

DTU SPECIAL COURSE (5–10 ECTS)

Reworking microstructure and materials to develop longer-lasting, more sustainable climbing holds

PROJECT OVERVIEW

In collaboration with the start-up Sisu Climbing and DTU, you will try to optimize polymer material properties and surface microstructures to shape the next-generation of climbing holds. The aim is to enhance wear resistance and improve recyclability.

BACKGROUND

- **Current industry practice:** For over 20 years, climbing holds have been produced from non-recyclable resin plastics whose surfaces wear quickly, generating significant waste.
- **Sustainability potential:** Redesigning microstructure can extend hold lifespan, reduce replacement frequency, and lower CO₂ emissions.

SISU CLIMBING'S INNOVATION

- **Customizable microstructures:** A novel manufacturing method allows precise control over surface textures in climbing holds.
- **Material flexibility:** Experiment with various polymers (e.g., polyurethane, polyester) and composites.
- **Industry partnership:** Sisu Climbing provides prototypes, technical support and maybe financial support for testing.

TASK OUTLINE

1. **Theoretical Review**
 - Study tribological interactions between skin/shoe rubber and polymer surfaces.
 - Compare wear behavior of different polymers and microstructure parameters.
2. **Hypothesis Generation**
 - Propose 1–3 microstructure + material combinations expected to outperform current designs.
3. **Test Rig Design**
 - Design and document an experimental setup for quantitative wear measurements (friction, wear depth, surface profiling).



4. Experimental Validation & Analysis

- Fabricate prototype holds and conduct wear tests against standard samples.
- Analyze results: statistical comparison of wear metrics and durability improvements.

LEARNING OBJECTIVES & FORMAT

- Apply advanced tribology and materials science concepts.
- Develop skills in experimental design, data processing, and statistical analysis.
- Present findings in a technical report and a final poster or conference paper.

SUPERVISION & COLLABORATION

- **DTU Supervisor:** Tobias Eifler and Yang Zhang
- **Industry Mentors:** Sebastian B. Nielsen SisU Climbing.
- **Resources:** Access to SisU Climbing's production.

ABOUT SISU CLIMBING

MISSION

Create authentic, highly durable climbing holds by mimicking natural rock microstructures.

STATUS

Prototypes in testing phase; preparing for sale and industrial-scale production.

CONTACT

Interested in advancing sustainable climbing technology? Reach out to **Sebastian B. Nielsen** at sebastian.barnsteingmail.com for project details and application instructions.

THE TEAM



IVAN B. MALLING

Latest send: Ferdinand 7A+ flash
(Kjuge)

8A flash on the kilter board

Digital graphic designer and 3d
designer

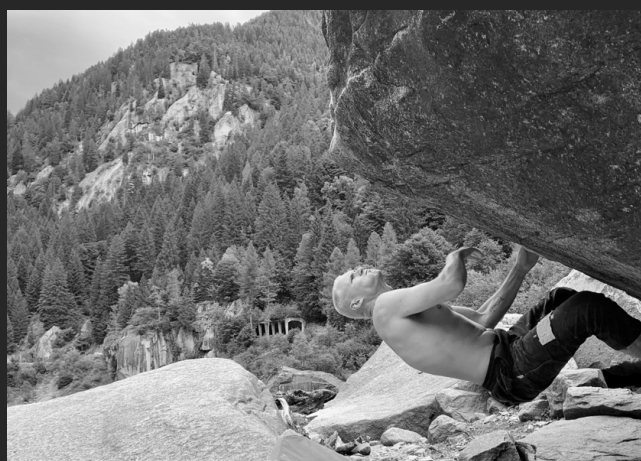
Co-Founder of PROSPER clothing

SEBASTIAN B. NIELSEN

Latest send: Festival 7A
(Bornholm)

Product innovator,
production and CEO

D&I Masters – DTU



DANIEL M. ROWOLD

Latest send: 8b in margalef

6x junior national champ

Marketing strategist and instagram

Co-Founder of PROSPER clothing

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