

# Skiers (sliding) on Snow

Teemu Lemmettylä, Master of Science, MSc in Sport Science

# Teemu Lemmettylä

co - employed project manager at Finnish Ski Association

- Bring the science to the practice
- Prepare our team to PyeongChang 2018
- Development of our service teams

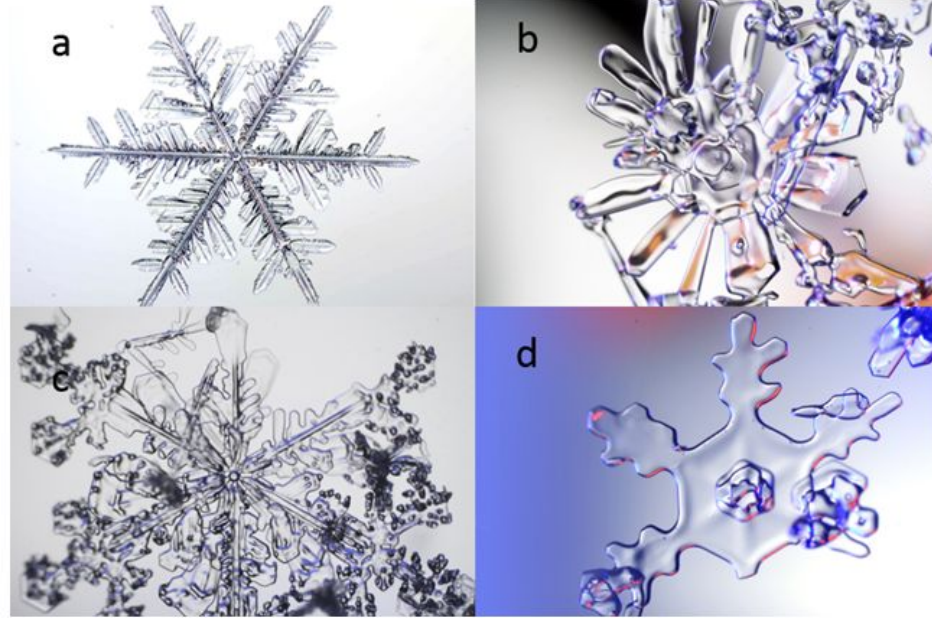
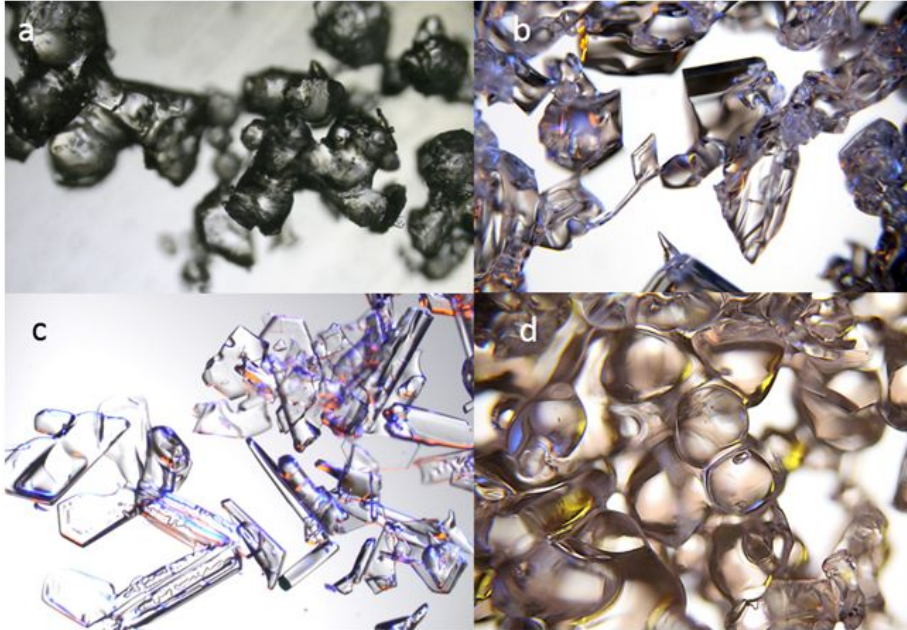


SUOMEN AMPUMAHIIHTOLIITTO  
FINNISH BIATHLON ASSOCIATION



Our biggest problem is that sometimes it's slippery  
and sometimes it's not ...

[https://youtu.be/mRbqLQ9c\\_AE?t=7s](https://youtu.be/mRbqLQ9c_AE?t=7s)



# What makes ski sliding

- Pressure distribution under the ski
- Touching surface to the snow
- Chemistry between ski surface and snow



# And what we can do

- Pressure distribution under the ski
  - Construction of the ski
  - Profile of the ski
  - Stiffness of the ski
- Touching surface to the snow
  - Base material of the ski
  - Grinding
  - Waxing
- Chemistry between ski surface and snow
  - Waxing





# And what we can do

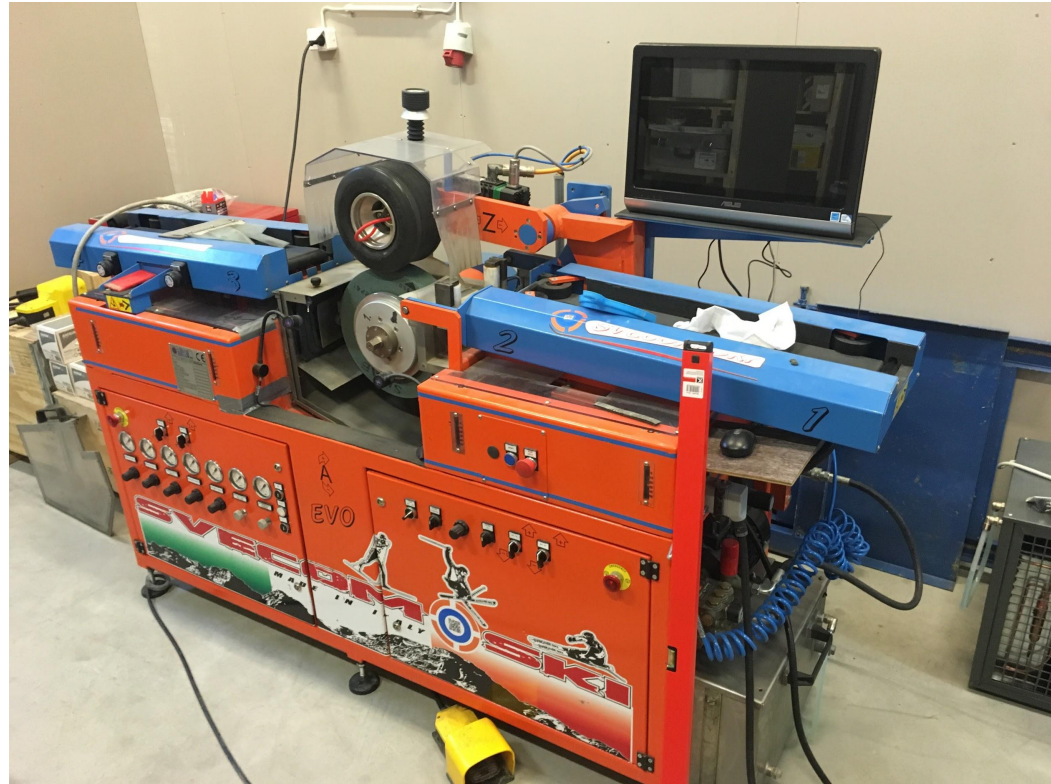
- Pressure distribution under the ski
  - Construction **of the ski**
  - Profile **of the ski**
  - Stiffness **of the ski**
- Touching surface to the snow
  - Base material **of the ski**
  - **Grinding**
  - **Waxing**
- Chemistry between ski surface and snow
  - **Waxing**

**Ski is the biggest thing in the glide  
(after the skier), but still we have  
trucks full of service man to make  
them even better...**



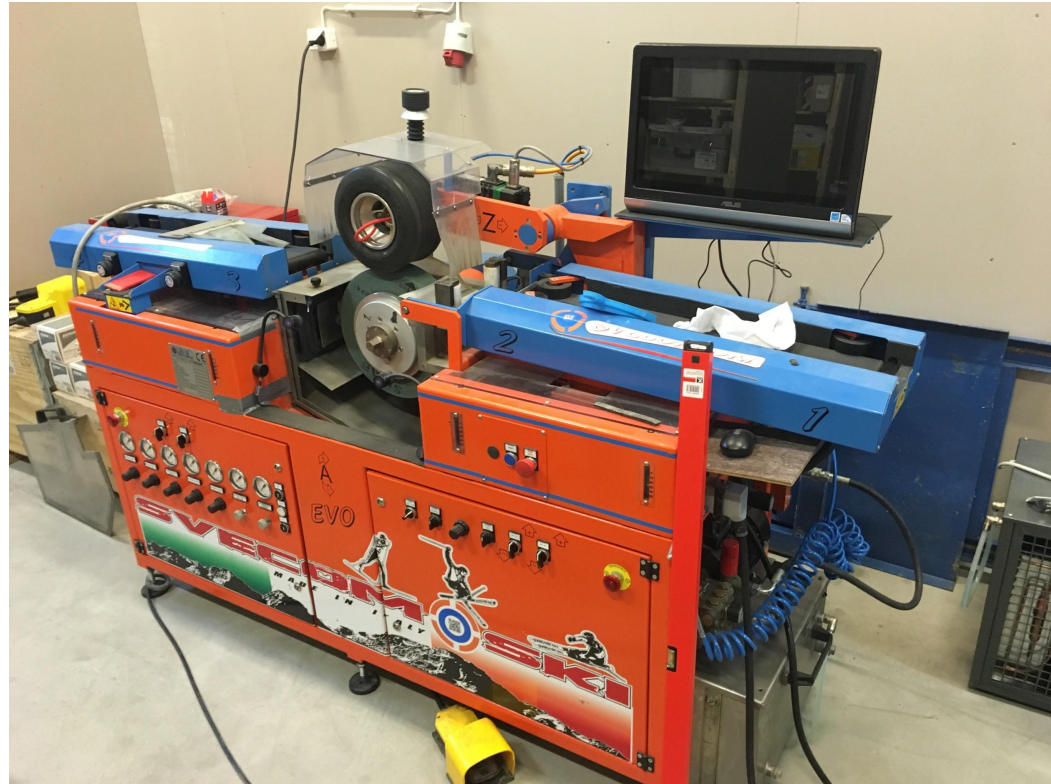
# Grinding with the machine?

- CNC machine cuts the grind to the stone
- Large amount of combinations



# Grinding with the machine?

- CNC machine cuts the grind to the stone
- Large amount of combinations
  - 4 x Stones
  - 6 x Diamonds
  - Endless combination patterns





# Waxing the base

- Tested wax with right hardness and fluor
- Adding the tested powder



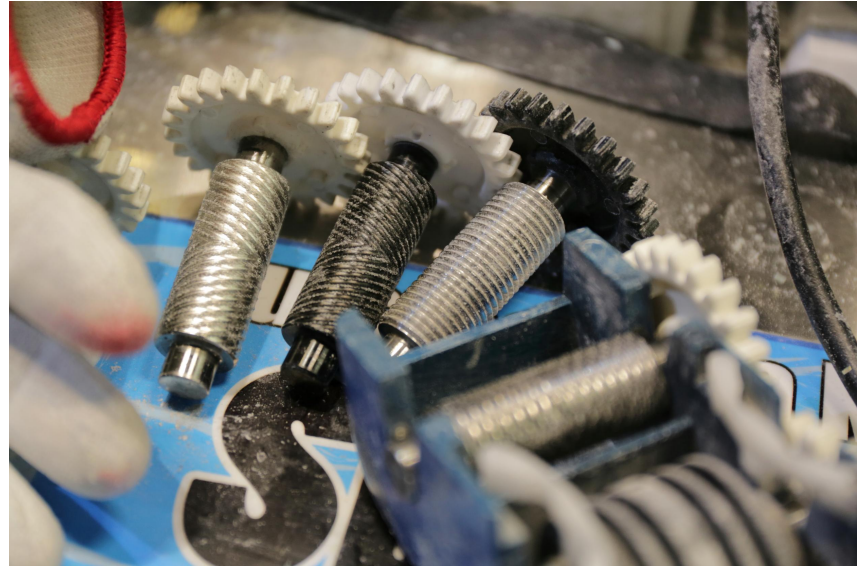
# Waxing the base

- Tested wax with right hardness and fluor
  - In our truck we have about 100 different wax products
- Adding the tested powder
  - 200 different powders



# Toppings and hand structures

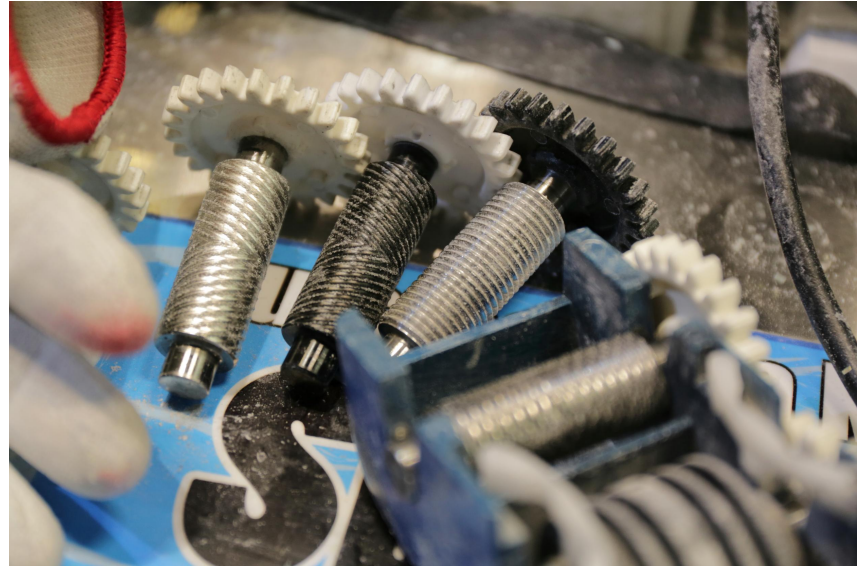
- Tested liquids and blocs
- Tested hand structure



# Toppings and hand structures

- Tested liquids and blocs
  - 50 different liquids and 50 different blocks in the truck
- Tested hand structure
  - About 100 different imprint tools

**Yes you can always mix :)**





# The calculation for Olympic start

## Possibilities (simplified)

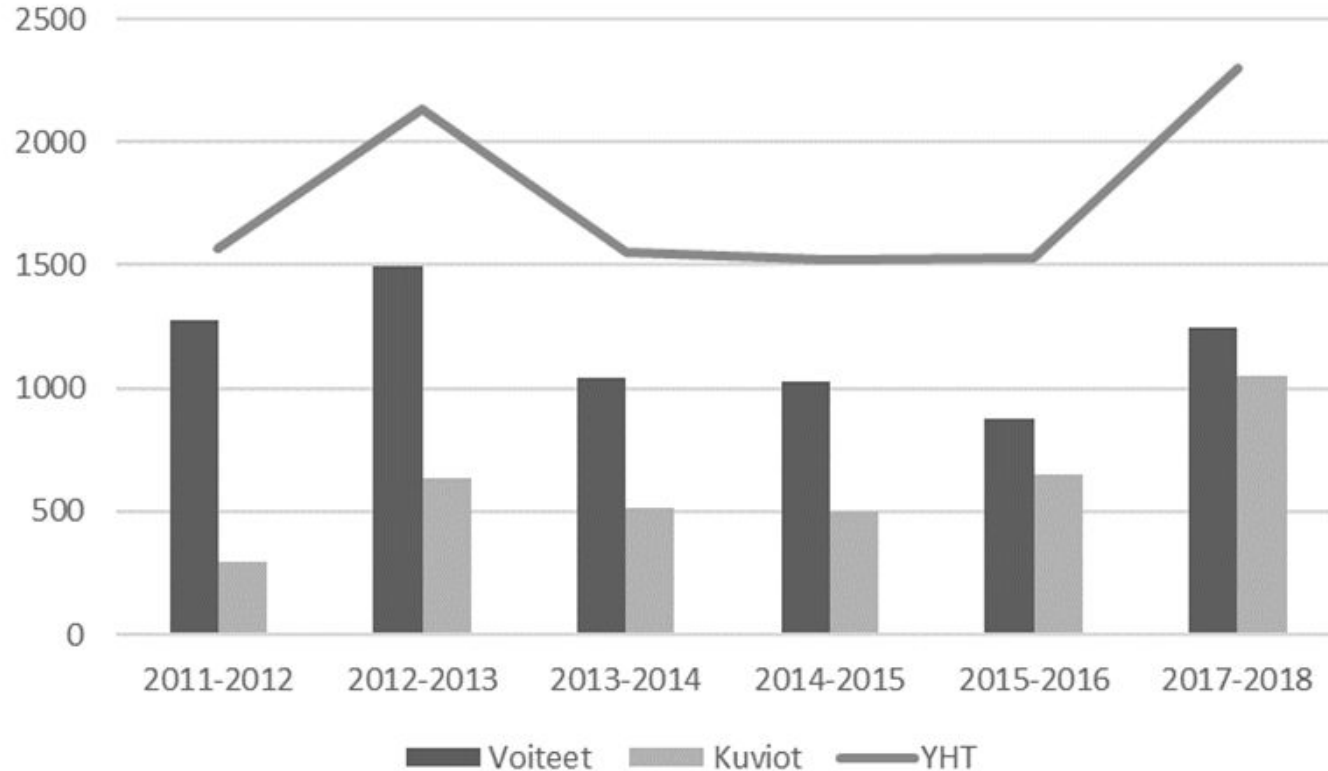
grinding + waxing + toppings =  $4 \times 6 \times 3 \times 5 \times 50 \times 100 \times 100 \times 100 = 18 \text{ billion}$

## Testing

grinding + waxing + toppings =  $16 \times 2 \times 4 \times 2 \times 14 \times 2 \times 8 \times 2 \times 8 = 917504$

**Knowledge is the key!**

After all... It is all about testing.



Thank you !

