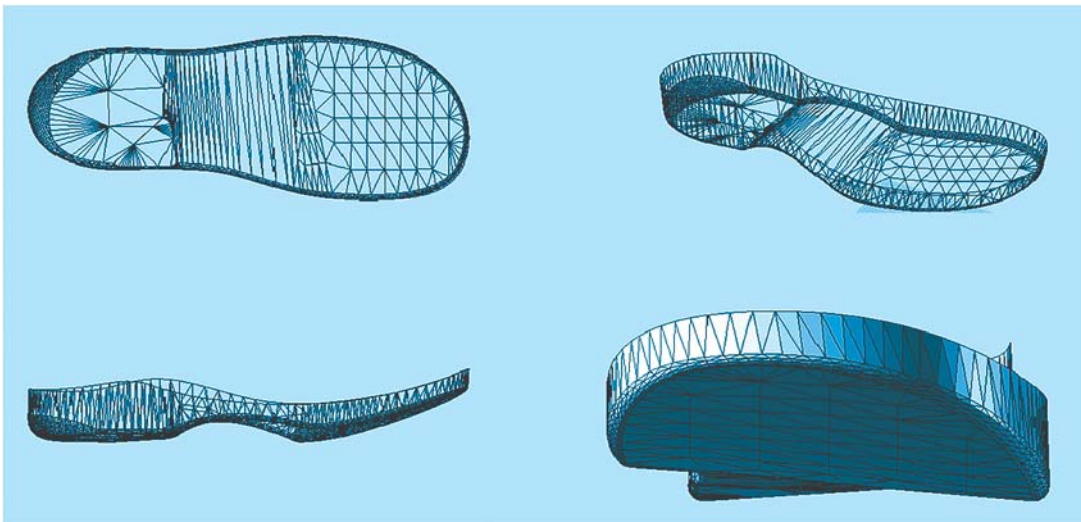


# ShearStep

*...a new concept in  
diabetic footwear*



from The  
**Langer**  
Group

## the problem

The International Diabetes Federation estimate that 285 million people worldwide currently have diabetes. The 2009 World Diabetes Congress put the number closer to 300 million. The International Diabetes Federation estimate that at the current rate of growth the numbers will exceed 435 million by 2030. IDF predicts that diabetes will cost the world economy at least US\$376 billion in 2010, or 11.6% of total world healthcare expenditure and is expected to exceed US\$490 billion by 2030.

Every thirty seconds a foot is lost to diabetic amputation. According to The International Consensus on the Diabetic foot, 85% of all diabetes related lower extremity amputations are preceded by a diabetic foot ulcer. There exists a strong relationship between the formation of plantar ulcers and the wearing of footwear considered inappropriate for the diabetic wearer.



## the solution

Shearstep Diabetic Shoe is a range of footwear for adults with type 2 Non-Insulin Dependant Diabetes Mellitus (N.I.D.D.M.).

The purpose of the footwear is to create an environment that minimises the risk of foot ulceration and reduces the incidence of re-ulceration. The function of the shoe is achieved by utilising methodologies from differing treatment modalities currently used in Diabetic foot care and incorporating their features into the design and construction of the shoe. It is believed that, if key features from different treatment methodologies can be successfully integrated into the design of footwear, the incidence of plantar ulceration will be significantly reduced.

The Unique tri-planar last profile intimately contacts the contours of the foot without the need for custom made total contact orthoses. The narrow profile mid foot secures the foot to the bed of the shoe reducing anterior/posterior movement of the foot.

The patented Langer rigid conical axis rocker utilises the different diameters and locations of the metatarsal heads to create a conical outsole profile. The conical axis profile inverts the fore foot during heel lift diverting high pressures away from the high risk areas of the 1st and 2nd metatarsal heads.

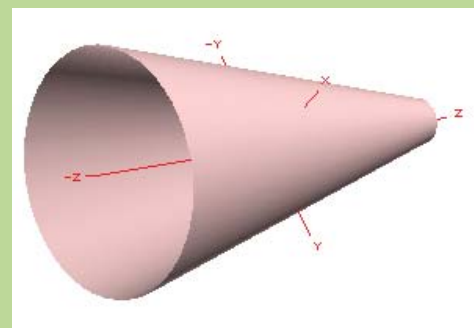


## the design

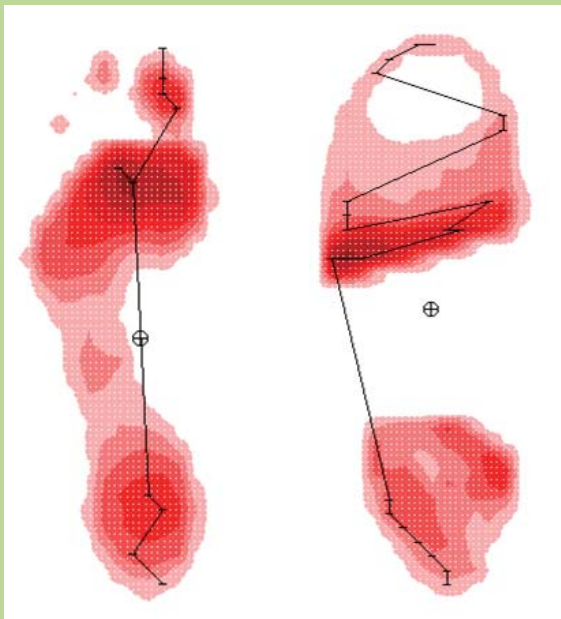
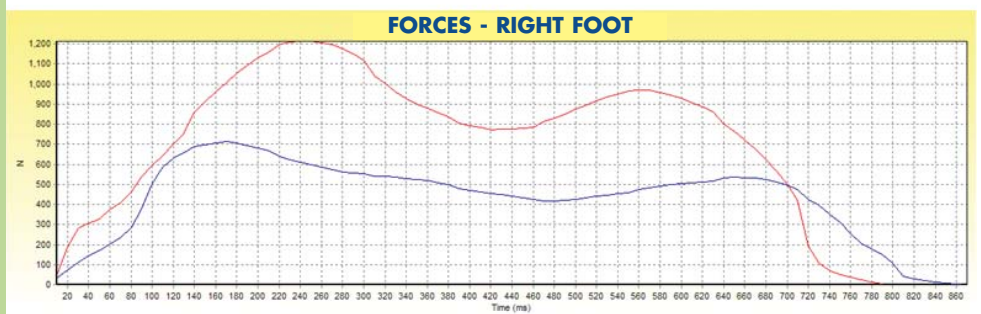
Shearstep Diabetic Shoe incorporates accepted five star biomechanical treatment modalities to reduce the risk of primary plantar ulceration and secondary re-ulceration. Shearstep Diabetic Shoe draws on the principles of a variety of treatment modalities and quantitative measures to reduce the biomechanical risk factors in ulcer development. The primary design features of the shoe are as follows:

- **Intimate total contact fit concept.**
- **Rigid Rocker Sole featuring the conical axis rocker concept.**
- **Tri-planar topographical out sole.**
- **Asymmetric heel profile.**
- **Laminated foam/Gel insole.**

The topography of the patented Langer rigid conical sole unit guides the foot through a complete contact step sequence beginning with Inversion at heel strike, neutral at loading response, 4 degree pronation at midstance, resupination at terminal stance phase.



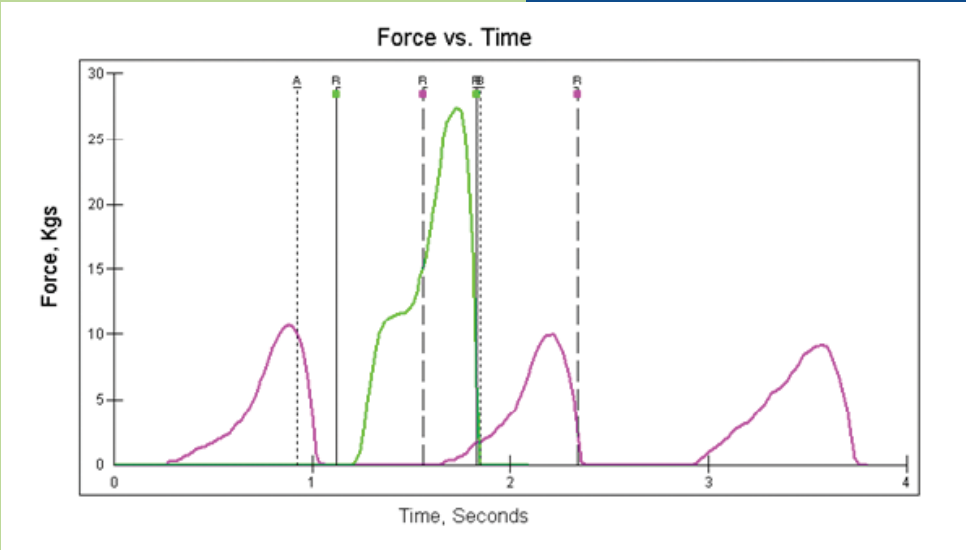
# the results



Vertical Forces  
**Red** - without Shoe  
**Blue** - with Shoe

Centre of Force Pathway  
 with and without shoe

Imp: 9.27 kg\*sec without shoe  
 Imp: 3.10 kg\*sec with shoe



# the benefits of the Shearstep Diabetic Shoe

- Restored step biomechanics
- Contoured internal profile
- Reduced ground reaction force
- Reduced pressure/time integral
- Modified centre of force pathway

## the references

Cavanagh. P. Therapeutic footwear for people with diabetes. *Diabetes/Metabolism* June 2004 vol. 20 sup1 pp 51 - 55

Boulton : Jude. Therapeutic Footwear in Diabetes: The good, the bad, and the ugly? *Diabetes Care*.2004; 27: 1832-1833.

Donaghue. V. et al Longitudinal in-shoe foot pressure relief achieved by specially designed footwear in high risk diabetic patients.: *Diabetes research and clinical practice* 31 1996 pp 109 -114

Jeffcoate et al Off-Loading in Trials in Neuropathic Diabetic Foot Ulceration: No, it's not time...*Diabetes Care*.2004; 27: 635-636.

OK Litzelman, OJ Marriott and F.Vinacor. The role of footwear in the prevention of foot lesions in patients with NIDDM, Conventional wisdom or evidence-based practice? *Diabetes Care*, Vol. 20, Issue 2 156-162,

Maciejewski et al Effectiveness of Diabetic Therapeutic Footwear in Preventing Reulceration. *Diabetes Care*.2004; 27: 1774-1782.

What causes high foot pressures in diabetes how can they be relieved? In Proceedings of the IDF Satellite Symposium on the Diabetic Foot, Washington 1991`Stephan F .E. Praet, and Jan-Willem K. Louwerens, The Influence of Shoe Design on Plantar Pressures in Neuropathic Feet.

Cavanagh. P. Ed in *The Foot in Diabetes: 4th Ed* 2004. Wiley ISBN 10 0-470-01504-7

Cavanagh. P Ed in *International Consensus on the Diabetic Foot 1999* ISBN 90-9012716-X

Foster. A. Edmonds. M. in *A Practical Manual of Diabetic Foot Care*. Blackwell Publishing 2004 ISBN 1-4051-0715-4

Root. M. et al *Normal and Abnormal Function of the Foot* 1976 Clinical Biomechanics Corp.

Foster. A. in *Podiatric Assessment and Management of the Diabetic Foot* 2006 Elsevier ISBN 0-443-10043-8

Higgins. R. *Properties of Engineering Materials* 1986Hodder and Stoughton ISBN 0-340-17909-0

Janisse. D. *Pedorthotic and Orthotic management of the Diabetic Foot and Ankle Clinics N. America* 11: 2006: 717-734

Chantelau.E. *Foot Dimensions of Elderly People with and without Diabetes Mellitus- data based on shoe design. Gerontology* 2002: 48: 241-244

Uccioli. L. *Manufactured Shoes in the Prevention of Diabetic Ulcers. Diabetes Care* 1995 18: 1376-1378

Maciejewski. M. et al Effectiveness of Diabetic Therapeutic Footwear in Preventing Ulceration. *Diabetes Care* 2004:27:1774- 1784

## contact

Langer UK Ltd  
Emerald Way  
Stone Business Park  
Stone  
Staffordshire  
ST15 0SR

[www.lbguk.com](http://www.lbguk.com)  
[sales@lbguk.com](mailto:sales@lbguk.com)  
Tel. 0845 6780182

The  
**Langer**  
Group