CHECKING THE STRINGBED STIFFNESS OF BADMINTON RACQUETS.

Important for player,coach and stringer.

Big difference in stringing–result.

When 10 stringers string the same racquet at the same tension, the difference in result will be huge. The cause for this is that the stringing result depends on the quality of the stringer, of the machine and of the elongation figures of the string.

The player does not feel the stringing tension, this is only a setting on the stringing machine. The player feels the stringing-result or the Stringbed Stiffness (SBS) which is measured in kg/cm or DT value. Therefore it is better to “string on stiffness” instead of on tension.

The player can ask for a certain result, so that he can be sure that he gets the stringbed that he prefers.

The importance of checking the SBS.

Both for players and stringers it is important to check the stringbed stiffness;

For stringers counts, like for every craftsman, that they should check their product after finishing it. Such a check shows, if the string, the machine and the stringer himself are of good quality.

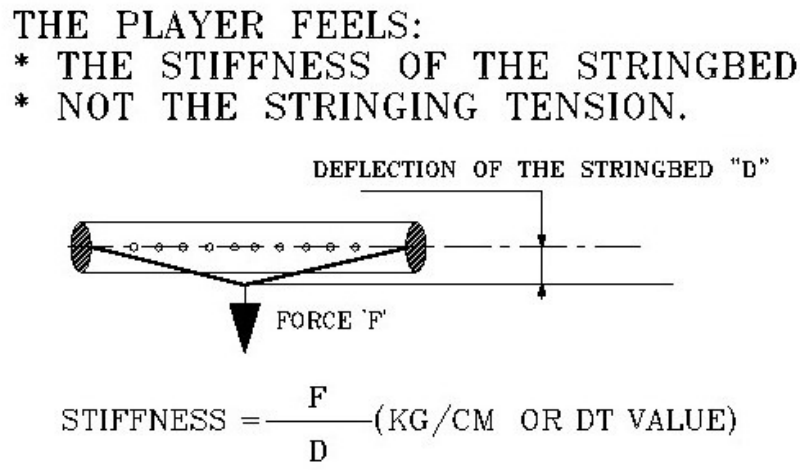
For players the SBS determines the playability of the stringbed in their racquet. Losing tension during play is caused by the remaining elongation in the string and this results in a change of playability of the racquet.

For badminton counts that the a higher SBS means more “speed” from the spring-back-effect of the shaft.

So if a player can check the SBS of his strings he can check the playability of the racquet.

Measuring the stringbed-stiffness.

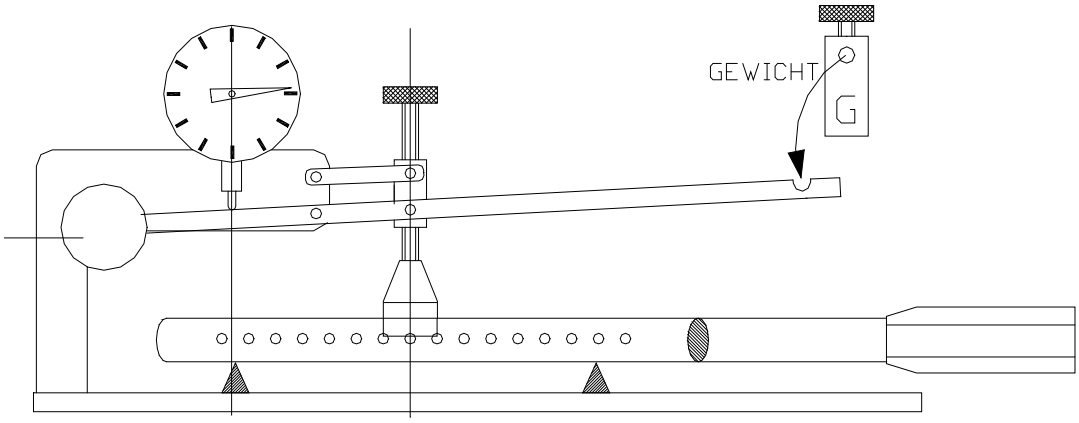
The stringbed stiffness is measured in kg/cm (=DT value), a sbs of 30 kg/cm means that 30 kg force is needed to deflect the stringbed 1 cm.



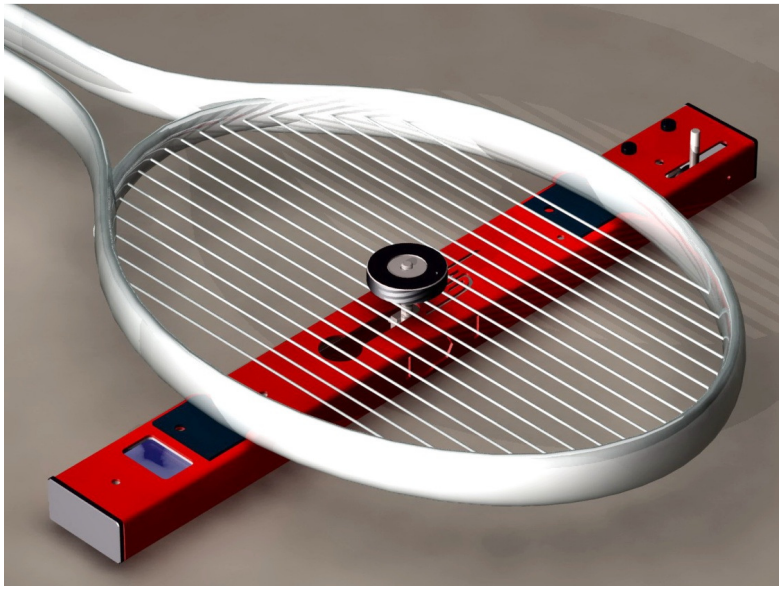
“Stiffness testers” are in use in the tennis world for many years, and that is why more and more tennis stringers “string of stiffness” nowadays.

The picture shows the principle of a stiffness test; A certain force is applied to the string bed while the deflection is measured.

STATIC MEASUREMENT.



The Stringlab 2 works according to this principle, it is a follow up development of the Stringlab 1.



Stiffness testers like the ERT300 and Stringlab 1 work according to “frequency principle”, which makes them useless for badminton. These tools generate the natural frequency of the stringbed and calculate the SBS from that frequency.

Because the SBS of the stringbed in a badminton racquet is much higher than the stiffness of the shaft, the shaft will vibrate more than the string bed which makes it impossible to obtain a useful value for the string-bed-stiffness.

The influence of the string on the stiffness is huge.

On last year's stringing happening, 1 badminton stringers strung 5 racquets at the same tension with different strings.

The table shows the big difference in stiffness;

Racquet		String		Tension in kg			SBS [kg/cm]	
brand	type	Brand	type	Mains	crosses	Date	date	kg/cm
Yonex	Nanospeed 7000	Ashaway	MicroLegend XL	8,6	9,6	10-8-2012	11-8-2012	28
Victor	Brave Sword 09	Yonex	BG-65	8,6	9,6	25-11-2012	25-11-2012	20
YangYang	Nano Gold 8000	YangYang	NS 68	8,6	9,6	25-11-2012	25-11-2012	20
YangYang	Quantum Saber 7000	YangYang	Nano Platinum 66	8,6	9,6	24-11-2012	25-11-2012	27
YangYang	Quantum Saber 7001	Ashaway	Powergut 66	8,6	9,6	25-11-2012	25-11-2012	16

This means that the SBS can vary between 16 and 28 kg/cm while the stringing tension is the same.

Because the stringer and his machine were the same for all racquets the difference is the result of the difference in elongation character of the strings.

The player can feel this as a difference in playability of the strings, but in fact he feels the difference in string-bed-stiffness.

The cause of the big differences in stringing result lies in the different elongation figures of the strings.

2 properties of string elongation play an important part here:

* The "stretch-speed", i.o.w. how fast is the elongation in a string developed. In a "slow string" more time is needed before all the elongation has occurred.

A faster string will lose less tension than a slow string during stringing.

* The amount of elastic- and remaining- elongation in a string. The more remaining elongation in a string the more loss of tension will occur during play. More elastic elongation will result in a higher stiffness after stringing and less loss of tension during play.

The table shows the elongation figures of a number of badminton strings.

The table shows the difference in elastic and remaining elongation (8-15 kg) resulting a difference in Total elongation (=remaining + elastic).

"BADMINTON STRINGS							
					TOTAL ELONGATION		
	ELASTIC EL.		REMAINING EL.			STIFFNESS	
	[%]		[%]		[%]	EL INDEX	kg/%
	8-11kg	8-15 kg	8-11kg	8-15 kg	8-15 kg		8-11kg
Ashaway Micro leg XL	0,7	1,3	0,9	3,8	5,1	0,25	6,3
Ashaway Micro Power	0,9	1,7	0,6	3,1	4,8	0,35	6,67
Ashaway Zymax	0,7	1,4	0,5	1,8	3,2	0,44	8,3
Yang Yang NS 68	1,0	1,5	0,3	1,9	3,4	0,44	7,69
Yonex BG65	0,8	1,5	0,9	2,3	3,8	0,39	5,9
Yonex BG65 Tit	1,0	1,7	0,1	1,6	3,3	0,52	9,09
Yonex BG66UM	1,0	1,6	0,5	1,9	3,5	0,46	6,7
Yonex BG80	0,9	1,4	0,8	1,2	2,6	0,54	5,9
0							
Yang Yang Nanoplatinum 66	1,1	2,0	0,6	2,8	4,8	0,42	5,9
Victor VS 850 Nonotec	1,1	1,8	0,7	2,0	3,8	0,47	5,6
Ashaway Zymax 67	1,0	1,8	0,4	1,5	3,3	0,55	7,1
Ashaway Powergut 65	1,0	1,9	0,8	2,9	4,8	0,40	5,6
Ashaway Powergut 66	1,1	2,0	0,8	2,8	4,8	0,42	5,56
RSL TN 660	1,5	2,3	0,1	1,7	4,0	0,58	6,25

The influence of the stringer on the final stringbed stiffness.

A stringer has much influence on the end result.

A “golden rule” in the stringing World is “ *a fast stringer is a soft stringer”*.

* The faster the stringer clamps the string the shorter the time for the string to develop all the elongation. That is why a fast stringer with a slow string results in a low string-bed-stiffness.

* It is very important to straighten the cross strings while the tension unit (constant pull) is pulling. When the cross strings are straightened afterwards the SBS will go down.

* There are many stories about stringers who pull tension on more strings at the same time. This is a “crime” in the certified stringing World, because the extra friction around the corner will result in lower SBS.

* It is important to check the adjustment of the clamps. Hold the string behind the clamp so that you feel if the string slides when the tensioner releases the tension.

The influence of the machine on the stringbed stiffness.

A bad machine looses more tension than a good one. The tension unit has less influence than the clamps, bad clamps can loose many kilo's tension.

The accuracy of a tension unit depends strongly on the "constant pull accuracy", when it compensates for slow elongation of the string.

On many electronic machines the tension drops too much before a repull and it overshoots the adjusted tension because the pulling speed is too high.

Mechanical "constant pull" work more accurate than electronic cp.

The graphs show the pulling behavior of a high end electronic machine and a drop weigh CP machine.