

Ski touring boots kinetic and kinematic data acquisitions for climbing and skiing analysis

N. Petrone^{1*}, G. Zullo¹, P. Cibin¹ & L. Bortolan²

¹Dept. of Industrial Engineering, University of Padova, Padova, Italy

²Dept. of Neurosciences, Biomedicine and Movement Sciences, University of Verona, Verona, Italy

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INTRODUCTION. Ski touring is rapidly gaining interest and increasing its pool of practisers thanks to a boost given by the recent pandemic and the closure of ski-lifts in many regions. Differently to alpine skiing, lightness of the gear is crucial since the practiser ascends the track without ski-lifts. Nevertheless, structural properties still need to ensure a safe and enjoyable skiing. Ski boot is one of the key components contributing to the overall performance of the system and its flexural stiffness in downhill has already been investigated in the past [1,2]. To guide industry towards an optimization of the ski boot structure also in uphill climbing, a complete measurement system was developed to collect ski boot loads and kinematics in uphill and downhill phases.

METHODS. Two six-axis load cells M3564F (Sunrise Instruments, China) were placed under front and rear Alpinist 12 (Marker) ski touring bindings with two pairs of additional aluminium plates. Total added weight of the load acquisition system was 0,52 kg/ski. Height added between ski and ski binding was 20 mm. To measure boot component angles in the sagittal plane, a Tecnica Zero G ski boot was equipped with three angular potentiometric sensors to collect the angle between: i) ski boot sole and the ski (in climbing), ii) boot shell and cuff, iii); boot shell and skier's tibia. Load and angle data were acquired with SoMat (HBM) data acquisition system fitted in a compact backpack. Right side climbing and skiing data of an agonist skier (age 26 y.o., weight 70 kg) was recorded in a mixed piste/off-piste terrain in Passo Rolle (TN, Italy) (Figure 1.a).

RESULTS. Figure 1.b reports uphill climbing total force and kinematics data of four cycles. Vertical GRF shows a typical gait shape with two local maxima of 662 N and 686 N respectively. Angular range of motion was of 60° for the ski/boot sole, 20° for the boot sole/cuff, and 17.5° for the boot sole/tibia.

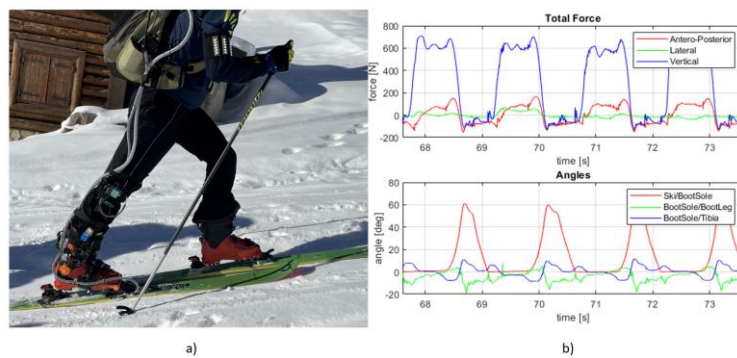


Figure 1 a) skier ascending the slope; b) uphill kinetic and kinematic data

DISCUSSION AND CONCLUSIONS. Results of in field test sessions will be analysed to generate data which will be used to feed a test bench designed for applying climbing and skiing loads to ski boots.

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