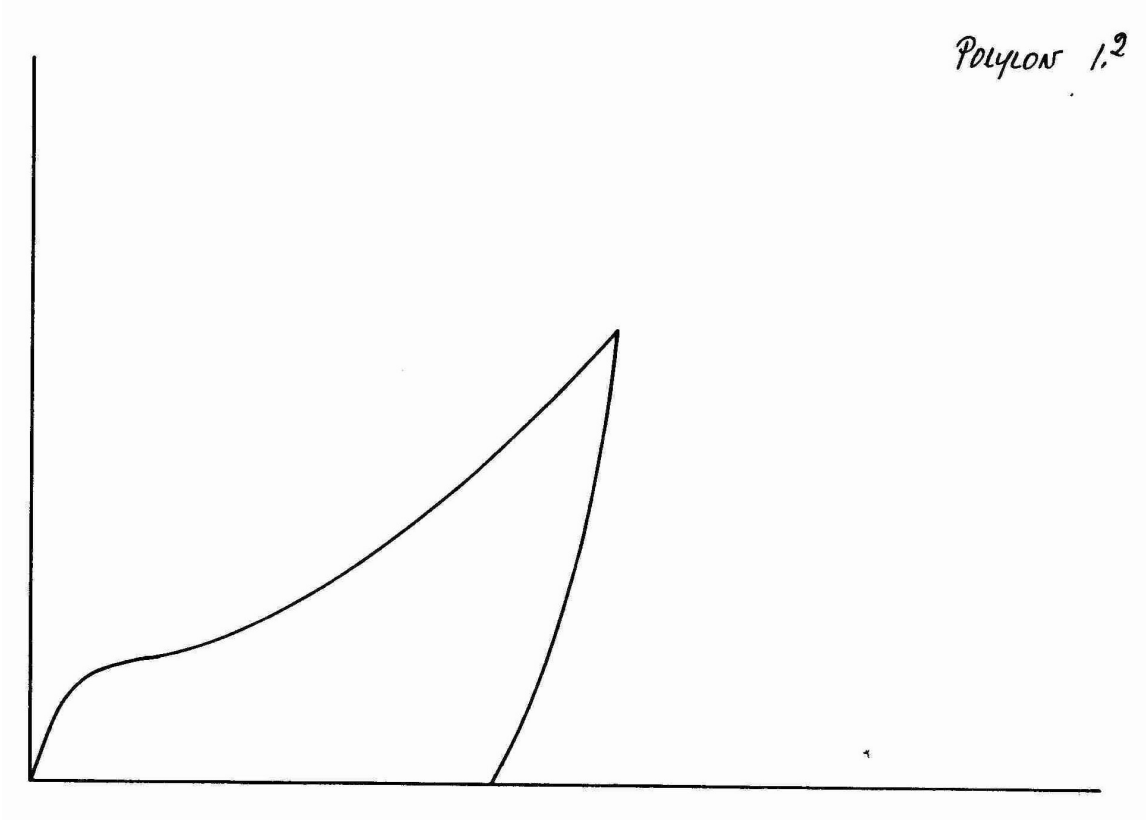
| | | | REMAINING EL. | | | |
|---|---|---|---|---|---|---|
| **C1 COMFORT** | | **ELASTICITY** | | **TOTAL ELONGATION** | **"QUALITY** | **INDEX"** |
| Magic Fiber | 1,7 | 2,5 | 2,1 | 4,6 | 0,5 | |
| Supreme Titanium 1,30 | 1,5 | 2,4 | 2,2 | 4,6 | 0,5 | |
| T 931038 | 1,3 | 2,2 | 2,2 | 4,4 | 0,5 | |
| Supreme Comfort | 1,1 | 2,3 | 1,8 | 4,1 | 0,6 | |
| Kevlastic | 1,1 | 2,2 | 1,9 | 4,1 | 0,5 | |
| | | | | | | |
| **C2 ALLROUND** | | | | | | |
| PT16028 1,28 | 0,7 | 1,5 | 2,4 | 3,9 | 0,4 | |
| SuperSynt. | 1,1 | 2,2 | 1,4 | 3,6 | 0,6 | |
| UT43532 1,30 | 1,1 | 2,2 | 1,4 | 3,6 | 0,6 | |
| | | | | | | |
| **C3 SPIN PLAYABILITY** | | | | | | |
| Syntetic Super | 1,2 | 2,1 | 1,3 | 3,4 | 0,6 | |
| UT40030 1,30 | 0,9 | 2,0 | 1,3 | 3,3 | 0,6 | |
| UT45032 1,30 | 1,0 | 2,1 | 1,1 | 3,2 | 0,7 | |
| | | | | | | |
| **C4 SPIN DURABILITY** | | | | | | |
| PolyesterGrijs | 0,7 | 1,4 | 1,9 | 3,3 | 0,4 | |
| PT10023 1,23 | 0,8 | 1,7 | 4,3 | 6,0 | 0,3 | |
| | | | | | | |
| | | | | | | |
| **Useless to much elong** | | | | | | |
| Supreme power 1,25 | 0,6 | 1,1 | 8,1 | 9,2 | 0,1 | |
| Supreme touch 1,25 | 0,6 | 1,0 | 8,8 | 9,8 | 0,1 | |
| Supreme Lemon (los mo | 0,5 | 0,9 | 9,0 | 9,9 | 0,1 | |
| PT10018 1,18 | 0,9 | 1,1 | 6,0 | 7,1 | 0,2 | |
| | | | | | | |

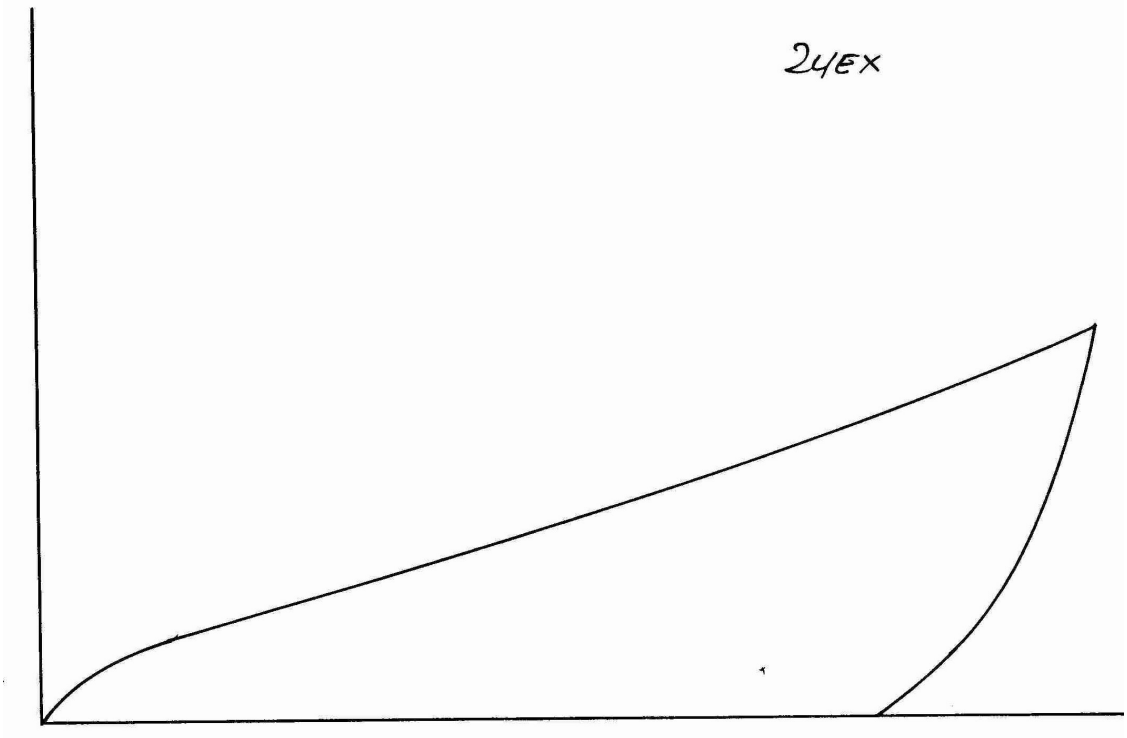
DARM
(Gut)



TECHNYFIBRE
TOURNEMENT




Polylon 1.2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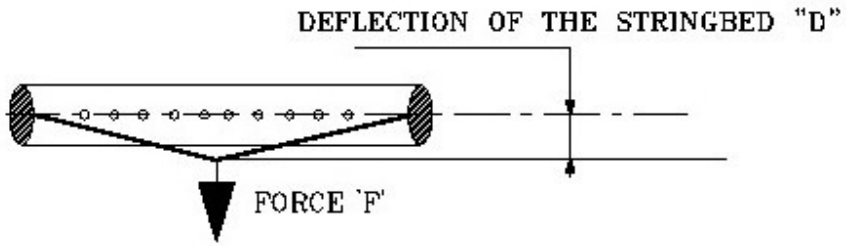
# HET METEN VAN DE REK

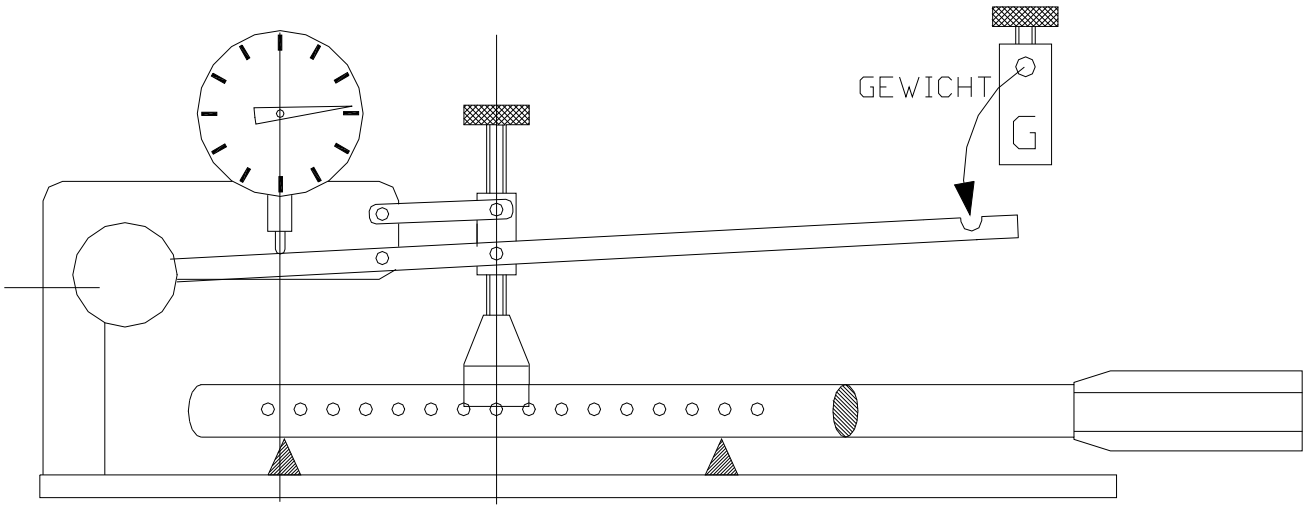
# STRING-BED STIFFNESS.

THE PLAYER FEELS:
* THE STIFFNESS OF THE STRINGBED
* NOT THE STRINGING TENSION.




$$\text{STIFFNESS} = \frac{F}{D} \text{(KG/CM OR DT VALUE)}$$

## STATIC MEASUREMENT.



# DYNAMIC STIFFNESS TESTS.


ERT 300


STRINGLAB

# DIFFERENCE BETWEEN DYNAMIC AND STATIC MEASUREMENT.

*WITH THE STATIC STIFFNESS TEST:*
*THE ELONGATION CHARACTER OF THE STRING HAS INFLUENCE ON THE TEST RESULT.*

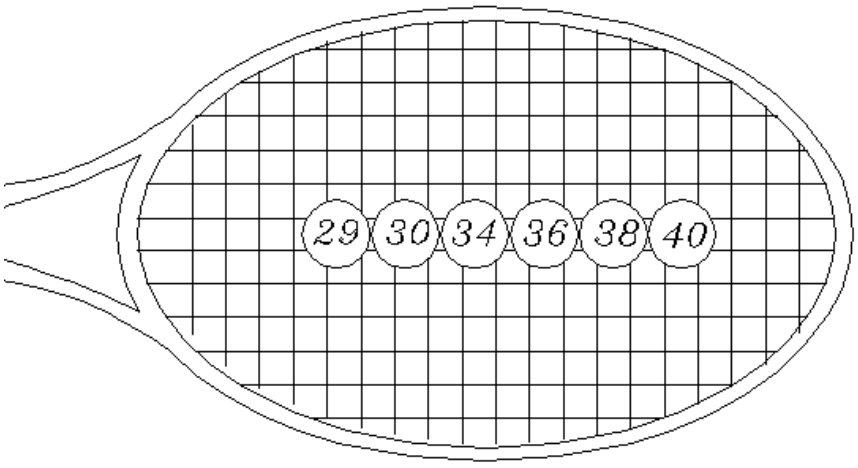
The stringbed is deflected so much that the string actually stretches.

THE DYNAMIC TEST ONLY MEASURES THE STRINGBED STIFFNESS.

This means that there is a clear relation between the stringing tension and the dynamic test result.

THE STRINGBED STIFFNES IS DIFFERENT IN EVERY POSITION OF THE STRINGBED.

THE DIFFERENCE IS CAUSED BY THE DIFFERENCE IN TENSION IN THE CROSS STRINGS. THE FRICTION BETWEEN MAINS AND CROSSES VARIES BECAUSE THE LENGTH OF THE MAINS GETS SHORTER TOWARDS THE END OF THE STRING JOB.



# THE CHECK OF THE STRING BED STIFFNESS IS IMPORTANT FOR MANY REASONS:

*** AFTER STRINGING:**

- TO CHECK IF THE STIFFNESS IS RIGHT FOR THAT PLAYER.
- TO CHECK THE FUNCTIONS OF THE STRINGING MACHINE.
*- TO CHECK THE QUALITIES OF THE STRINGER HIMSELF!*

*** AFTER PLAY:**

**-** TO CHECK THE QUALITY OF THE STRING:
Bad strings, with too much remaining elongation, loose tension very quickly.

## THE DYNAMIC STIFFNESS TEST:

The dynanic stiffness tester measures the natural vibration of the stringbed.
The measuring tool vibrates on the stiffness of the stringbed.

**IMPORTANT REMARKS:**

- THE MESSUREMENT ONLY WORKS WHEN THE „SYSTEM“ WANTS TO VIBRATE IN THAT SPOT.
The tool will show an ERR indication in the „zero amplitude“ position of the stringbed.

- BECAUSE OF THE FRICTION THERE WILL BE A LARGE DIFFERENCE IN TENSION IN THE CROSS STRINGS DIRECTLY AFTER STRINGING.

The first measurements can show a bigger difference because the differences in tension will level out during the measurement

## ADVISE:

LEVEL OUT THE DIFFERENCES BEFORE THE TEST BY DEFLECTING THE STRINGBED WITH YOUR FOOT.

# TO STRING ACCURATELY MEANS LITTLE LOSS OF TENSION.

## MORE LOSS WILL OCCUR:

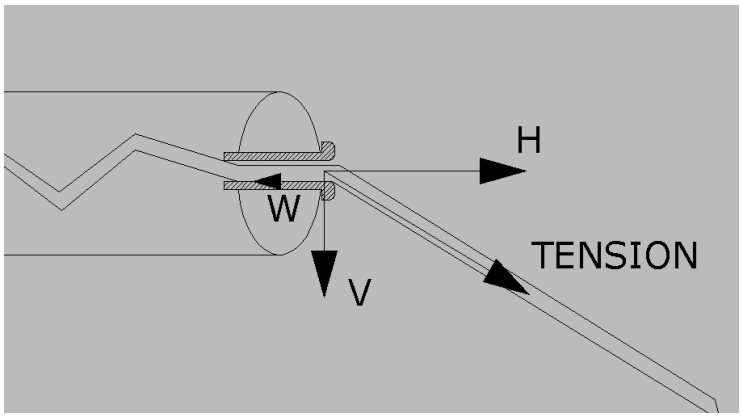
*** WITH STRINGS WITH TOO MUCH REMAINING ELONGATION OR BAD ELASTICITY.**

*** WHEN THE CROSS STRINGS ARE NOT LINED OUT DURING TENSIONING.**

*** WITH BAD OR DIRTY CLAMPS.**

*** WITH „HIGH SPEED“ STRINGING.**
A string needs about 6 seconds to stretch.
(see grahps)

*** WHEN THE STRING IS PULLED DOWNWARDS THROUGH THE HOLES IN THE GROMMET.**




The force V causes loss of tension W.

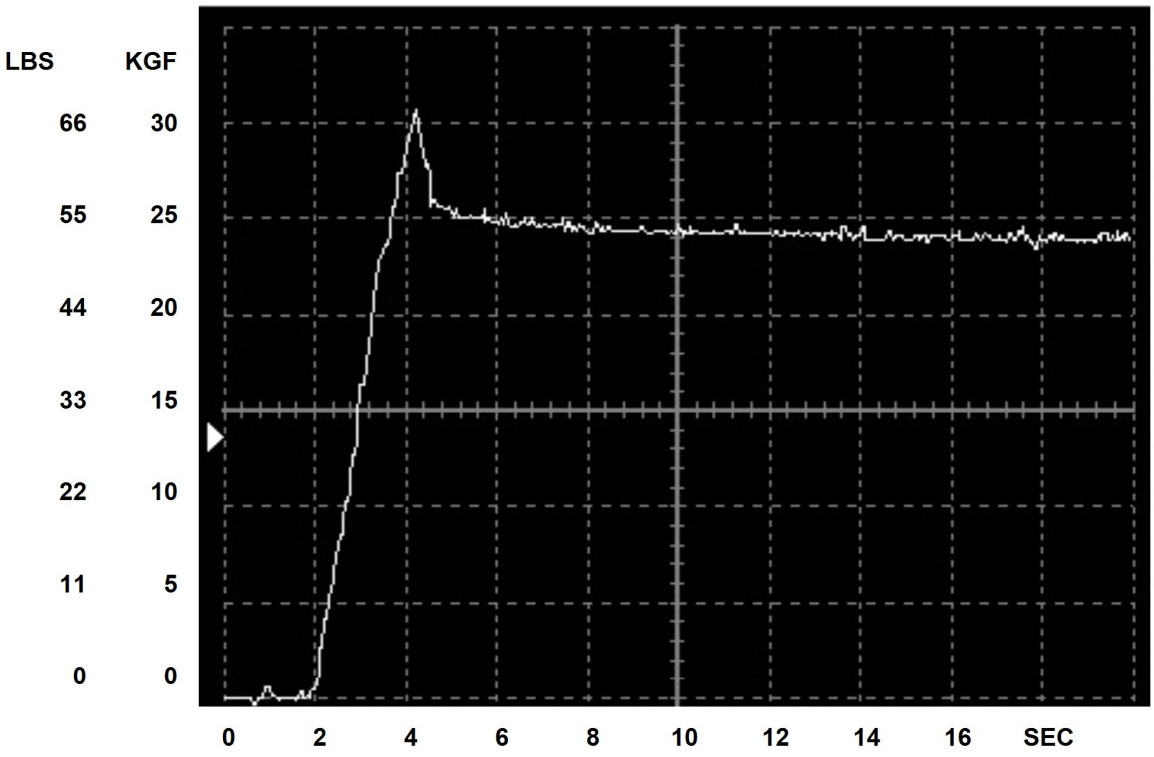
*** ON MACHINES WITHOUT CONSTANT PULL ACTION.**

- WITHOUT CP NO ACCURACY, THE LOSS CAN BE 15 LBS DEPENDING ON THE STRING AND THE STRINGER.

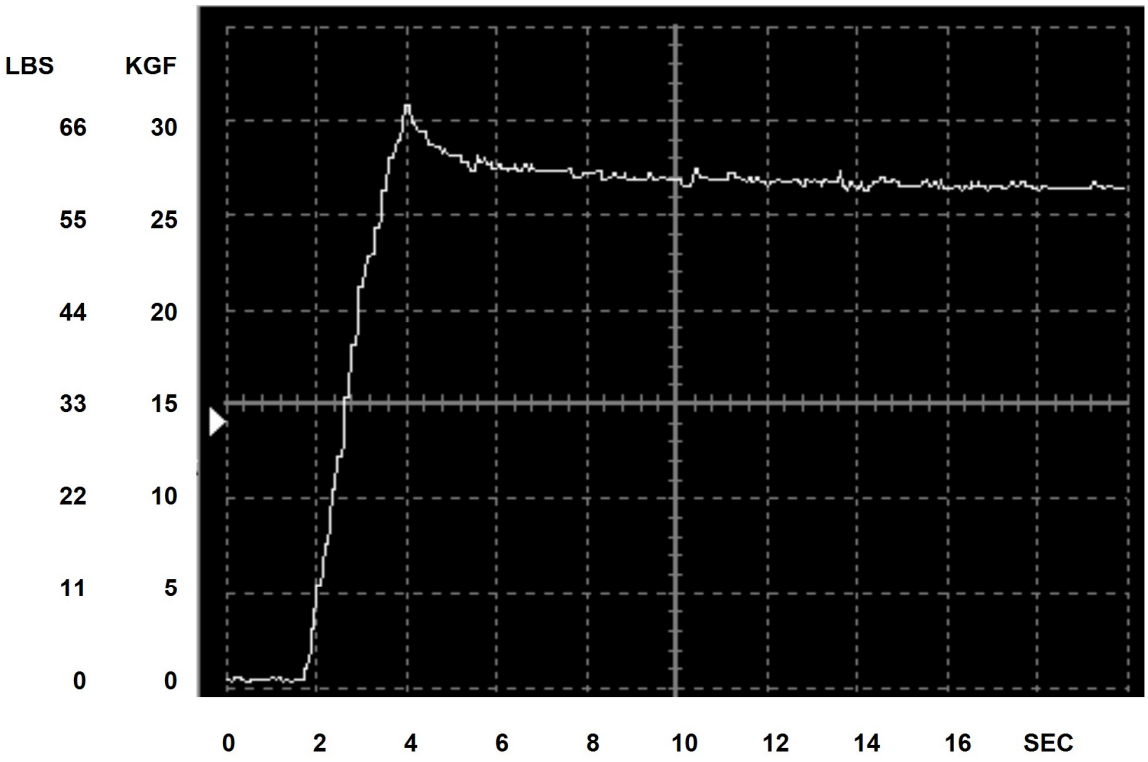
- MECHANICAL CONSTANT PULL SYSTEMS CAN BE AS GOOD (or better) THAN ELECTRONIC ONES.

# CONSTANT PULL vs LOCK OUT TENSIONERS

LOCK OUT TENSIONER WITH NYLON MULTIFILAMENT STRINGS.

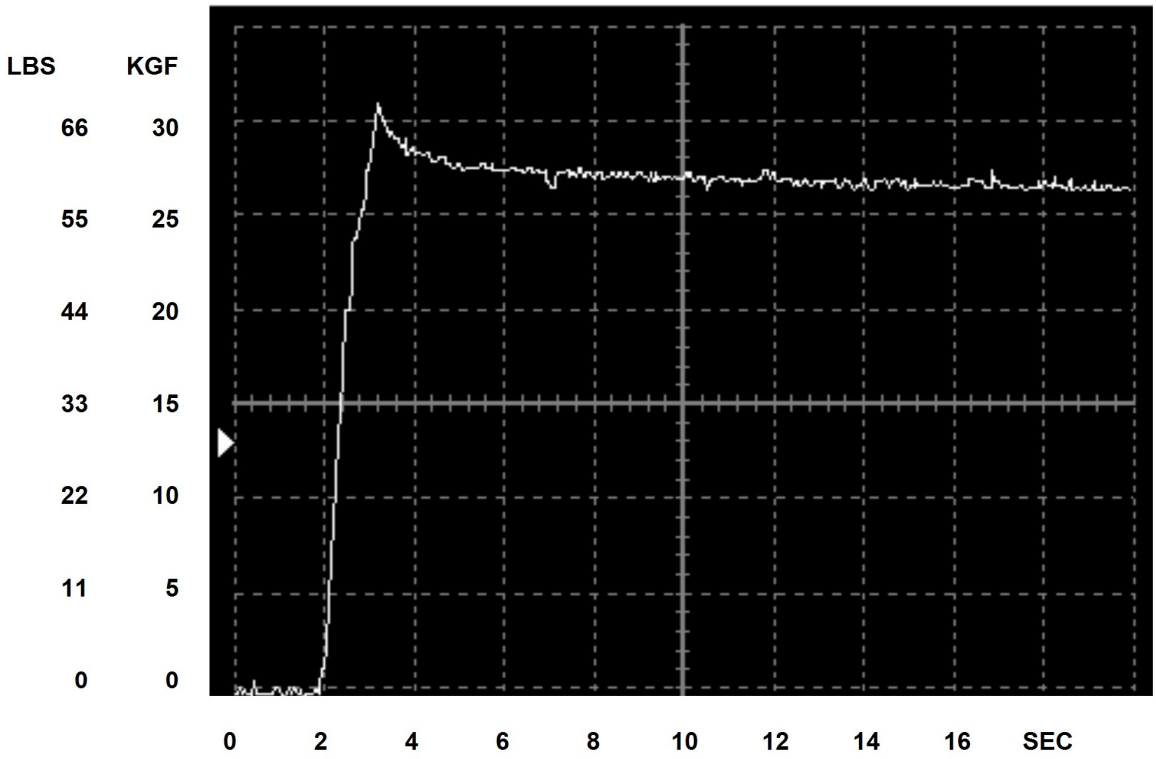



LOCK OUT; NYLON 1,8 / 4,2 % / 20 KGF. TENSION LOSS = 8 KGF (17,6 LBS)

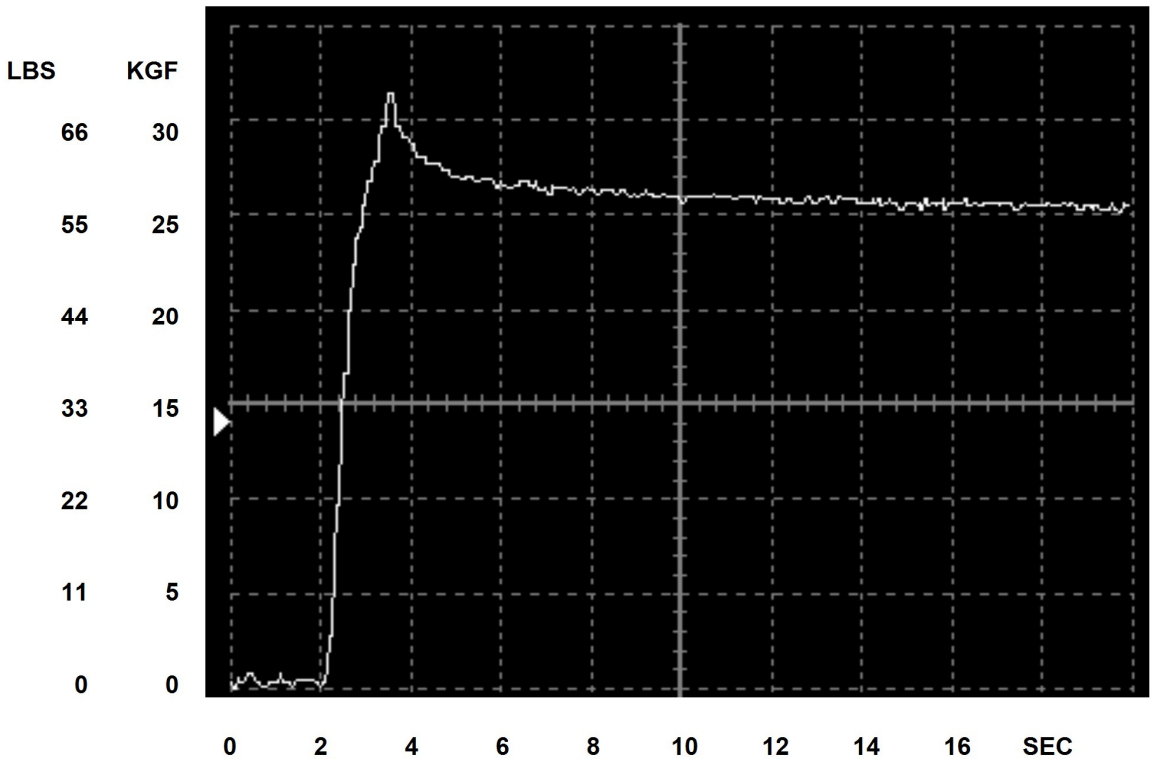



LOCK OUT; NYLON 1,6 / 3,4 % / 20 KGF. TENSION LOSS = 5 KGF (11 LBS)

# LOCK OUT TENSIONER WITH MONOFILAMENT STRINGS.

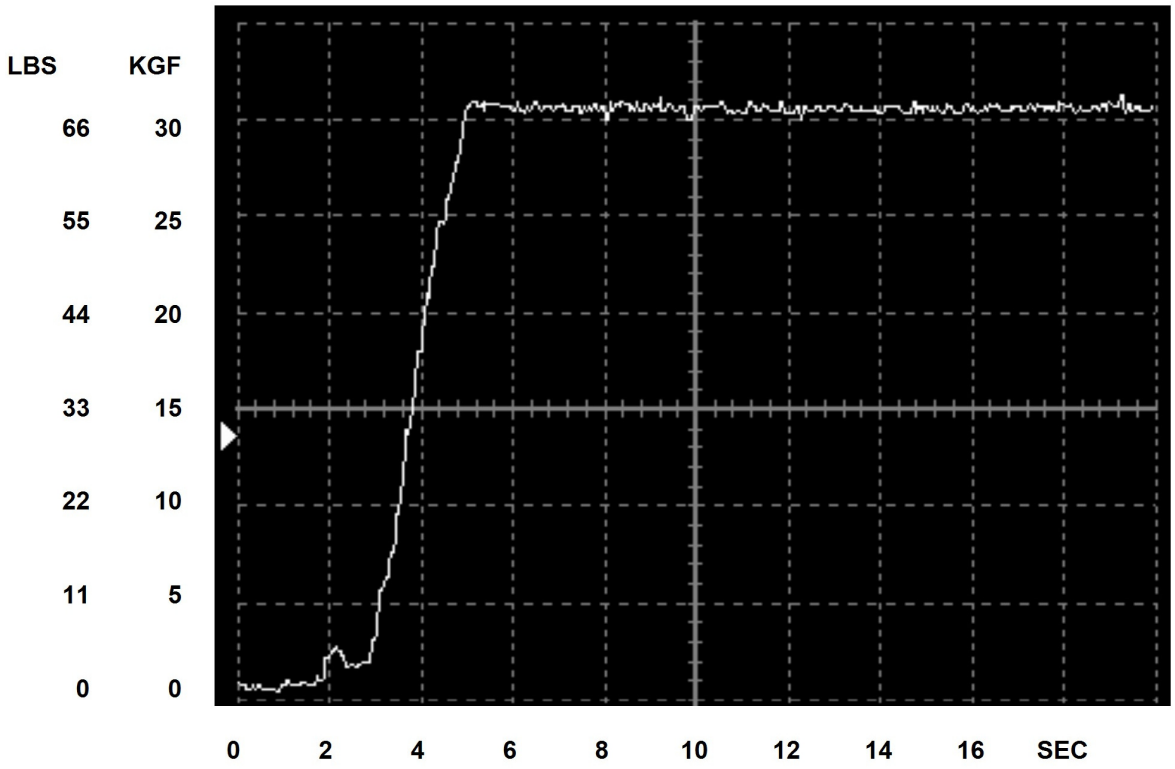



LOCK OUT; MONOFIL. 1,0 / 2,7 % / 20 KGF. TENSION LOSS = 4,5 KGF (10 LBS)

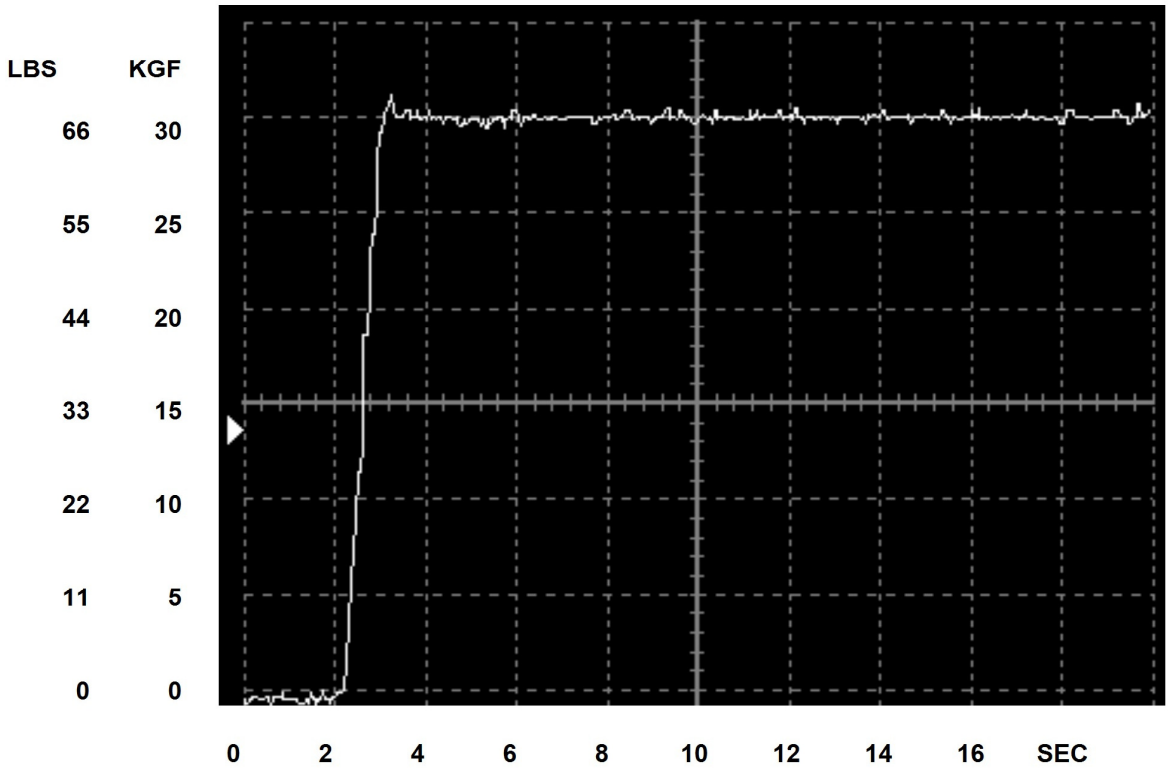



LOCK OUT; MONOFIL. 1,0 / 6,0 % / 20 KGF. TENSION LOSS = 6 KGF (13,2 LBS)

# "SMART-SPRING TENSIONER"

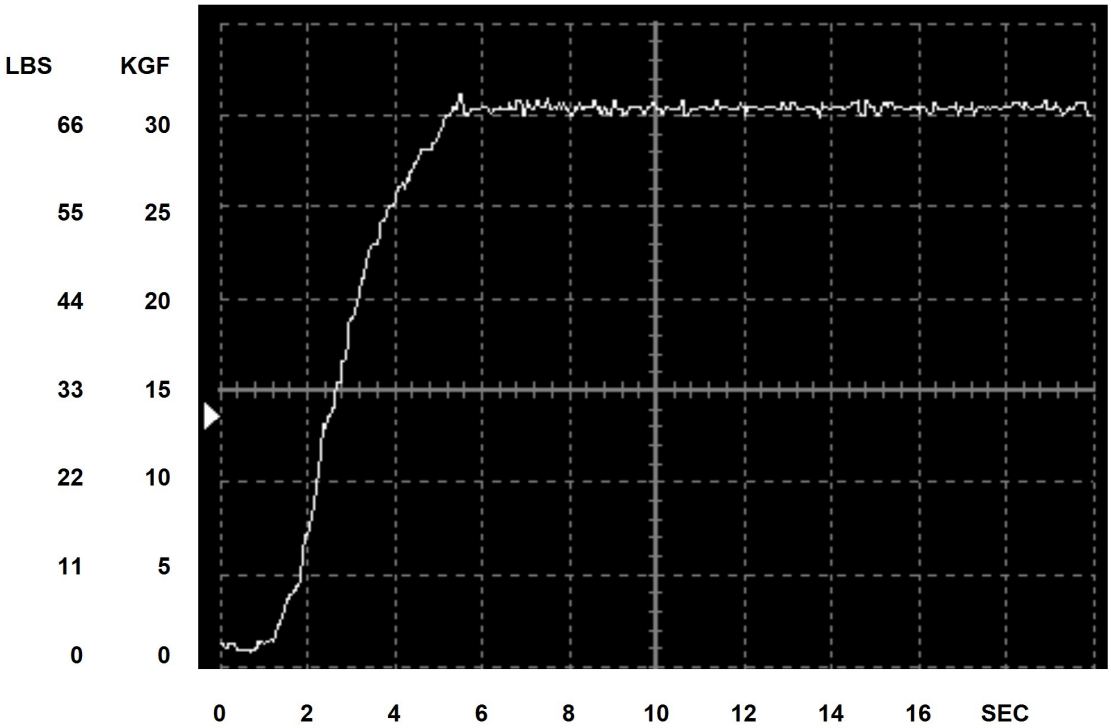



MS150 NYLON 1,8 / 4,2 % / 20 KGF. NO TENSION LOSS



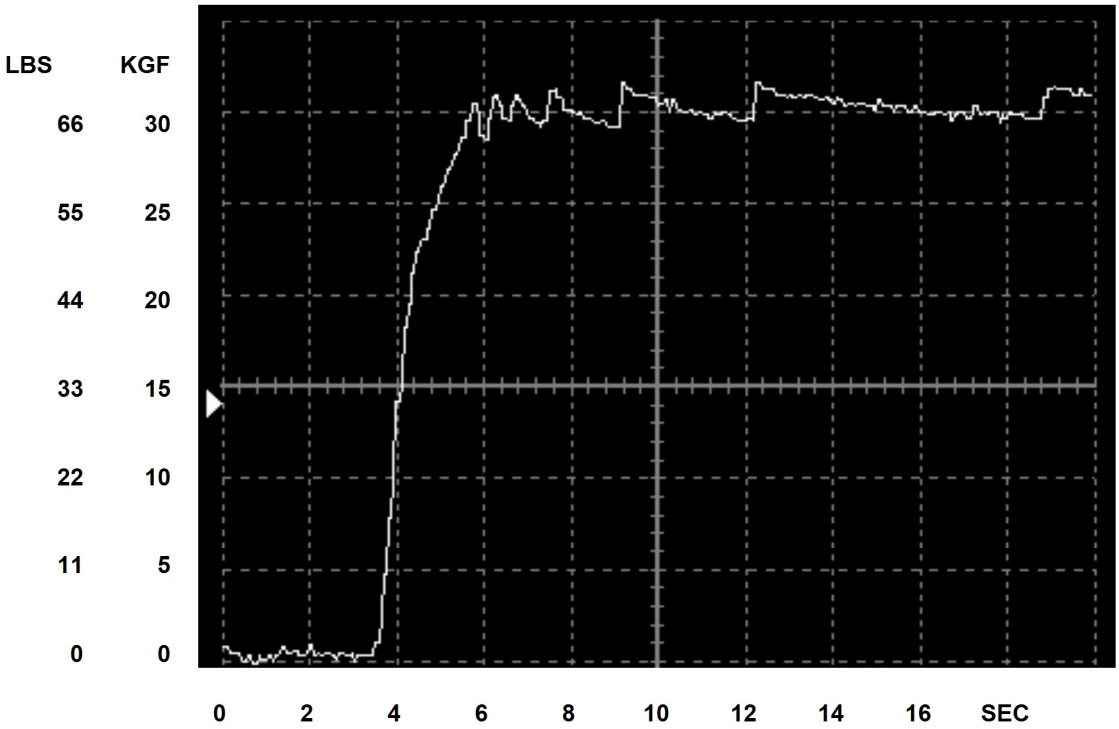

MS150 MONOFIL. 1,0 / 6,0 % / 20 KGF. NO TENSION LOSS

## "SMART-WEIGHT" DROPWEIGHT-TENSIONER




MS150 MONOFIL. 1,1 / 8,4 % / 20 KGF. NO TENSION LOSS

## HIGH END ELECTRONIC TENSIONER




EM450 MONOFIL. 1,0 / 6,0 % / 20 KGF. LOSS OF TENSION +1,5 - -0,5

# **OVERPULL CAN KILL THE STRING**.

>> THE GRAPHS SHOW THAT A LOCK OUT MACHINE NEEDS UP TO 15 LBS EXTRA TENSION TO ACHIEVE THE SAME STRINGBED STIFFNESS.

>> THIS MEANS THAT ALL THE ELONGATION AT THIS HIGHER TENSION IS PULLED OUT OF THE STRING.

***THE STRING IS ACTUALLY ALWAYS PRESTRETCHED!***

>> PLAYABILITY OF THE STRING IS DAMAGED!

# THE RIGHT STIFFNESS FOR EVERY PLAYER.

THE STIFFNESS IS DIFFERENT FOR EVERY TYPE OF PLAYER: .

## LOWER STIFFNESS OFFERS:

- EASIER BALL ACCELLERATION.

- LONGER BALL CONTACT >> MORE COMFORT.

- MORE MOVEMENT OF THE STRINGS IN THE STRINGBED.
>> Shorter string life.

- MORE USE OF THE ELONGATION QUALITIES OF THE STRING.

- MORE VIBRATION OF THE STRINGBED.
(Use a vibration damper)

## HIGHER STIFFNESS OFFERS:

- MORE CONTROL ON THE SPEED OF THE BALL.

- LONGER STRING LIFE WITH SPIN PLAY.

- LESS VIBRATION OF THE STRINGBED.

## HOW TO FIND OUT THE RIGHT STIFFNESS FOR A PLAYER?

ASK HIM OR HER A NUMBER OF QUESTIONS.

**>>>>>> SW ROUTEMAP.**

# THE STRING AND THE STRING-BED STIFFNESS.

## * THE STIFFNESS OF THE STRING BED MUST BE ADJUSTED AT THE ELONGATION OF THE STRING:

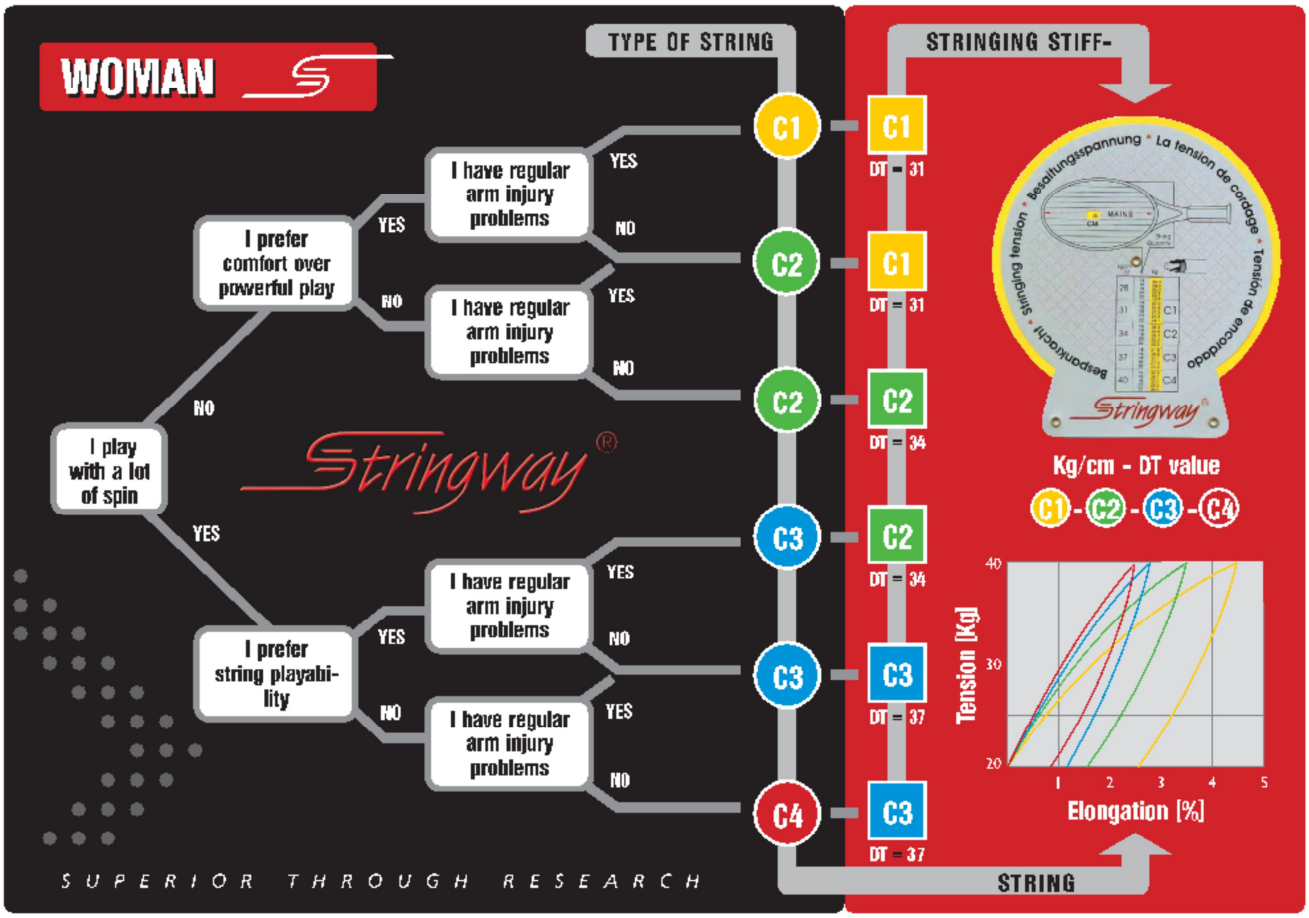
- A „COMFORT-STRING“ (more elongation) should be strung at a LOWER TENSION so that the stretch qualities of the string are used more.

- A ‚SPIN-STRING“ (stiff string) should be strung at HIGHER TENSION, for maximum string life and maximum control on the speed of the ball.

TO ACHIEVE THIS:

**THE STRINGS AND THE STRINGBED STIFFNESS CAN BE CLASSIFIED IN 4 CLASSES.**

THE ROUTE MAP SHOWS THE CHOICE OF THE STIFFNESS AND THE STRING.



# THE STIFFNESS AND THE STRINGING TENSIONS.

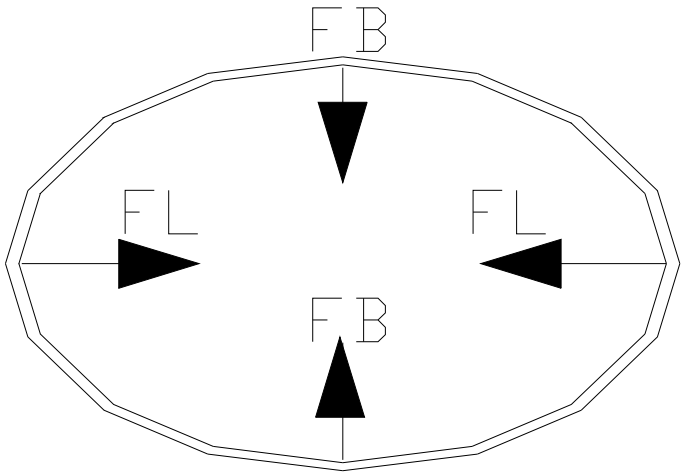
THE COMBINATION OF TENSION FOR MAIN- AND CROSS STRINGS MUST MEET 2 DEMANDS:

1. **THE STRESS IN THE MATERIAL OF THE RACQUET MUST BE MINIMAL.**

**2.THE STRINGBED STIFFNESS MUST BE RIGHT FOR THE CUSTOMER.**

## THE STRINGING TENSIONS AND THE BENDING OF THE RACQUET.

THE TENSIONS OF THE MAINSTRINGS WILL MAKE THE STRINGAREA SHORTER AND WIDER.
THE TENSIONS OF THE CROSS STRINGS MUST UNDO THIS CHANGE OF SHAPE.




THE DIFFERENCE IN TENSION FOR MAIN- AND CROSS STRINGS DEPENDS ON:

*** THE LENGTH AND THE WIDTH OF THE STRING AREA.**
The larger the length of the string area in relation to the width, the larger the difference in tension.

*** THE NUMBER OF MAIN- AND CROSS STRINGS.**
The more cross strings the lower the tension on the crosses that is needed to undo the widening of the frame.

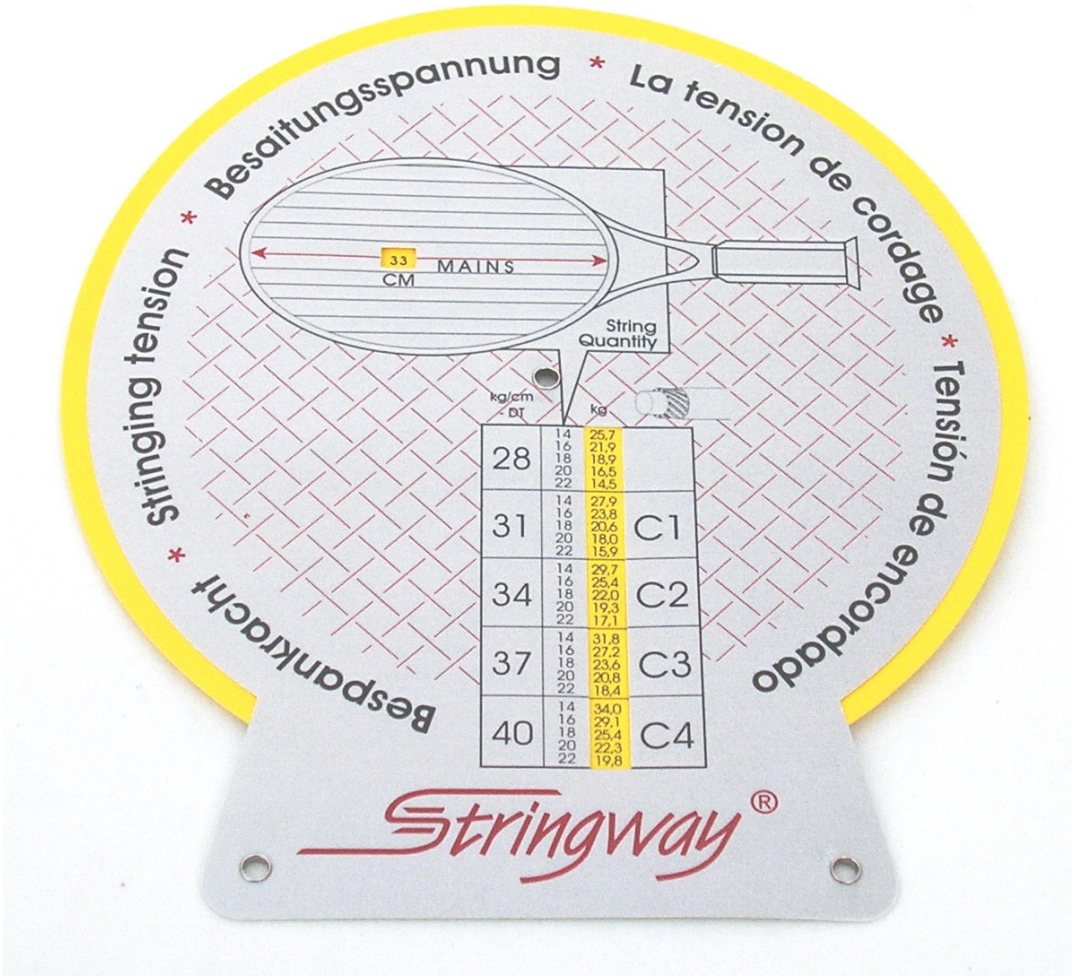
# THE RELATION BETWEEN STRINGING TENSION AND STRINGBED-STIFFNESS:

FOR **THE SAME TENSION** THE STIFFNESS DEPENDS UPON:

* HIGHER STIFFNESS WITH HIGHER STRING DENSITY
(smaller pitch between the strings)
With more strings a lower tension is needed for the same stiffness.

* LOWER STIFFNESS FOR LARGER STRINGAREA.
Lower tensions are needed for the same stiffness when the string area is bigger.

## THE „TENSION ADVISOR“ CAN BE USED TO CALCULATE THE CORRECT TENSIONS



# THE „TENSION ADVISOR“ CALCULATES:

* THE STRINGING TENSIONS FOR MAIN- AND CROSS STRINGS.

- FOR 5 DIFFERENT STIFFNESS CLASSES.
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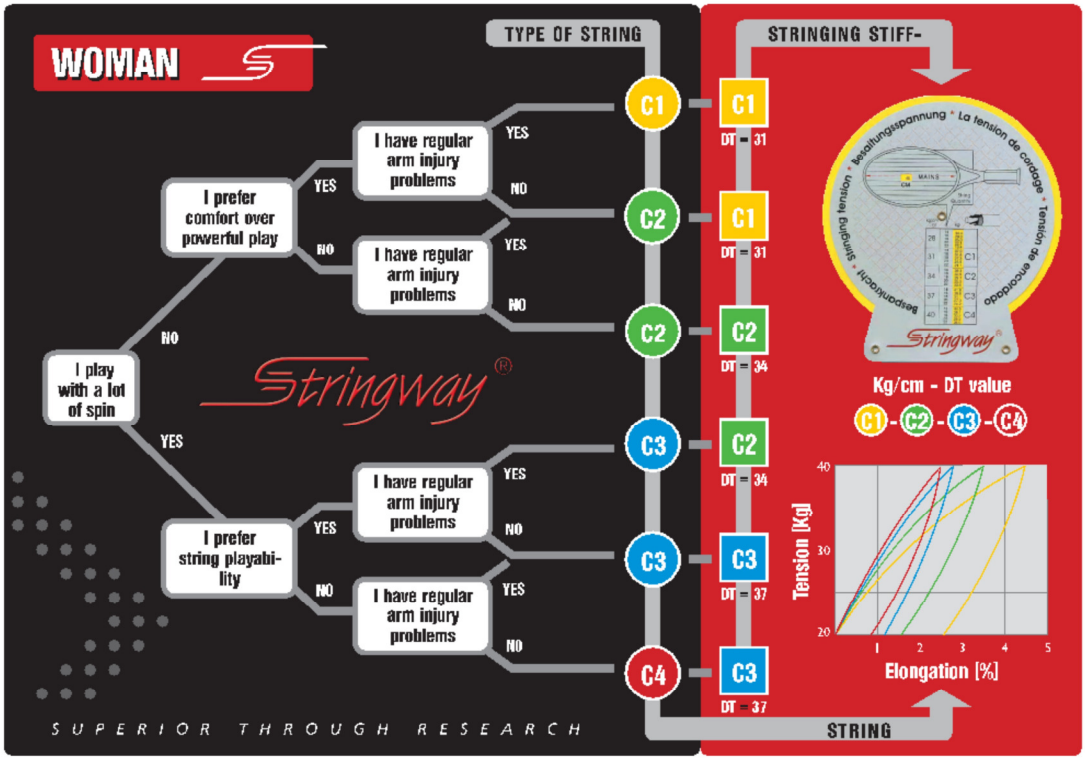
**INDEPENDENT OF THE BRAND OF THE RACQUET!**

## FOR EXAMPLE:

LENGTH 34 CM – WIDTH 24 CM

NUMBER OF MAINSTRINGS: 16
NUMBER OF CROSS STRINGS: 19

FOR A LADY WITH AN ARMINJURY:




STRING C3 STIFFNESS C1

FL = 24.8 KG FQ = 21.8 KG

## CHECKING THE RESULT:

IT IS EASY TO CHECK THE RESULT:
THE LENGT AND THE WIDTH OF THE STRING AREA MUST BE THE SAME AS BEFORE STRINGING **WITHOUT THE STRINGS.**

## TO ADJUST THE STRINGING TENSIONS:

* WHEN THE WIDTH OF THE STRINGAREA HAS BECOME SMALLER:
>>> USE A LOWER TENSION ON THE CROSS STRINGS FOR THIS RACQUET, NEXT TIME.
* WHEN THE WIDTH OF THE STRING AREA HAS BECOME BIGGER:
>>> USE A HIGHER TENSION ON THE CROSS STRINGS NEXT TIME.

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## SPECIAL CASES;

## HYBRIDE STRINGING:

THE TESNIONS IN THE STRINGS ARE MAINTAINED BY THE ELASTIC ELONGATION OF THE STRINGS.
WHEN DIFFERENT STRINGS ARE USED FOR MAINS AND CROSSES, IT IS DIFFICULT TO CALCULATE THE RIGHT TENSIONS.

ONE CAN ONLY FIND THE RIGHT DIFFERENCE IN TENSIONS BY TRYING.

## ADVISE OF A RACQUET MANUFACTURER.

WHEN ONE WANTS TO USE THE ADVISE OF THE RACQUET MANUFACTURER, AND STILL GET THE RIGHT STIFFNESS THE FOLLOWING WAY CAN BE USED:
* User the calculated tensions fort the cross strings.
* Use the difference in tensions for mains and crosses as advised by the manufacturer.

## MONOFILAMENT STRINGS:

MANY MONOFILAMENT STRINGS LOOSE MORE TENSION THEN NYLON STRINGS.
IT CAN BE NECESSARY TO ADJUST THE CALCULATED TENSIONS.

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