# EliteVT

EliteVT combines an energy-storing-and-return prosthetic foot with a VT adaptor. It uses e-carbon foot springs to efficiently absorb energy during weight bearing and return it during off-loading, in order to aid propulsion. The C-shaped heel spring allows >10mm of vertical compliance for shock-absorption and maximises the energy return. The split toe spring, in combination with the separate heel spring, permits a tripod design for exceptional ground compliance. The VT element adds axial and torsional compliance, interface pressures and shear forces at the socket-residuum interface are reduced, protecting the skin of the residual limb and allowing the user to achieve an enhanced performance without fear of injury.

## Clinical Outcomes using e-carbon feet

Much research confirms the substantial equivalency of all energy-storing and return feet, including Blatchford e-carbon feet[1].

With respect to **SAFETY**

- High mean radius of curvature for Esprit-style e-carbon feet[2]: “The larger the radius of curvature, the more stable is the foot”

With respect to **MOBILITY**

- Allow variable running speeds[3]
- Increased self-selected walking speed[4]
- Elite-style e-carbon feet (L code VL5987) or VT units demonstrate the second highest mobility levels, behind only microprocessor feet[5]

With respect to **LOADING SYMMETRY**

- Users demonstrate confidence in prosthetic loading during high activity[6]
- Improved prosthetic push-off work compared to SACH feet[7]
- Increased prosthetic positive work done[4]

With respect to **USER SATISFACTION**

- High degree of user satisfaction, particularly with high activity users[8]

## Improvements in Clinical Outcomes using shock-absorbing pylon/torque absorber compared to rigid pylon

Improvement in **SAFETY**

- Reduced back pain during twisting movements e.g. golf swings[9]

Improvement in **MOBILITY**

- Reduced compensatory knee flexion at loading response[10]
- No reduction in step activity[11]
- Blatchford torsion adaptors match the able-bodied rotational range[12]

Improvement in **RESIDUAL LIMB HEALTH**

- Reduced loading rate on prosthetic limb[13], particularly at fast walking speeds[14]
- Users feel less pressure on their residual limb[15]

Improvement in **USER SATISFACTION**

- Patient preference, citing improved comfort, smoothness of gait and easier stairs descent[13]

**References**


16. Crimin A, McGarry A, Harris EJ, et al. The effect that energy storage and return feet have on the propulsion of the body: A pilot study. Proc Inst Mech Eng [H] 2014; 228: 908–915.
17. Curtze C, Hof AL, van Keeken HG, et al. Comparative roll-over analysis of prosthetic feet. J Biomech 2009; 42: 1746–1753.
18. Strike SC, Arcone D, Orendurff M. Running at submaximal speeds, the role of the intact and prosthetic limbs for trans-tibial amputees. Gait Posture 2018; 62: 327–332.
19. Ray SF, Wurdeman SR, Takahashi KZ. Prosthetic energy return during walking increases after 3 weeks of adaptation to a new device. J Neuroengineering Rehabil 2018; 15: 6.
20. Wurdeman SR, Stevens PM, Campbell JH. Mobility analysis of AmpuTees (MAAT 5): Impact of five common prosthetic ankle-foot categories for individuals with diabetic/dysvascular amputation. J Rehabil Assist Technol Eng 2019; 6: 2055668318820784.
21. Haber CK, Ritchie LJ, Strike SC. Dynamic elastic response prostheses alter approach angles and ground reaction forces but not leg stiffness during a start-stop task. Hum Mov Sci 2018; 58: 337–346.
22. Rock CG, Wurdeman SR, Stergiou N, Takahashi KZ. Stride-to-stride fluctuations in transtibial amputees are not affected by changes in push-off mechanics from using different prostheses. PloS one. 2018;13(10).
23. Highsmith MJ, Kahle JT, Miro RM, et al. Differences in Military Obstacle Course Performance Between Three Energy-Storing and Shock-Adapting Prosthetic Feet in High-Functioning Transtibial Amputees: A Double-Blind, Randomized Control Trial. Mil Med 2016; 181: 45–54.
24. Rogers JP, Strike SC, Wallace ES. The effect of prosthetic torsional stiffness on the golf swing kinematics of a left and a right-sided trans-tibial amputee. *Prosthet Orthot Int* 2004; 28: 121–131.
25. Berge JS, Czerniecki JM, Klute GK. Efficacy of shock-absorbing versus rigid pylons for impact reduction in transtibial amputees based on laboratory, field, and outcome metrics. *J Rehabil Res Dev* 2005; 42: 795.
26. Klute GK, Berge JS, Orendurff MS, et al. Prosthetic intervention effects on activity of lower-extremity amputees. *Arch Phys Med Rehabil* 2006; 87: 717–722.
27. Flick KC, Orendurff MS, Berge JS, et al. Comparison of human turning gait with the mechanical performance of lower limb prosthetic transverse rotation adapters. *Prosthet Orthot Int* 2005; 29: 73–81.
28. Gard SA, Konz RJ. The effect of a shock-absorbing pylon on the gait of persons with unilateral transtibial amputation. *J Rehabil Res Dev* 2003; 40: 109–124.

29. Boutwell E, Stine R, Gard S. Shock absorption during transtibial amputee gait: Does longitudinal prosthetic stiffness play a role? *Prosthet Orthot Int* 2017; 41: 178–185.

30. Adderson JA, Parker KE, Macleod DA, et al. Effect of a shock-absorbing pylon on transmission of heel strike forces during the gait of people with unilateral trans-tibial amputations: a pilot study. *Prosthet Orthot Int* 2007; 31: 384–393.