

Technical challenges and methods in ski preparation in Nordic skiing: grinds, waxing, and base preparation

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Olympic project

4 years

Together 4 moths in the venue

7 visit

Special made container with the grinding machine and service goods was sent 2 moths before games

Around 200 test and 100 measurements

What is possible in Olympic ski service

Grinding of the ski base

Waxing of the ski

Tuning the ski with imprints

New skies, but normally skies are produced before the games!

Grinding machine



Imprint tools and structures



Testing in the race day

Testing starts about 3 hours before the race


Testing

- Test ski packs 4-8 pair each
- 3 – 5 test sets
- 1 – 3 additional small tests and confirmation

Test design is based on

- Testing in previous days
- Testing in previous years in same place and similar places
- Personal knowledge in the service team
- Forecasts and environmental measurements

Main challenges in testing reliability

- Variability of snow with in the race course
 - Variables in ski preparation
 - Variables in test skies
 - Variables in weather during the test (ex. Wind, temperature and snow formation)
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Average temperature in biathlon stadion

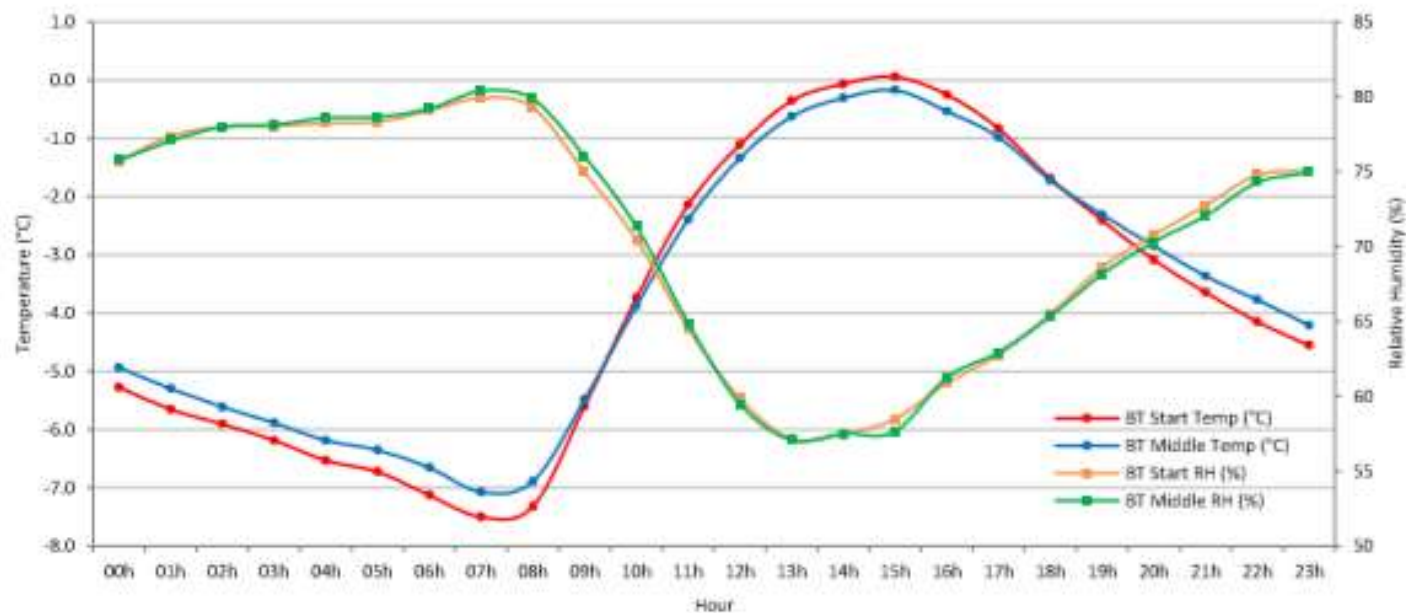


Figure 7. Hourly average temperatures and relative humidity at the Alpensia Biathlon Centre

Ski preparation challenges

Grinding

- Difference between grinding machines manufacturers
- Variability of the machines, stones and diamonds with in the manufacturer

Ski base

- State of the base
- Waxing and warming of the base changes the base characteristics
- Differences between ski manufacturers

Ski preparation

- Wide variety of the tools (ex. Brushes, scrapers)
- Variability in use of the tools between servicemen

Waxing and Toppings

- Lot of choices and no real information of the content of the products
- Raw product quality can change between production batches

Imprint tools

- Lot of choices and possibilities to combine
- Structures change over the time and skiing distance
- Can make ski worse!

Methods for better ski preparation in the Olympics

Control

- Grindings proses
- Servicemen working methods
- State of the ski base

Preparation for the worse

- Problems with tools and equipment
- Running out of products
- Power shortages

Ensuring all the possible things

Weather surveillance

Quality of Testing!

Supporting operations

Environmental knowledge

- Weather reports and Forecasts
 - Testing design and race tactics
 - What can be expected
- Local measurements
 - Humidity in Snow and air
 - Electrolyte analyses from melted snow
- Experience and testing in the competition venue
 - Final products, testing design and race tactics

Test pack formation

- Testing pack calibration made in Vuokatti

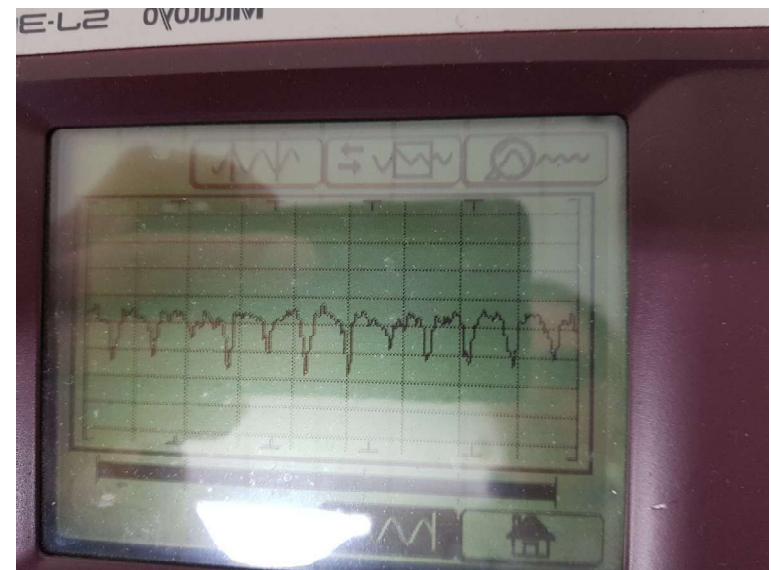
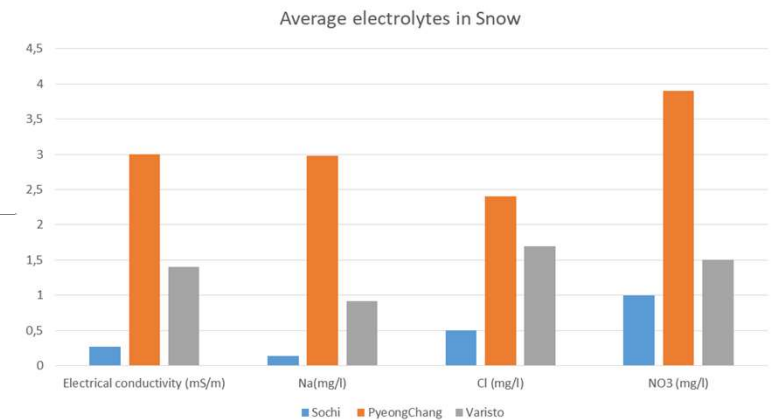
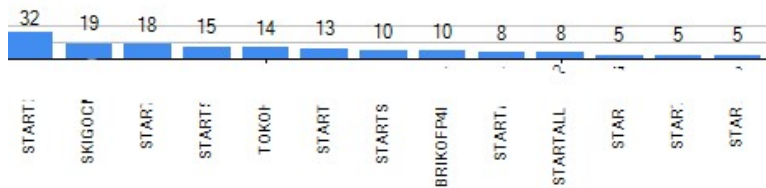
Base measurements

- Controlling the quality and the wear of the structures

Test library

- Common database and sharing of the test results to all service teams daily

Examples



After all it is about making right choices



Thank you!
