EVAN CALL² MS³ CSM (NRM); SANDRA GUZMAN⁴ PHD; RANDY JONES⁴ ME³ MBA; SUSAN JELLUM⁴ MSN³ RN³ CWOCN³ CHRN; CRAIG OBERG² PHD

¹EC SERVICE, CORP, ²WEBER STATE UNIVERSITY

INTRODUCTION

When a compression bandage is applied to the skin, the nature of the contact between the skin and the bandage is defined by the friction and the total contact area at a microscopic level. This relationship defines the ability of the bandage to stay in place, keep its shape and provide comfort as well as compress the tissue. Moreover, when applying a two-layer compression system, the friction between layers changes significantly when one or both of those layers are stretched. This influences the bandage compression, the consistency of pressure applied, and the patient compliance.

PURPOSE

In this study we calculated the work applied to the tissue by measuring the force-elongation of the individual layers of two compression systems in a bench test.

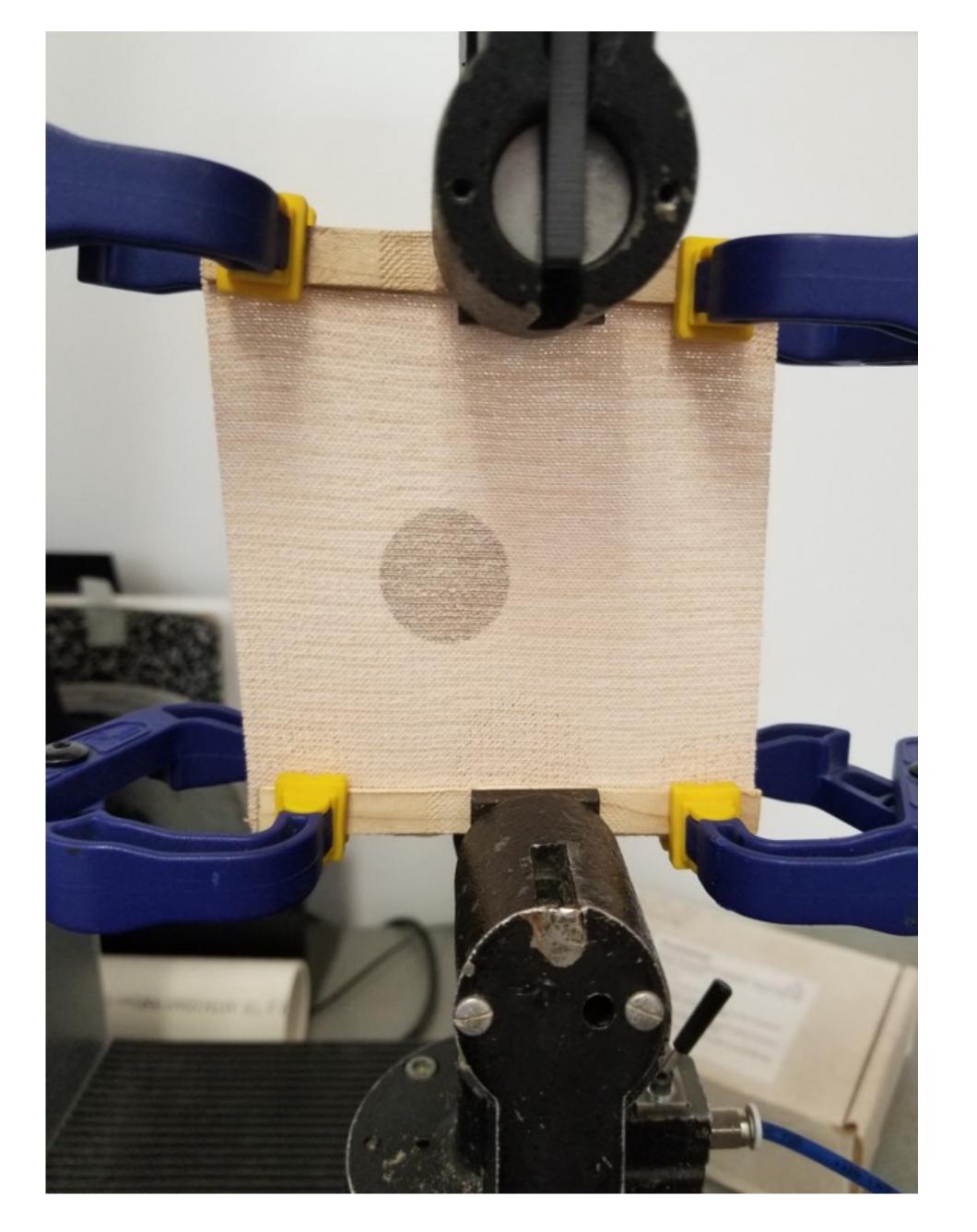
Contact: sandra@ec-service.net

METHODS

A novel dual compression bandage system (DCS*) and another traditional two-layer bandage compression system (TLB*) were tested. The DCS* consists of two active compression layers with pressure guide for the accurate application. The TLB* consists of a comfort and compression layers. To calculate the work, the tensile test pulled up to the point where the pressure guide from the DCS* formed a perfect circle. For TLB*, the recommended maximum deflection was determined by following the theoretical manufacturer's instructions.

Fig. 1 Application of pressure sensor on leg





RESULTS

The DCS* obtained a higher load (13.5 N \pm 1.0 N vs 10.1 N \pm 1.4 N), and higher work than the TLB* (0.13 J \pm 0 J vs 0.09 \pm 0.02).

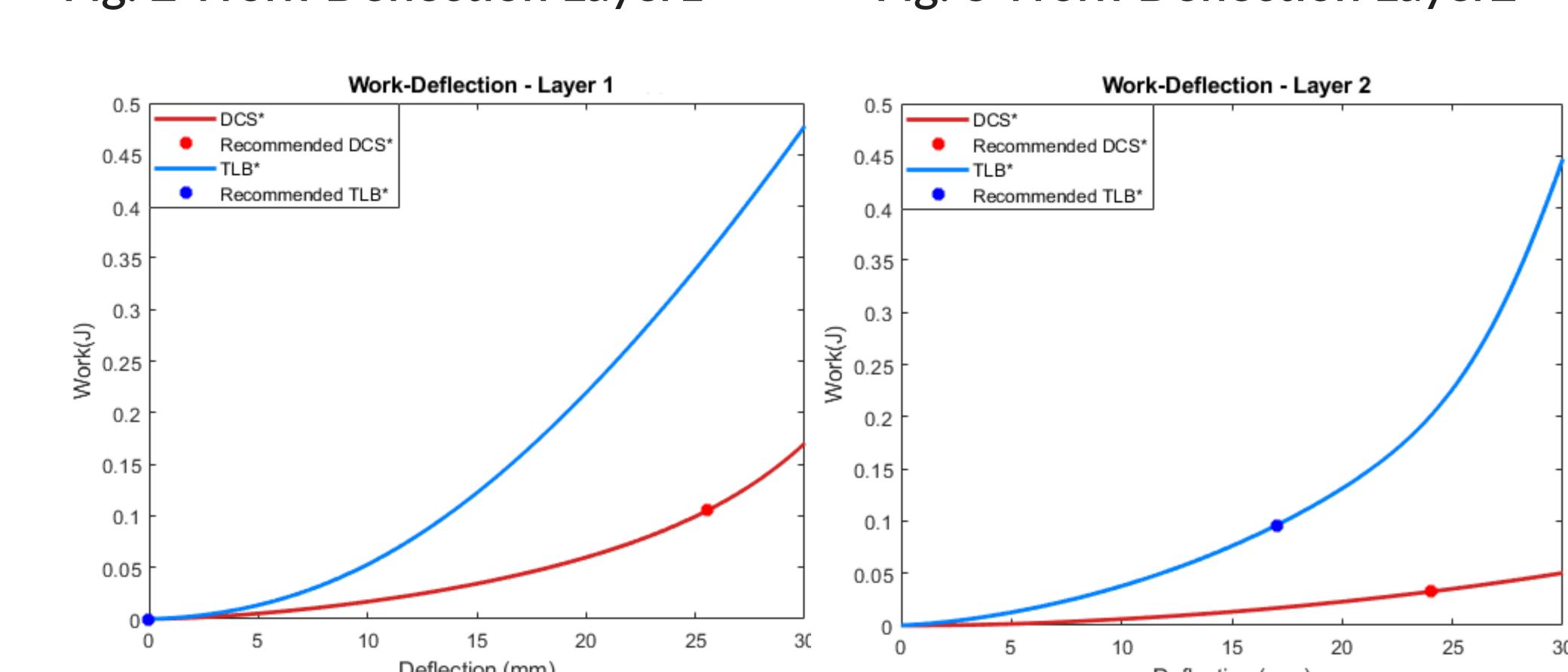
Table 1. Comparison of Load, Work at Deflection recommended by the manufacturer (Values are mean ± 95% confidence interval)

Compression system	Layer1 + Layer2 (N=3)		
	Load (N)	Work (J)	Deflection (mm)
DCS*	13.5 ± 1	0.13 ± 0	25
TLB*	10.1 ± 1.4	0.09 ± 0.02	17

In compression bandages, work may be an important element to take into account, since it considers both the applied load and the stretch. This demonstrates the maintenance of the compressive work, and includes all layers in a multiple layer bandage system as we assume them to be additive.

Fig. 2 Work-Deflection Layer1





DISCUSSION

Since the calculation of work depends on both load and deflection, we hypothesized that higher work is more effective at initial limb reduction, and maintaining a sustained compression, especially after the limb volume changed. In addition, a lower work in the compressive force might lead to a drop in the therapeutic pressure. Moreover, when a stretch material is stretched, it gets narrower. This narrowing causes a microscopic weave fabric interaction that if the stretch remains, locks the two layers together in a 3-dimensional scaffolding effect that stiffens the cross section allowing a greater tendency to remain in place and still provide functional compression.

*UrgoK2 Bandage System, Urgo Medical North America Financial support for this study was provided by Urgo Medical North America

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