LOWER LEG PROSTHESIS FOR NORDIC SKIING SKATE TECHNIQUE – FROM PROTOTYPE TO PRODUCTION

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3. The Swedish Sports Organization for the Disabled and The Swedish Paralympic Committee
16,000 students and 1,000 employees
OBJECTIVE

• Develop a lower leg Nordic skiing prosthesis for skate technique.
THE "NUCM VINTERIDROTT" PROJECT

"National Development Centre Mid Sweden – Winter sports for people with a disability"

- Availability and Facilities
- Education and Knowledge
- Equipment

Future: Sweden4all
Design Criteria

Brain-storming

Design data

Concepts

Sketches

FEM

Prototype

Field test
DESIGN CRITERIA

1) adjustable inversion-eversion angle of the ankle
2) restricted flexion-extension angle of the ankle
3) adjustable attachment of lower part
4) ordinary binding system (first Rottefella NNN, then Salomon SNS)
5) adjustable rotation angle
Design Criteria

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CONCEPTS

Software: SolidWorks
Design Criteria

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FEM CALCULATIONS

Model name: nedre dubbellänk version 3
Study name: Study 1
Plot type: Static modal stress Stress1
Deformation scale: 1

Software:
SolidWorks

Max: 22.0
Min: 2.0

von Mises (N/mm² (MPa))

Yield strength: 215.0
Design Criteria

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FREE-FORM FABRICATION

Objet Eden 260V

Arcam
TITANIUM PROTOTYPE
DESIGN CRITERIA, TI PROTOTYPE

1) adjustable inversion-eversion angle of the ankle
2) restricted flexion-extension angle of the ankle
3) adjustable attachment of lower part
4) ordinary binding system (Rottefella NNN)
5) adjustable rotation angle
6) low cost
7) rigid (athlete’s perception)
Sketches

Prototype II

Field test

Final product

Further development...

Manufacturing competence
DESIGN CRITERIA, TI PROTOTYPE

1) adjustable inversion-eversion angle of the ankle
2) restricted flexion-extension angle of the ankle
3) adjustable attachment of lower part
4) ordinary binding system (Rottefella NNN)
5) adjustable rotation angle
6) low cost
DESIGN CRITERIA, FINAL

1) adjustable inversion-eversion angle of the ankle
2) restricted flexion-extension angle of the ankle
3) adjustable attachment of lower part
4) ordinary binding system (Salomon SNS)
5) adjustable rotation angle
6) low cost
7) rigid (athlete’s perception)
FUTURE DEVELOPMENT

Make the product available to the market
Continuous improvements (construction, weight, cost)
Development of prosthesis for classical skiing
Adopt to skates and in-lines
Helene Ripa