



Spring Seminar of the Finnish Ski Service Club



Ski Service of the Italian National Team

**“Testing, ski selection, grinds,
manual structures”**



Agenda:



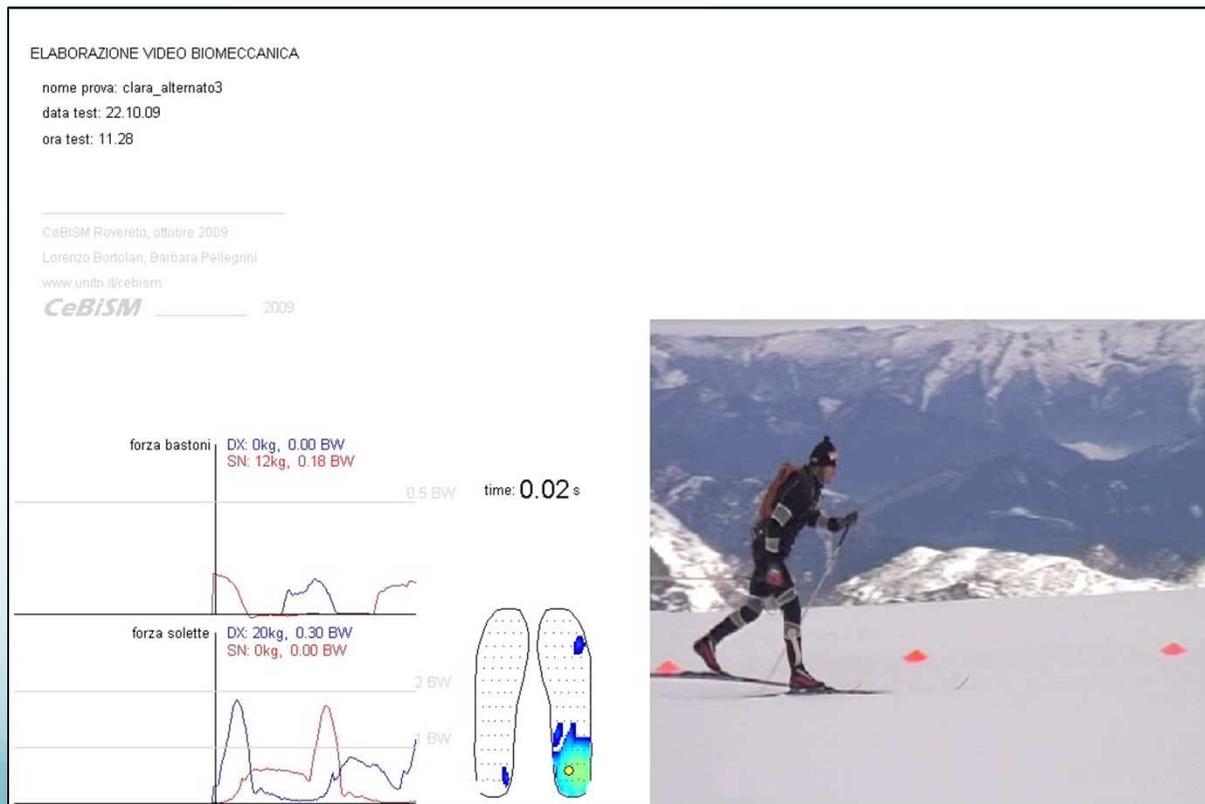
- Measurement of the ski;
- Ski selection;
- Grinds;
- Manual structures;
- Testing.



Ski Measurement



After many baro-podometric analysis, made on different athletes, we found that the maximal pressure point is placed 7 cm behind the half ski.

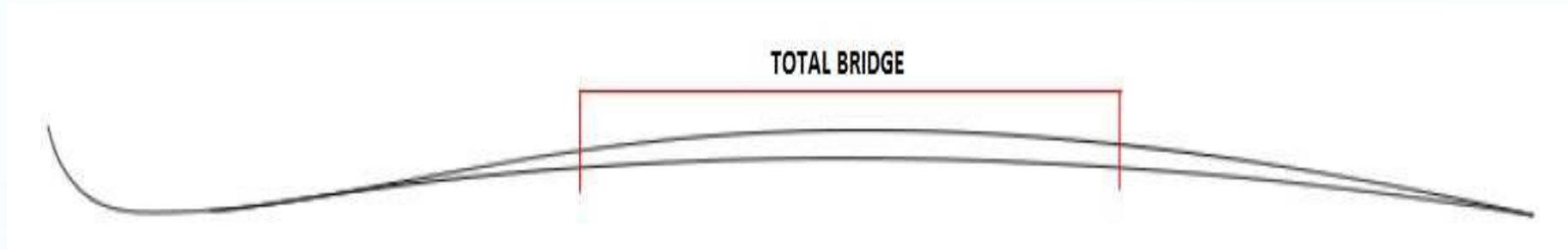


METHODS:

- *Static mode;*
- *Dynamic mode.*



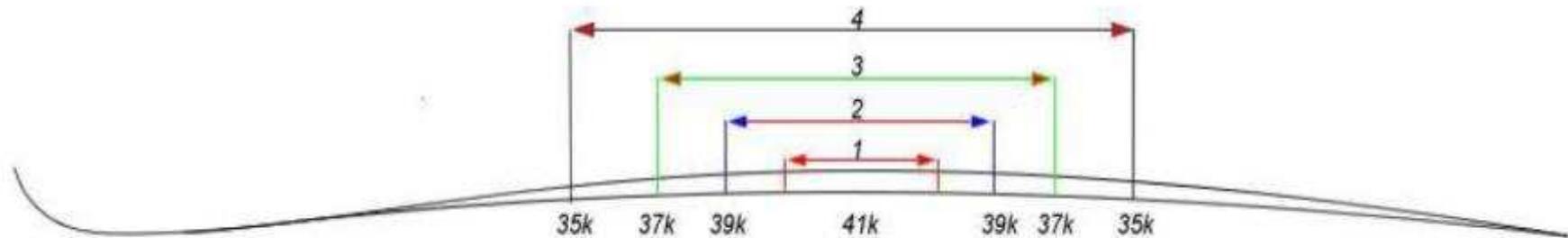
Static measurement



The CL (cell load - dynamometer) is placed 7 cm behind the half ski. With HBW (half body weight) and a 0,1 mm thickness we mark the extreme points of the bridge and its total length. Increasing the pressure on the CL we find also the measure of the total flattening.



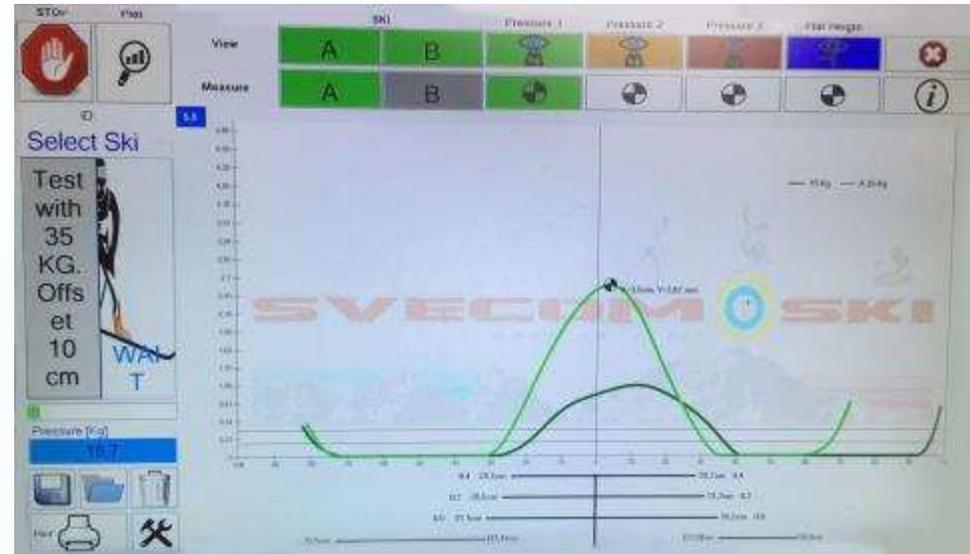
Dynamic measurement



The first part of the measurement is the same of the static method. After that we use a 0,4 mm thickness (like about a kick wax layer) and increasing by 2 kg the HBW every step, we mark all the kick wax areas until the total flattening and the highest part of the ski. We could have a lot of marks; so there's the possibility to remove some of those, keeping just maximum 4 relevant marks that would be use for the kick wax layers.



SVECOM Dynamometer



Professional dynamometer with laser scanner and load cells for the measurement of bending parameters and elasticity of the cross-country skiing. Dedicated software to determine the bending curve, the hardness and the length of the ski bridge and locate the waxing area by determining the amount of kick wax to apply.

HMI software with control of the laser position and actuator pressure of the bending of the ski simulator and curve chart of the area and the thickness of the waxing sealing.



Skis selection and data collection



The data that are detected with the measurement of the skis refer to the hardness of the ski, to the length of the front, the rear and the total bridge, and the load of flattening. In the photo below a screen shot of the storage of data on skis software.

ITA		
Cod.	A	Base / Costr.
8		28 610
Durezza / ponte / Kg		
2,2	46/30	87
Atleta		
MACOR E.		
Impronta		
F3V		
Factory:	2,1	89

The screenshot shows a software interface for ski data collection. It features a menu bar with 'File' and 'Gare'. Below the menu bar, there are dropdown menus for 'Atleta' and 'Utilizzo' (set to 'Tutto'). The main area is divided into several sections:

- Dati Generali:** Includes a 'Marca sci' dropdown, 'N. Matricola', 'Lunghezza', 'Costruzione', and 'Base' input fields.
- Parametri Primari:** Includes 'Altezza mm', 'Ponte Anter. cm', 'Ponte Post. cm', 'Ponte Totale cm', and 'Appiattimento Kg' with 'A' and 'B' options and ski shape diagrams.
- Parametri Fabbrica:** Includes 'Altezza mm' and 'Appiattimento Kg' with 'A' and 'B' options and ski shape diagrams.
- LAVORAZIONE IMPRONTE:** A vertical list of 10 input fields for ski impressions.
- Utilizzo su neve:** A dropdown menu at the bottom.
- Note:** A text input field at the bottom.

On the left side of the interface, there are tabs for 'CLASSICO' and 'SKATING', and a list of 'CODICE SCI' with a search bar.



Grinds



As previously shown (with the dynamometer) F.I.S.I has in action a special partnership with SVECOM for developing **design, stones, diamonds** and quality of the grinds, that are becoming more and more important.

Now in the F.I.S.I. laboratory further than the dynamometer there are 2 tuning machines: *Svecom World Cup Evo 140* and *Svecom World Cup 350*. Our collaboration provide to develop new kind of stones and diamonds.





Grinds – Contact angles



The two enlarged photo below show the contact angles between two different kind of snow and relative grinds for those conditions.

WET/FROZEN SNOW – 69,48° (F6.1)



COLD & DRY SNOW – 81,71° (F2.2)

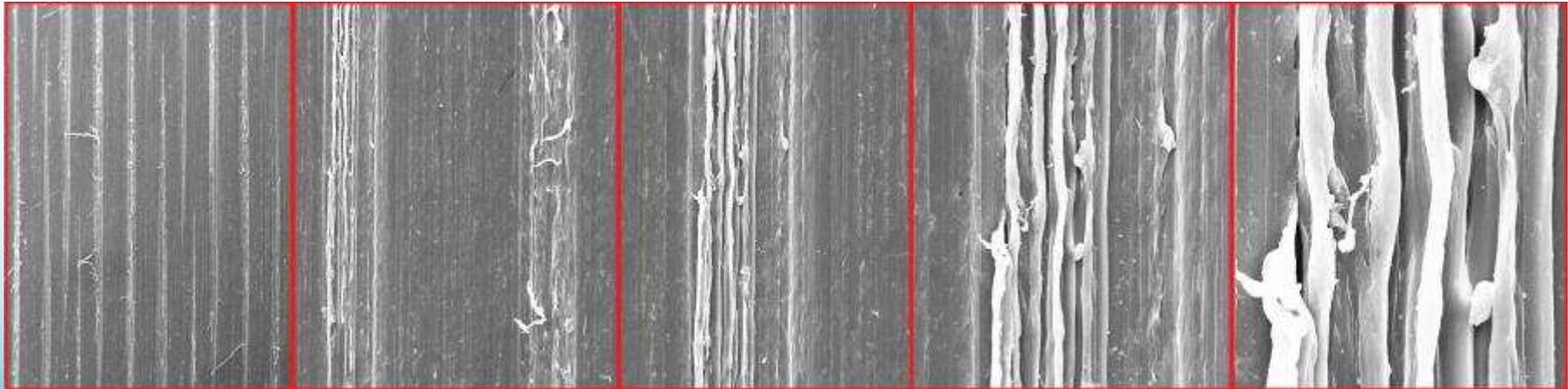




Grinds



In the image below is reported an enlarged photo shooting of a ski base from 50x to 2500x. The white color shows the deepest part of the structure.

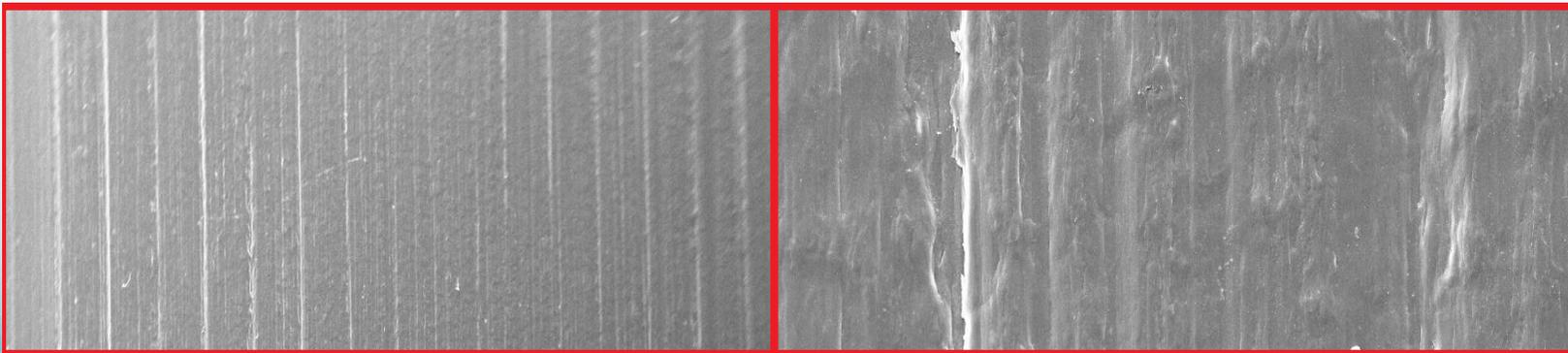




Grinds and overheating



Overheating is one of the most important problem of the base usury. It could be caused by snow, iron, cork and grinding machine. It's very important re-grinding the skis quite often. In the image below we report an enlarged photo shooting of an overheated ski base from 50x to 500x.





Manual structures



As the grinds etched in the machine, the manual structures are interfaced between the base of the ski and the snow, with the aim of ensuring (especially in particular conditions) a best smoothness.

The Italian experience on manual structures begins in the late 70s, when it was realized that the completely smooth skiing could create problems of smoothness. Thinking about the tires of the cars we thought to affect the soles of the skis with the edge of a lima (the incision was very approximate). During the Olympic Games in Lake Placid 1980, Swix enters the first manual striper on the market (nothing more than something which could control the lima during the working). The following years increasingly precise stripers were introduced, but always linear.

During the 80's in Italy the first mechanical machines for grinds with *Tazzari*, *Wintersteiger* and *Mantec/Svecom* (exclusive contract since 1998) were born. Manual structures weren't abandoned, in particular situations could make **skis more smoothly than skis with only machines grind.**

Now there are a variety of stripers manuals on the market with endless possibilities of combinations and of course the results.



Manual structures



The Italian experience on the machines grinds is very important and in continuous development. Our expertise show that the difference is granted by **stones** and **diamonds** (machine), but it's not left out the scoring manual in combination with machine grinds.

Nevertheless in addition to the type of striper we are going to use, we must also decide the **ski area** on which will be working (part or whole). Their etching, can occur several times during the working cycle of the skis, according to the type of line that we are going to use.

For example the deepest and straight lines are mainly carried out before waxing and, in the subsequent stages of the processing of the ski, the passage of the striper will have a mere function of "cleaning" of the rows previously etched.

The use of rotary stripers, or of those which provide a slight incision, is recommended at the end of the classic workings. Once the final ruling, we are going to clean the interested area with light brushes (brass and horsehair-nylon roto).

The stripers can have different forms and imparting different types of incision: from the more classic and known linear ones to the most recently evolved.



Testing - Zeroing



The "zeroing" is a primary element of importance to ensure in subsequent tests (choice of products, grinds, etc. ..) the most reliable data possible.

It can be performed both with **photocells** (stretches of min. 7"), both "**on feeling**" on sections of about one hundred meters, overall in cases where there are adverse weather conditions which make not possible to do a clear test with electronically devices (snow, wind, etc ..). A key aspect in the test realization is headed by the creation of initial conditions identical for all skiing, then you remember:

- choose a suitable stretch of track, with the snow as much as possible similar to the race track;
- do not put the skis under the sun or leave them in the bags;
- establish order and well-defined time tester;
- to ski about 500m with every pair or skis before testing.



Field Test



When we speak about tests, one of the key is to bring down the number of possible variables that may affect our results. Equally important it is to use clear and simple methods to describe the tests and archive them.

On the side our field test record card. Down here our “web storage system”.

FEDERAZIONE ITALIANA SPORT INVERNALI

Scheda TEST 2014/2015

Sez. FONDO

Squadra _____



DATA	
LOCALITA'	
QUOTA	
NOME GARA	
GG.ULTIMA NEVICATA	
KM PRIMA DEL TEST	

<input type="checkbox"/> TEST TARATURA
<input type="checkbox"/> TEST SCI
<input type="checkbox"/> TEST IMPRONTE
<input type="checkbox"/> TEST RIGHE
<input type="checkbox"/> TEST PARAFFINE - CERE
<input type="checkbox"/> TEST SCIOLINE DI TENUTA

ESECUZIONE TEST	
<input type="checkbox"/> In traccia	
<input type="checkbox"/> Fuori traccia	
<input type="checkbox"/> Entrambe	

	INIZIO	FINE
ORA		
TEMPERATURA ARIA		
TEMPERATURA NEVE		
HR % ARIA		
HR % NEVE		

GARA TEST
<input type="checkbox"/> GARA
<input type="checkbox"/> TEST

CONDIZIONI METEO		
<input type="checkbox"/> Sereno	<input type="checkbox"/> Parz. Coperto	<input type="checkbox"/> Neve
<input type="checkbox"/> Soleggiato	<input type="checkbox"/> Vento	<input type="checkbox"/>
<input type="checkbox"/> Velato	<input type="checkbox"/> Nebbia	<input type="checkbox"/>
<input type="checkbox"/> Coperto	<input type="checkbox"/> Pioggia	<input type="checkbox"/>

TIPOLOGIA NEVE
<input type="checkbox"/> Naturale
<input type="checkbox"/> Artificiale
<input type="checkbox"/> Cadente
<input type="checkbox"/> Nuova
<input type="checkbox"/> Parz. Trasformata
<input type="checkbox"/> Trasformata
<input type="checkbox"/>
<input type="checkbox"/>

PARAMETRI ASPETTO
<input type="checkbox"/> Farinosa
<input type="checkbox"/> Lucida
<input type="checkbox"/> Granulosa
<input type="checkbox"/> Ghiacciata
<input type="checkbox"/> Ventata
<input type="checkbox"/> Sporca
<input type="checkbox"/> Marcia
<input type="checkbox"/>

PARAMETRI COMPATTEZZA
<input type="checkbox"/> Compatta
<input type="checkbox"/> Parz. Compatta
<input type="checkbox"/> Non Compatta
<input type="checkbox"/>
<input type="checkbox"/>
<input type="checkbox"/>
<input type="checkbox"/>

PARAMETRI UMIDITA'
<input type="checkbox"/> Asciutta
<input type="checkbox"/> Poco umida
<input type="checkbox"/> Umida
<input type="checkbox"/> Bagnata
<input type="checkbox"/> Molto bagnata
<input type="checkbox"/>
<input type="checkbox"/>

PARAMETRI CRISTALLO
<input type="checkbox"/> Particelle di precip. +
<input type="checkbox"/> Particelle frammentate /
<input type="checkbox"/> Grani arrotondati ●
<input type="checkbox"/> Cristalli sfaccettati □
<input type="checkbox"/> Forme fuse ○
<input type="checkbox"/> Brina di superficie v
<input type="checkbox"/> Formaz. di ghiaccio ■
<input type="checkbox"/> Neve artificiale ⊙

Cod. Sci	Marca e tipo prodotto	TEST 1	TEST 2	TEST 3	TEST 4	TEST 5	TEST 6	Media tempi	Tarat. Sci	Tempi corr.	Scarto %

Cod. Sci	Primo Strato	T e n		S c o	Secondo Strato	T e n		S c o	Terzo Strato	T e n		S c o
		n	o			n	o			n	o	

Legenda: Ten = tenuta Sco = scorrevolezza I = Insufficiente S = Scarsa B = Buona O = Ottima

NOTE:

COMPILATORE:



Collecting tests



ELABORAZIONE SKI WAX

TEST/GARA di USER: GRUPPO:

DATA LOCALITA

NOME TEST

TEST PER (Basi - Cere - Finish) TEST / GARA Test Gara

TIPO / TECNICA TL Kms GENERE Maschile Femminile

PARTENZA Individuale Mass Start NOTE

QUOTA

SITUAZIONE NEVE - METEO

ORA DI EFFETTUAZIONE TEST Formato hh:mm METEO --> TENDENZA / VENTO --> -

TEMP. ARIA (C°) TEMP. NEVE (C°)

UMIDITA' ARIA % UMIDITA' NEVE %

ORIGINE TIPO

COMPATTEZZA ASPETTO farinosa lucida granulosa ghiacciata ventata vecchia sporca nericia

CRISTALLO UMIDITA'

SCORRIMENTO **TENUTA** **RIGATORI**

SB-BASI

Class	User	Rif. Sci	Valut. Sci	Base	Appl. Base	Base 1	Appl. Base 1	1° ST	Appl. 1° ST	2° ST	Appl. 2° ST	3° ST	Appl. 3° ST	4° ST	Appl. 4° ST	Impronta	Rigat.	Metodo	Nota
1	ski_fondo_b/fondo_a	2A	OTIMO	Matter Power Transformed*MasterWax	A Freddo														Fuori traccia
2	ski_fondo_b/fondo_a	3A		HP3 Yellow 2*Maplus	Ferro														Fuori traccia
3	ski_fondo_b/fondo_a	3B		HP3 Orange 1*Maplus	Ferro														Fuori traccia
4	ski_fondo_b/fondo_a	2B		HP3 Red*Maplus	Ferro														Fuori traccia

SC-CERE

Rif. SCI CLASSIFICA (1-migliore / 10-pessimo) USATO IN GARA VALUT.NE GARA

BASI

BASI APP. BASE BASE 1 APP. BASE 1

CERE

CERA APP.CERA CERA 1 APP. CERA 1

FINISH

FINISH APP. FINISH FINISH 1 APP. FINISH 1



Conclusions on ski testing



The result of a test is useful and reliable only if obtained through a well-defined **method**. The use of an incorrect method, or not properly applied is often due to serious errors of choice.

In order to avoid this, (and reduce variables, choose the stretch, maximum number of skis, etc ..) it is recalled to technics to:

- identify a "responsible" of the test that decides the stretch where test the skis, collect judgments and archives the results;
- choose a priority method to be used (photocell, feeling, etc);
- Estimate more precise as possible the test times, so as not having to run into wrong choices because of the rush;
- respect the order of the skis to be tested.



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Thanks for your attention!

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