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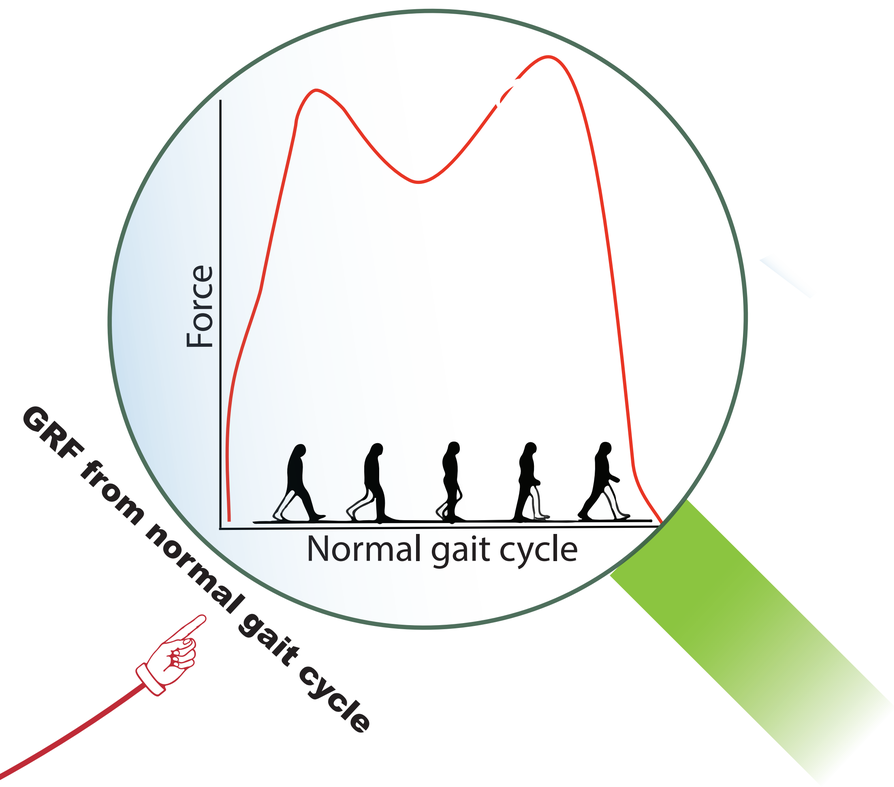
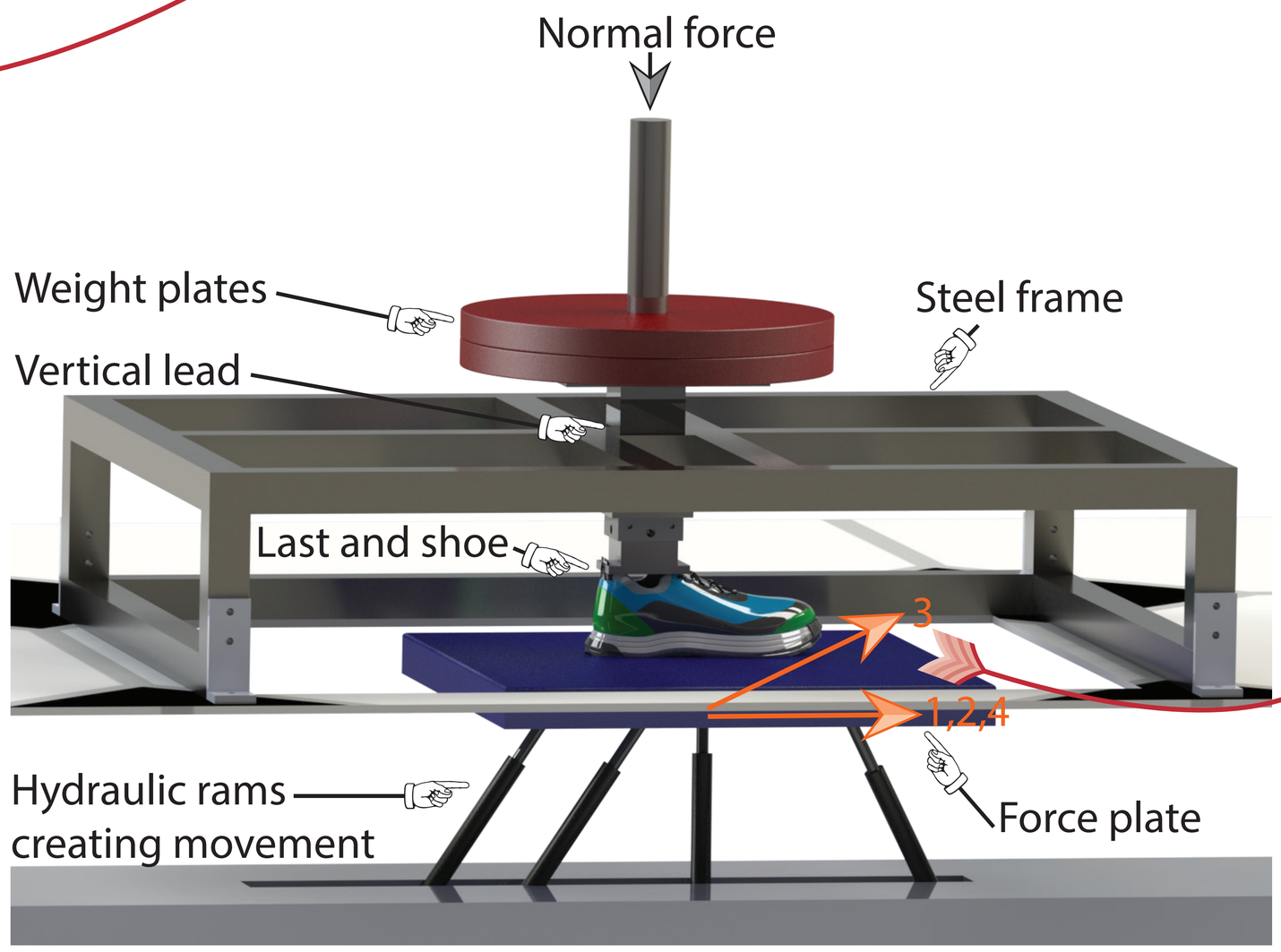
INTRODUCTION

The contact mechanism between shoe and surface is crucial in order to avoid slipping and falling [1], enhance sporting performance or minimize the risk of sport injuries [2]. However, studying this contact mechanism, between footwear and surface, is challenging and violates the traditional Amontons–Coulomb's law of friction, due to the viscoelastic outsole materials [3]. Hence, replicating the biomechanical test conditions are of great importance, when determining the friction properties of footwear [1]. The aim of this study is to present a test-setup able to replicate biomechanical relevant test conditions.

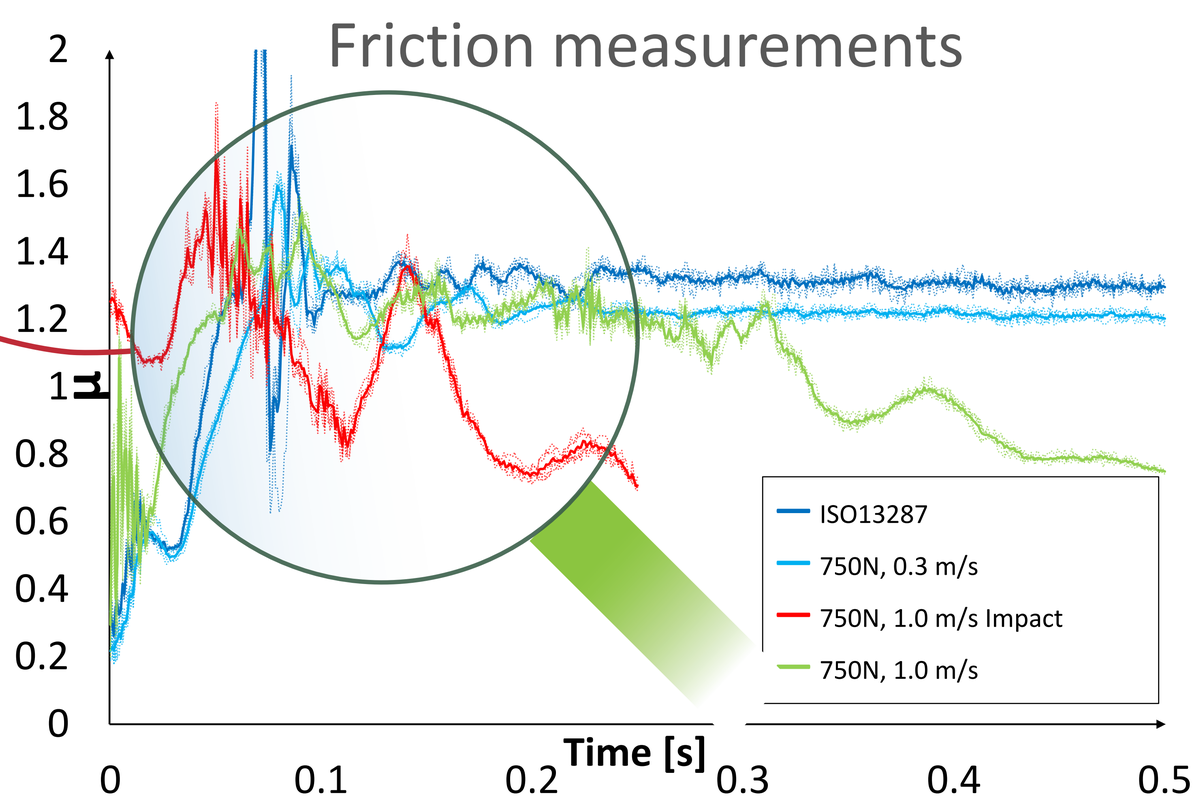


METHOD

The test-setup consisted of a steel frame designed to maintain the position of a shoe, mounted above a force plate . The force plate is attached on top of a hydraulic platform (Serman-Tipsmark, Brønderslev, Denmark), which makes it possible to move vertical and horizontal. Four different test conditions were performed: 1) Drag-test according to ISO 13287 (normal load (NL) 500 N, sliding velocity (SV) 0.3 m/s); 2) Drag-test (NL 750 N, SV 0.3 m/s); 3) Impacting, with the platform moving both horizontal and vertical (NL 750 N, SV 1.0 m/s), and 4) Drag-test (NL 750 N, SV 1.0 m/s). We recorded five trials for each condition.



RESULTS



CONCLUSION

This study presents a new test setup that can characterize the tribological behavior of shoe and surface in a traditional way, by following the traditional ISO 13287 standards, but more importantly also being able to add a novel impacting approach to the test of footwear, which is arguably more biomechanically relevant.

References

[1] Chang WR, et al. (2001), Ergonomics, 44: 1233-1261 [2] Frederick EC. (1993), ISBS-Conference, 11: 15-22 [3] Persson BN. (2001), J Chem Phys, 115: 3840-3861, 2001