Spinal Support Bed Systems

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Email: manager@spinalsupport.com.au

WHITEPAPER

The Study of Posture & Pressure on the Human Form on Comparative Bed Types

OBJECTIVES

1. To determine the pressure distribution along the human body when lying on various types of beds
2. To determine and measure the variation in posture (distortion) that is produced when the human body lies on various types of beds

Testing Protocols

The testing procedures were conducted in an independent Biomechanics Laboratory by Senior Researcher Noel Lythgo (PhD).

A representative male (mass = 79.6kg, height = 172.5cm) and female adult (mass = 62.8kg, height = 165.5cm) participated in this project. The alignment of the vertebral column, hips and shoulders was recorded for 12 bed types manufactured by major companies of varying construction types. Subjects lay on their side in the same relative position for each bed type.

A. Sleepmaker Classic Miracoil 5 zone Mattress/Platform Base

B. Sealy Posturepedic Prestige/Platform Base

C. 7 Turn Coilflex Standard Mattress/Platform Base

D. 7 Turn Coilflex Standard Mattress Variable Zone/Platform Base *

E. Endorsed Medium Firm 3 Zone/Platform Base

F. 5 Zone Pocket Spring/PlatformBase

G. Simmons Beauty Rest Physio Supreme Comfort/Platform Base

H. Pocket Spring Variable Zone/Platform Base

I. Tempur-pedic (20cm) VE /Platform Base

J. Tempur-pedic (20cm) VE /Variable Support Base **

K. Latex Mattress (17cm)/Platform Base

L. Latex Mattress (17cm)/Variable Support Base ***

* Denotes Mattress Type C. with “In Mattress” Variable Support

** Denotes Mattress Type I. with “Under Mattress” Variable Support

*** Denotes Mattress Type K. with “Under Mattress” Variable Support

Equipment

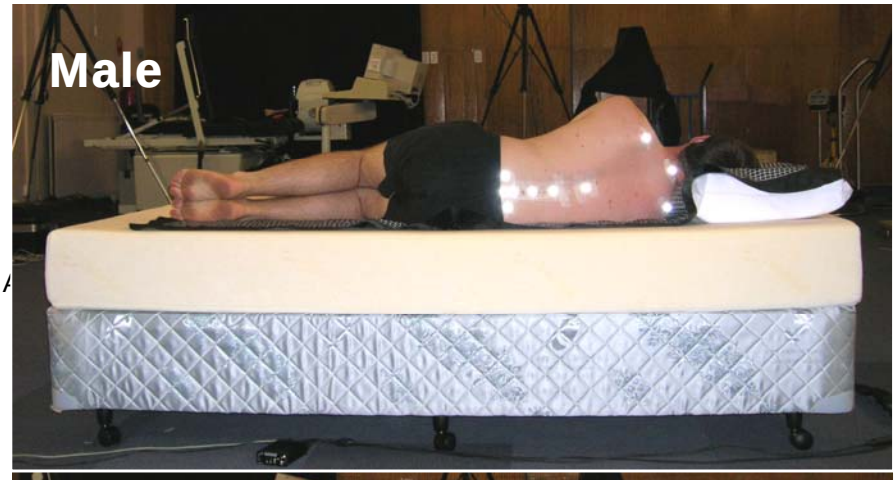
A Vicon (Oxford Metrics) 460 Motion Measurement System was used to record the 3D spatial coordinate position of spherical (9mm diameter) passive reflective markers placed on the following known anatomical landmarks:

(1) shoulder region - right and left scapula (mid-spine region of the scapulae); (2) vertebral column - spinous processes of C7, T8, T12, L3, L5; (3) sacrum (median sacral crest); and, hip region - right and left posterior superior iliac spines.

Test Component 1 – Posture Profiles

The subject was placed in a standing position and the markers were placed like so.

the subjects were made to lie on various beds like so:

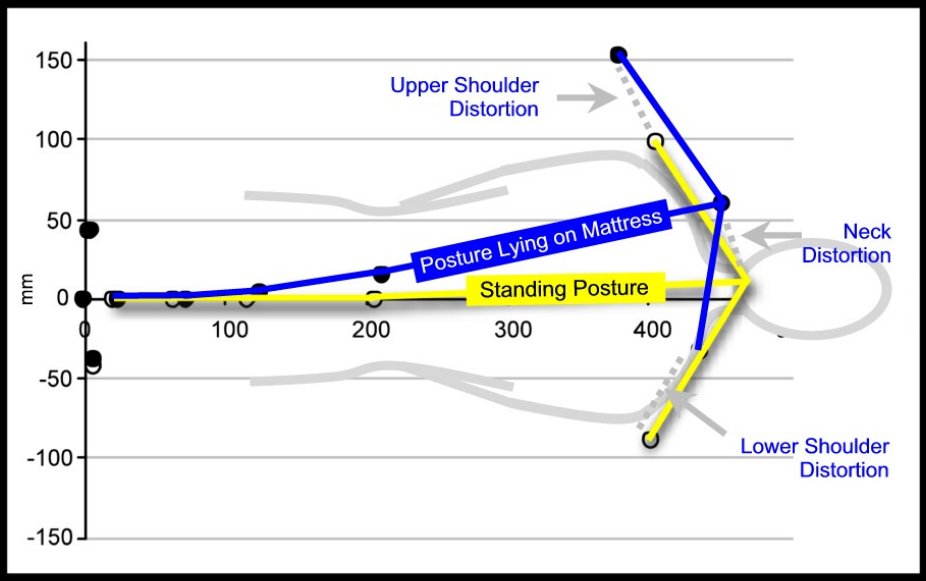


This Control Benchmark was captured and is represented by the yellow dots on each of the data sheets as shown on the example below.

The subject was then progressively placed on each of the bed types tested and captured. This posture profile is represented by the blue marks. By comparing the two profiles, one can measure the distortion (if any) produced by that particular bed on the appropriate subject.

This component of the testing procedures was used to identify the degree of variation in posture including spinal alignment and relationship of shoulders and hips to the plane of the spine.

POSTURE COMPARISON CHART - MATTRESS "A"



The yellow profile demonstrates the Control Benchmark of a subject's posture in a standing position.

The blue profile demonstrate the degree of variation from the Control Benchmark when the subject is lying on the mattress.

Source: Dr. Noel Lythgo, 2005 Field: Biomechanics

Dr. Lythgo's conclusions were

I conducted Biomechanics consultancy work for Spinal Bed Support Systems Pty Ltd. This work investigated the alignment of the body on 15 bed types that are commercially available. Information about the position of the back (vertebral column), shoulders and pelvis in 3-dimensional space was recorded buy a VICON motion analysis system. The results show the variable support system to align the body in a position similar to that achieved when standing (neutral position).

The mean difference, for example, in the line of the back from lumbar vertebrae 5 to cervical vertebrae 7 was 1.5°, whereas it was 7.2° for the other beds.

This demonstrates that the variable bed support system places the back in a position similar to standing whereas the other beds place the back in greater lateral flexion.

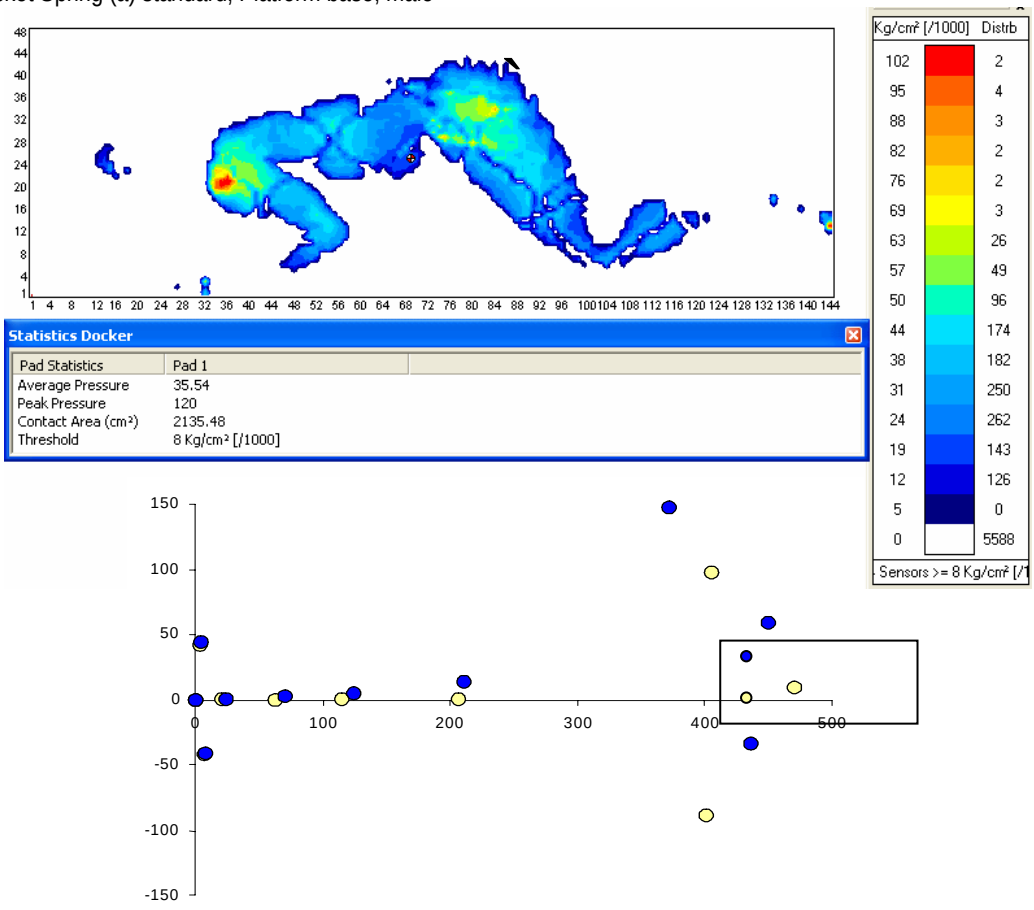
Noel Lythgo (PhD)

MAppSc, Grad., Dip. Ex. & Sport Science, BEd.

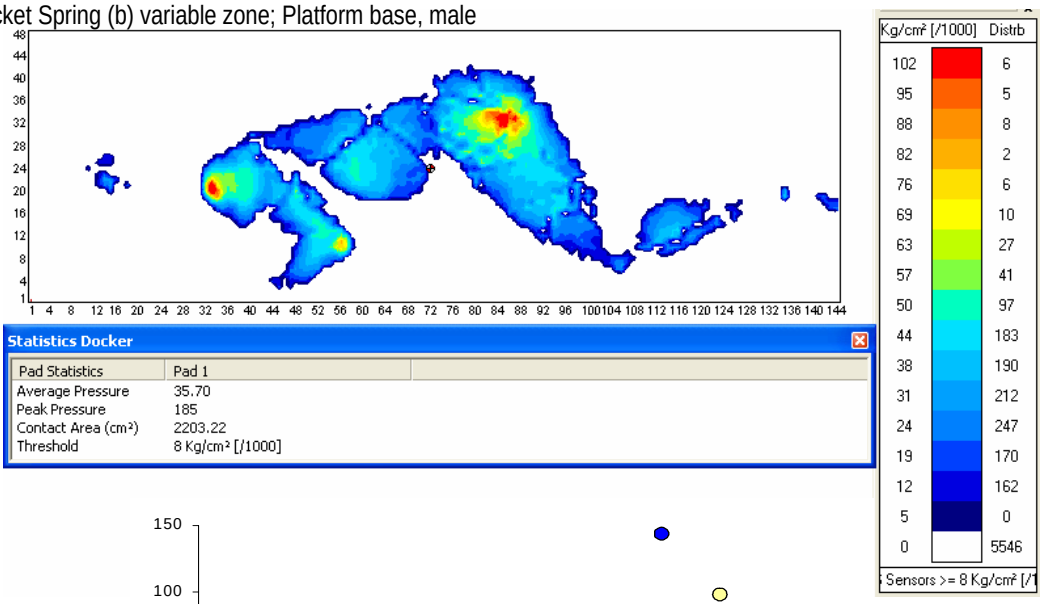
1. Results obtained from ‘SPRING – type mattresses’

Below are results obtained when testing the ‘Male’ on mattresses with spring types spring types A,B,C,E, on an unyielding platform Base

SSBS Pocket Spring (a) standard; Platform base, male

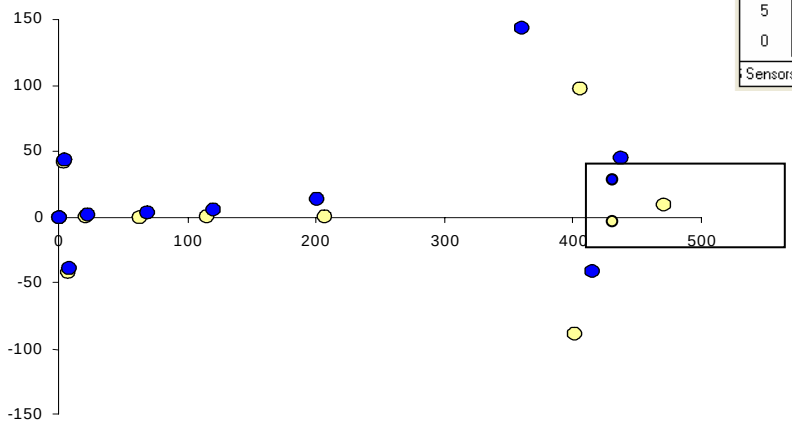


SSBS Pocket Spring (b) variable zone; Platform base, male



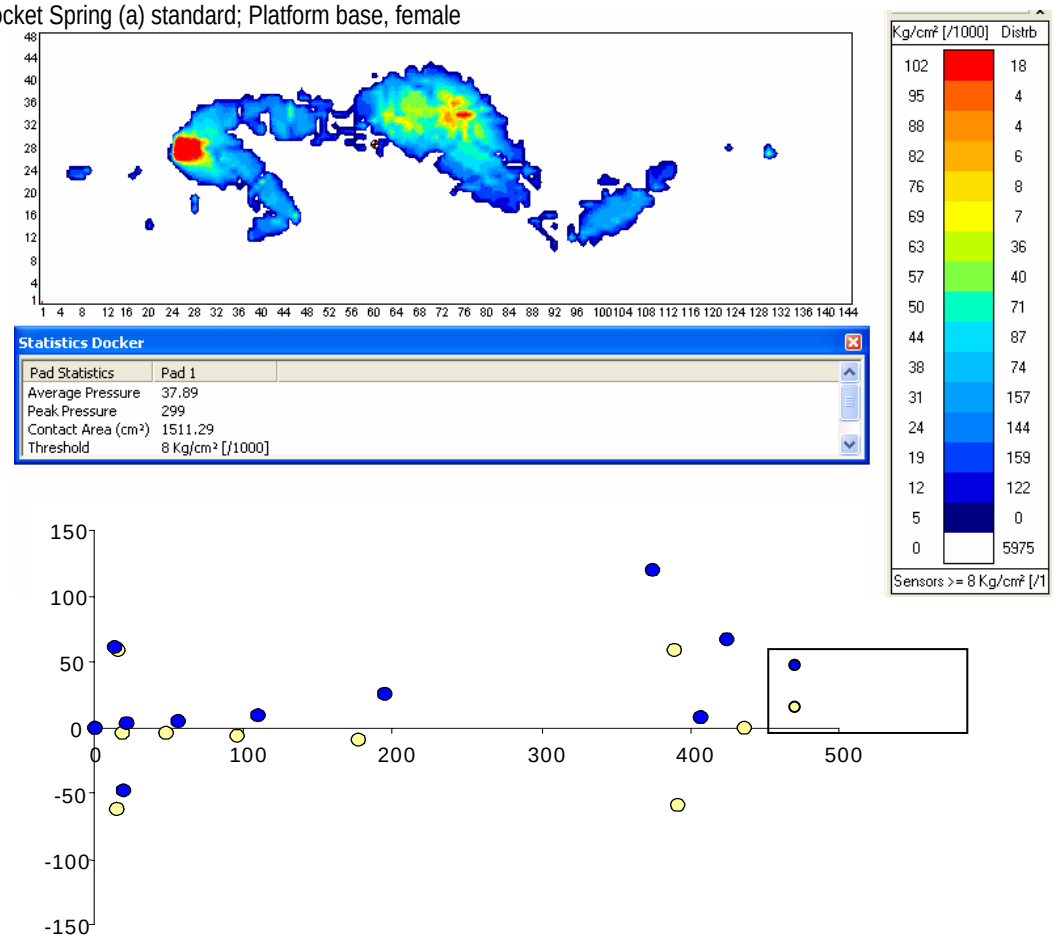
Statistics Docker

Pad Statistics	Pad 1
Average Pressure	35.70
Peak Pressure	185
Contact Area (cm²)	2203.22
Threshold	8 Kg/cm² [/1000]

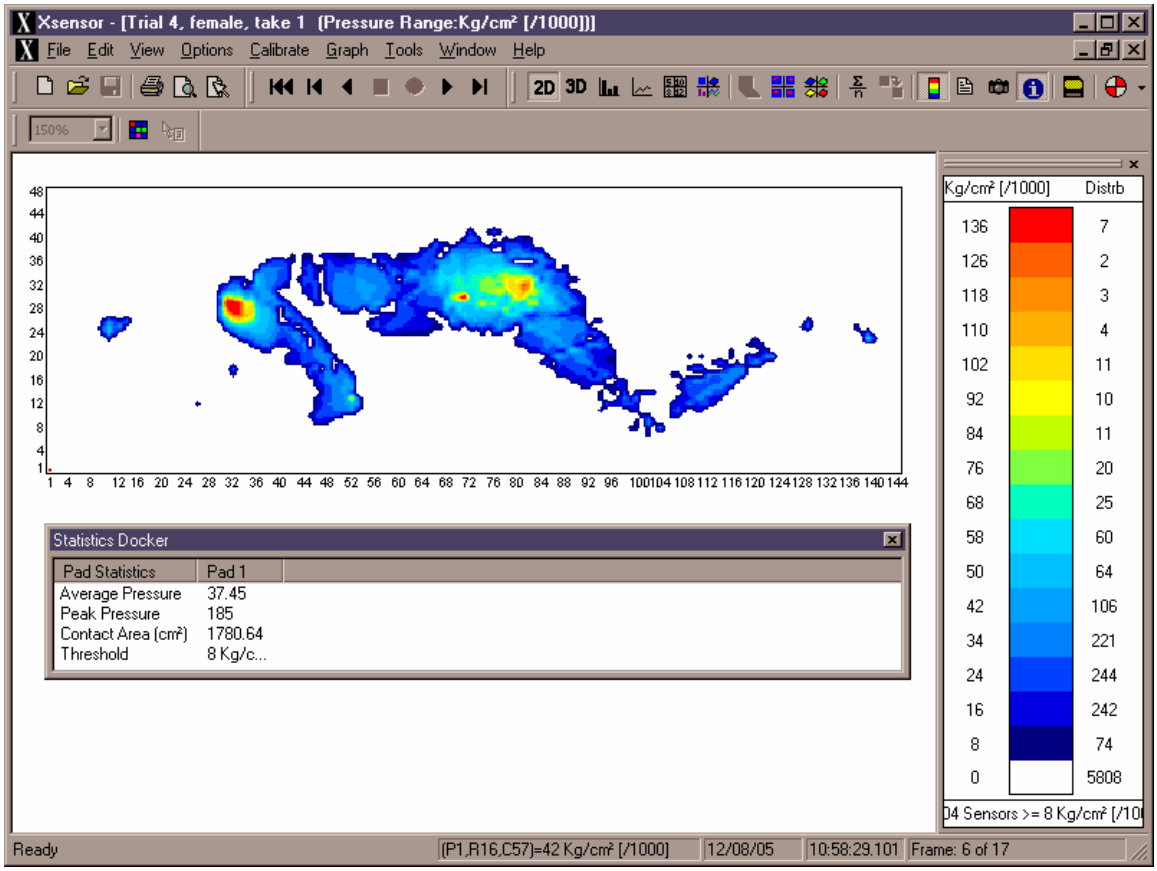


Below are results obtained when testing the ‘Female’ on mattresses with the same spring types A,B,C,E, on an unyielding platform Base

SSBS Pocket Spring (a) standard; Platform base, female



Female: SSBS Pocket Spring (b) variable zone; Platform base



As can be noted – the resultant distortions are very similar in each case.

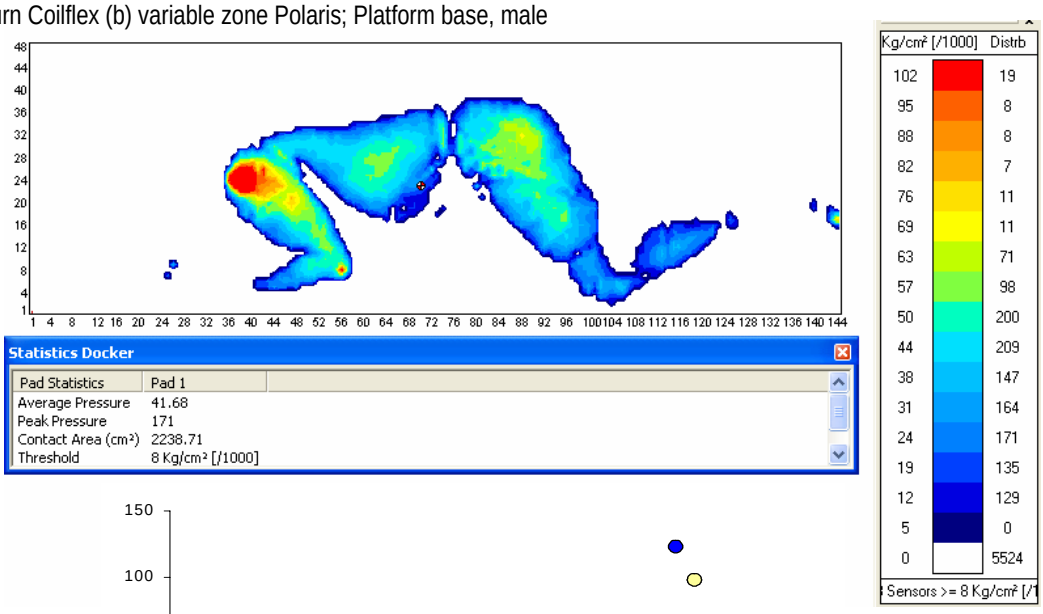
This is expected – because the distortion is ‘not the fault of the bed’ but is produced because the human body (both male and female) is not shaped in proportion to its weight – that is: wide where it is heavy and proportionately narrow where it is light – rather - it is the opposite at the shoulders (which are wide but light) and the waist/tummy (which is narrow but heavy).

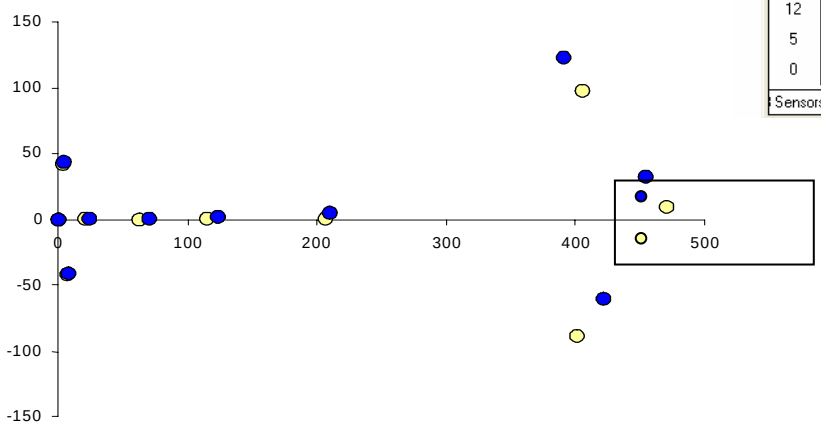
2. Results obtained from testing Futura's Variable Support Mattress:

It will be noted that the Variable support Mattress 'D' which incorporates the spring used in 'E' Also showed improved posture.

Male D

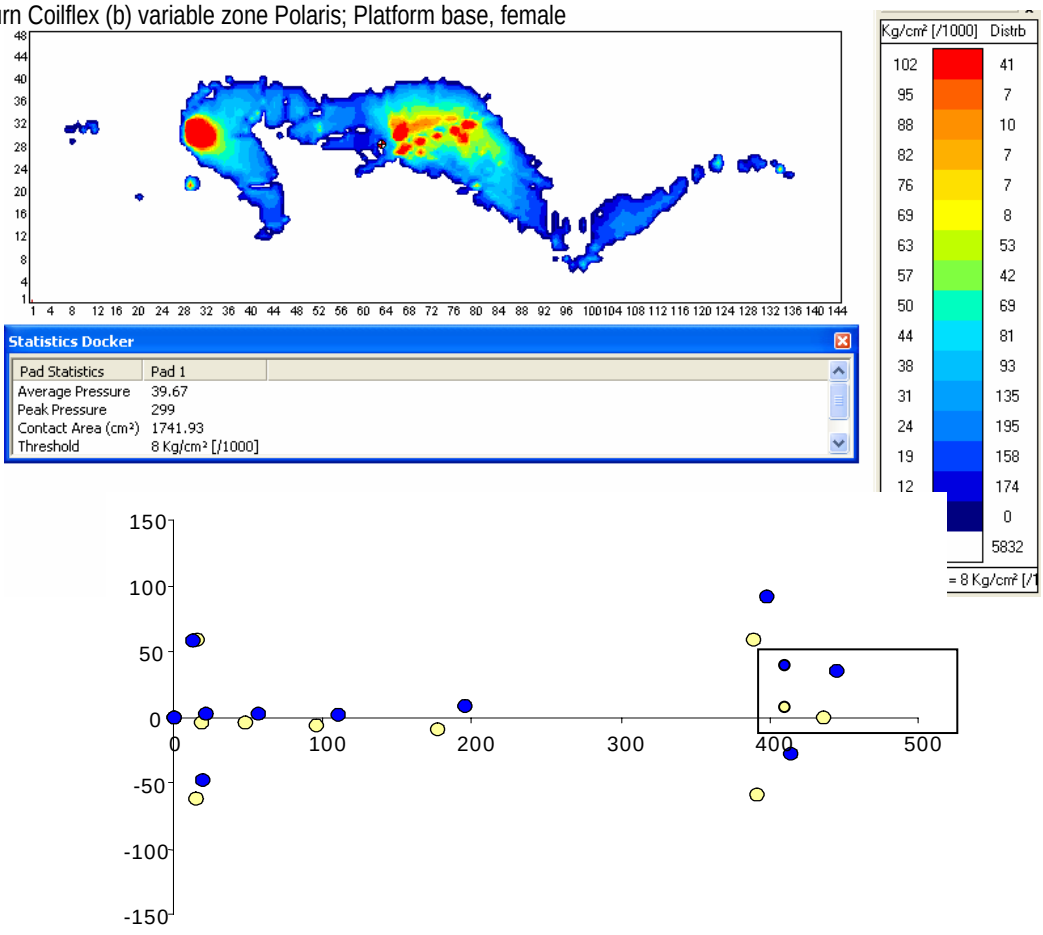
SSBS 7 turn Coilflex (b) variable zone Polaris; Platform base, male





Female D

SSBS 7 turn Coilflex (b) variable zone Polaris; Platform base, female



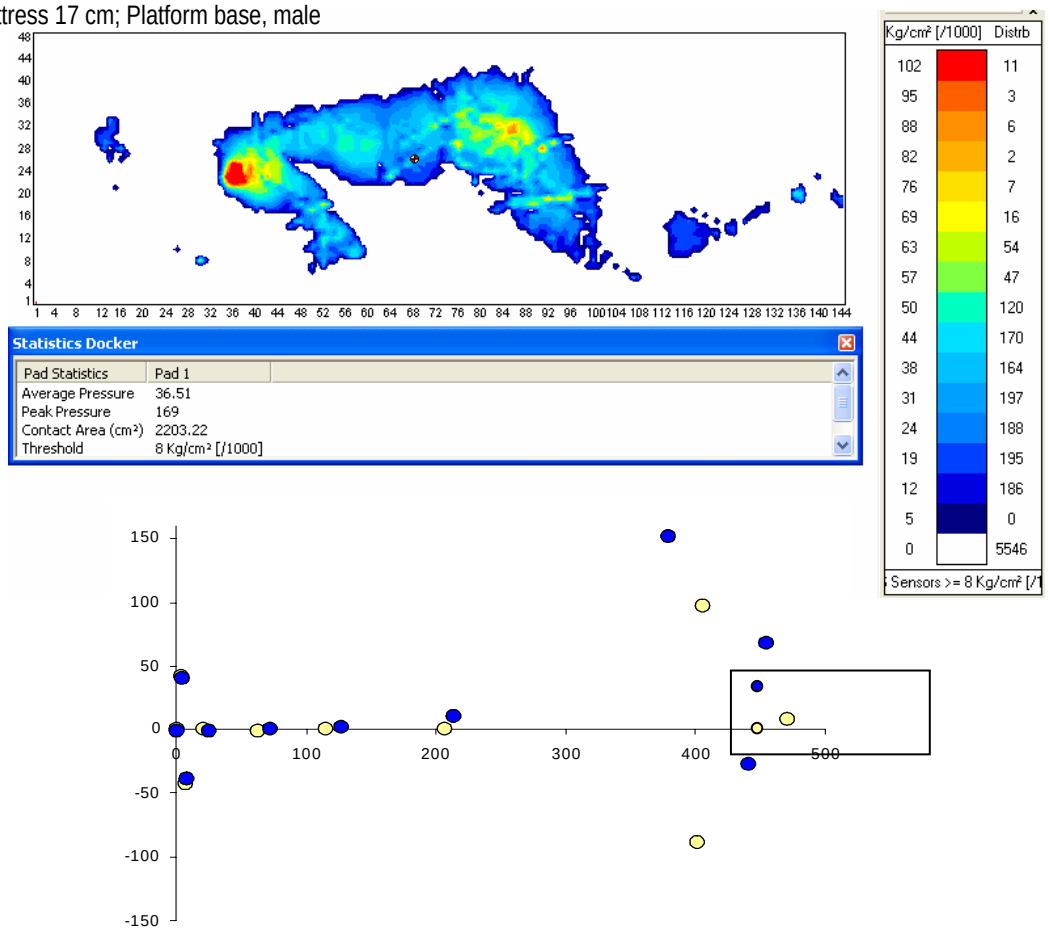
3. Results obtained from ‘Latex’ and ‘Visco-Elastic foam’ mattresses:

A. Latex Mattresses

Male ‘K’

Latex Mattress on flat Platform Base

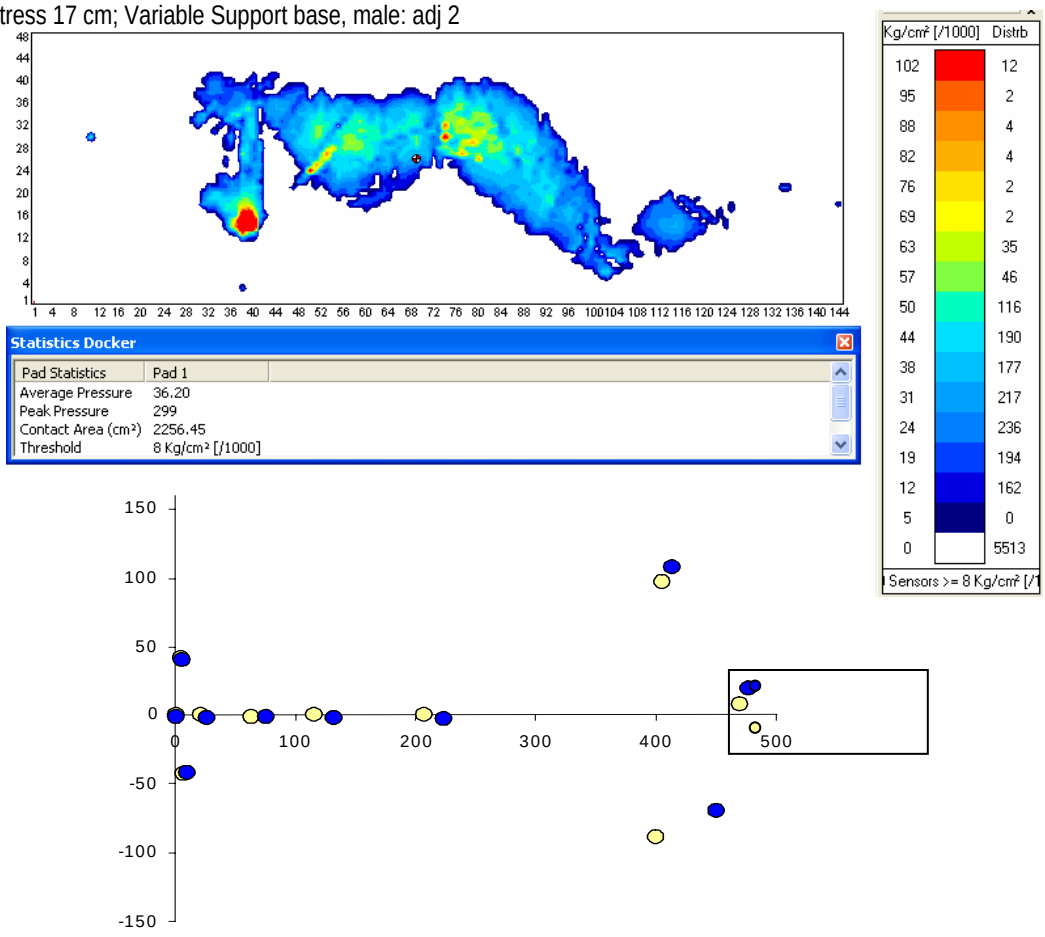
Latex mattress 17 cm; Platform base, male



Male ‘L’

Latex Mattress on Futura’s Variable Support Base

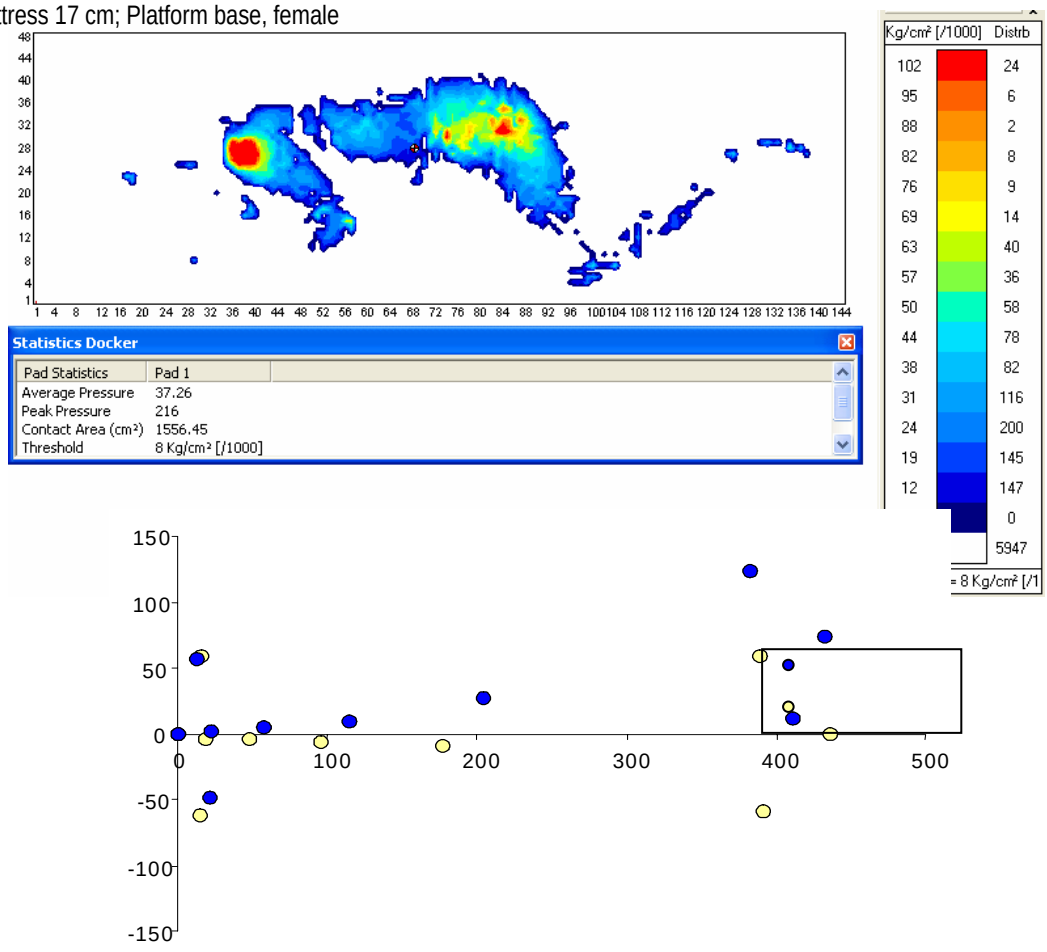
Latex mattress 17 cm; Variable Support base, male: adj 2



Female ‘K’

Latex Mattress on Flat Platform Base

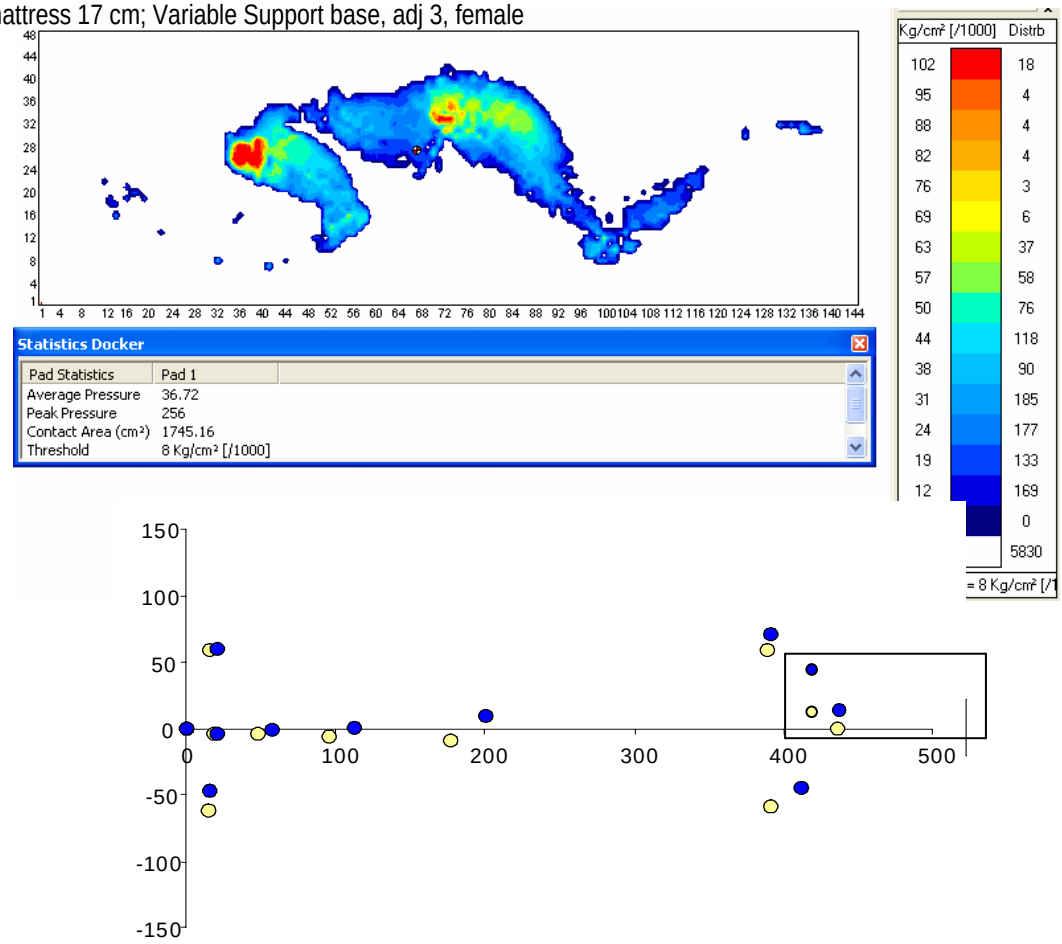
Latex mattress 17 cm; Platform base, female



Female ‘L’

Latex on Futura’

Latex mattress 17 cm; Variable Support base, adj 3, female

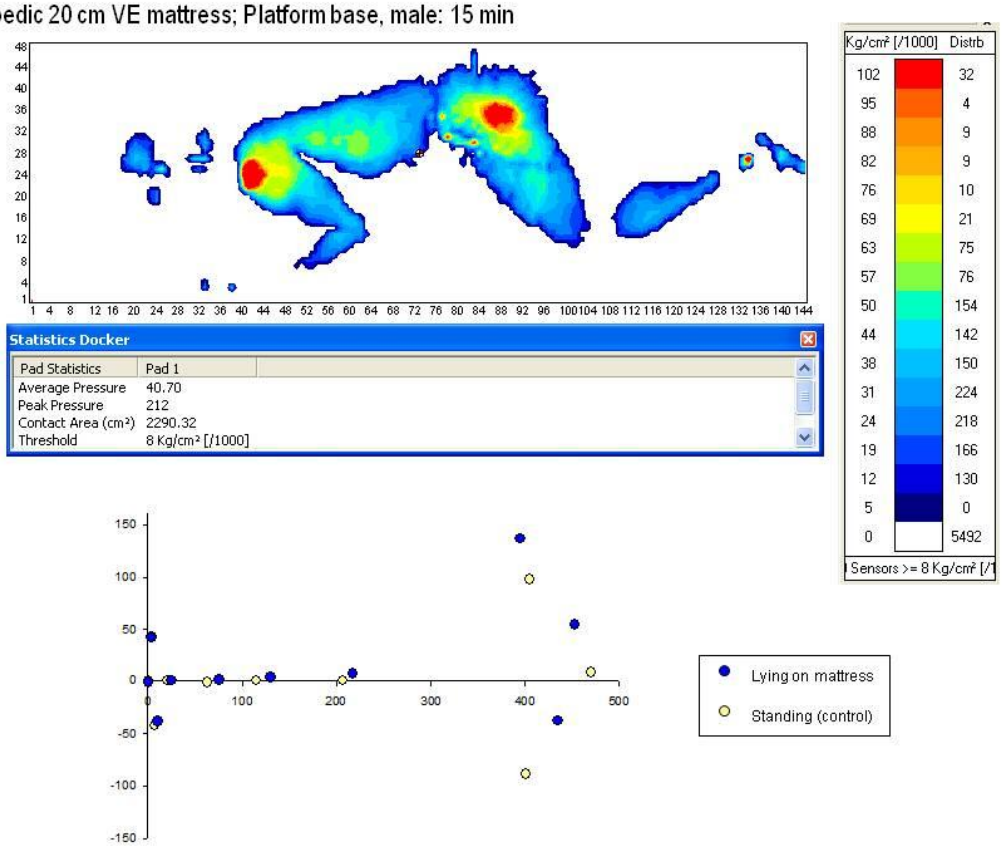


It is very clear that posture improved on the latex mattress as Futura’s Base **‘Corrective Capabilities’** were applied

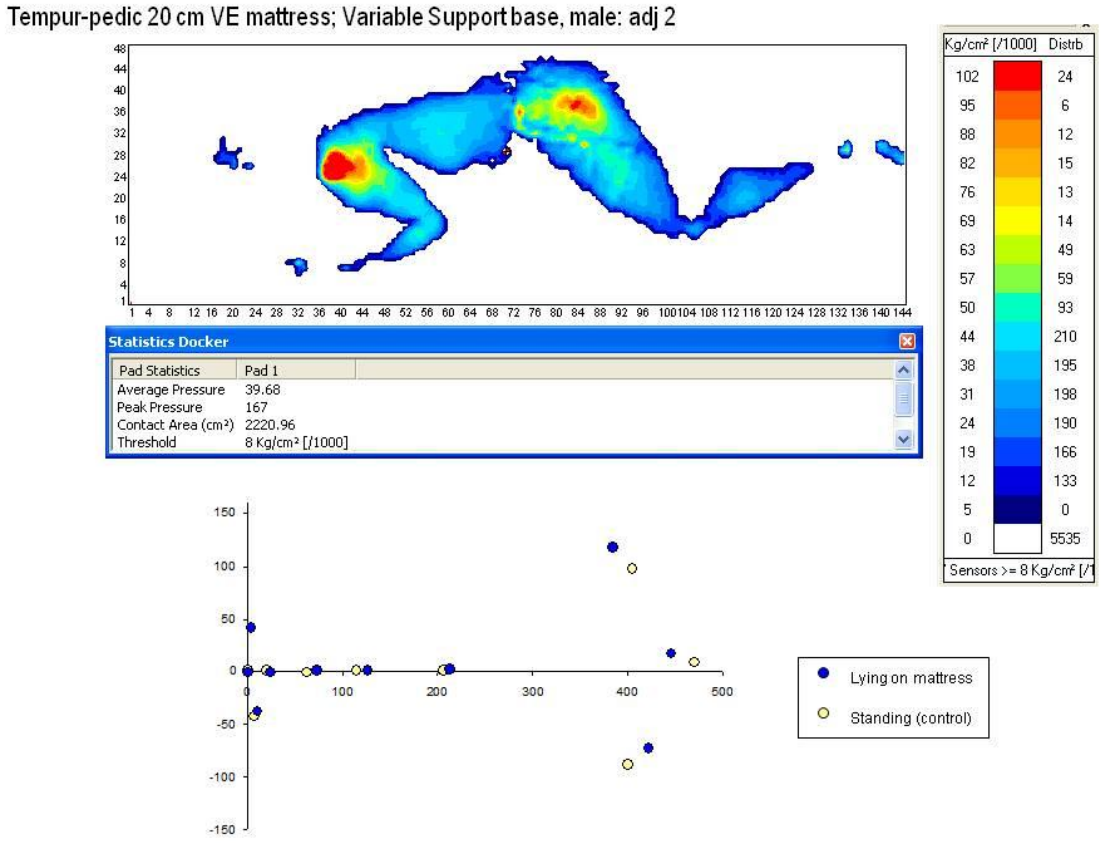
B. Visco Elastic Foam Mattresses

Male ‘I’
Visco-elastic Foam Mattress on Platform Base

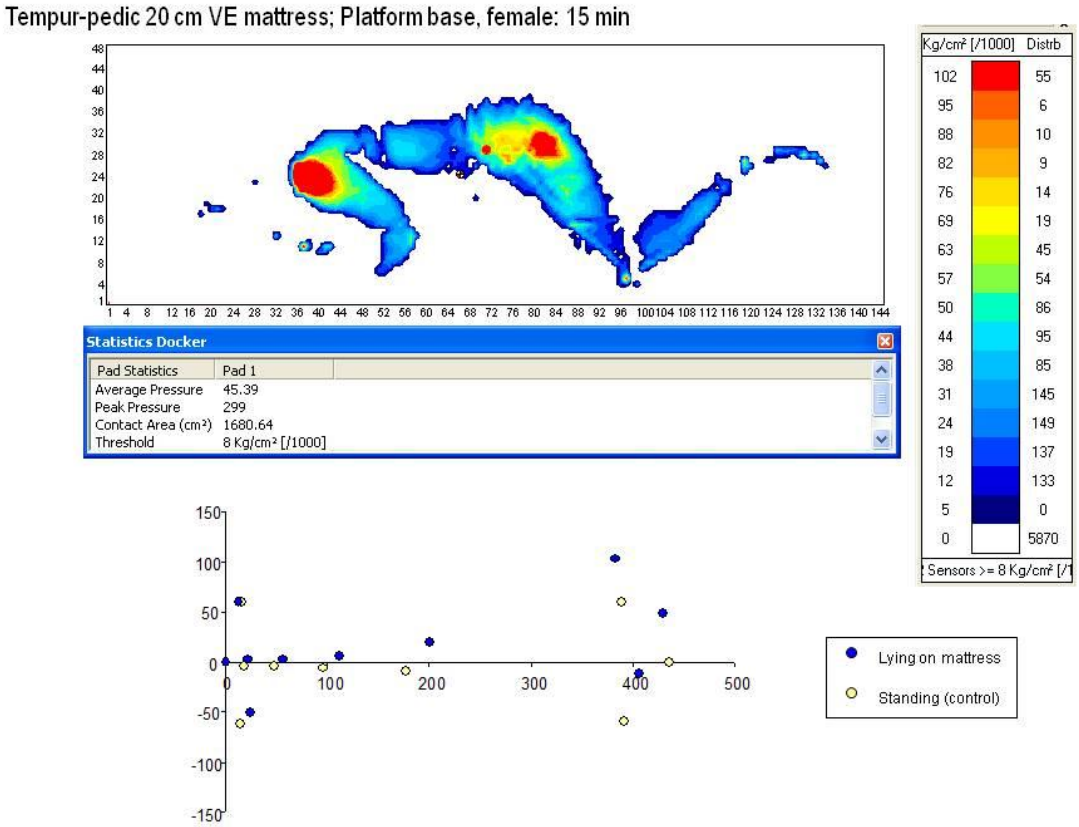
Tempur-pedic 20 cm VE mattress; Platform base, male: 15 min



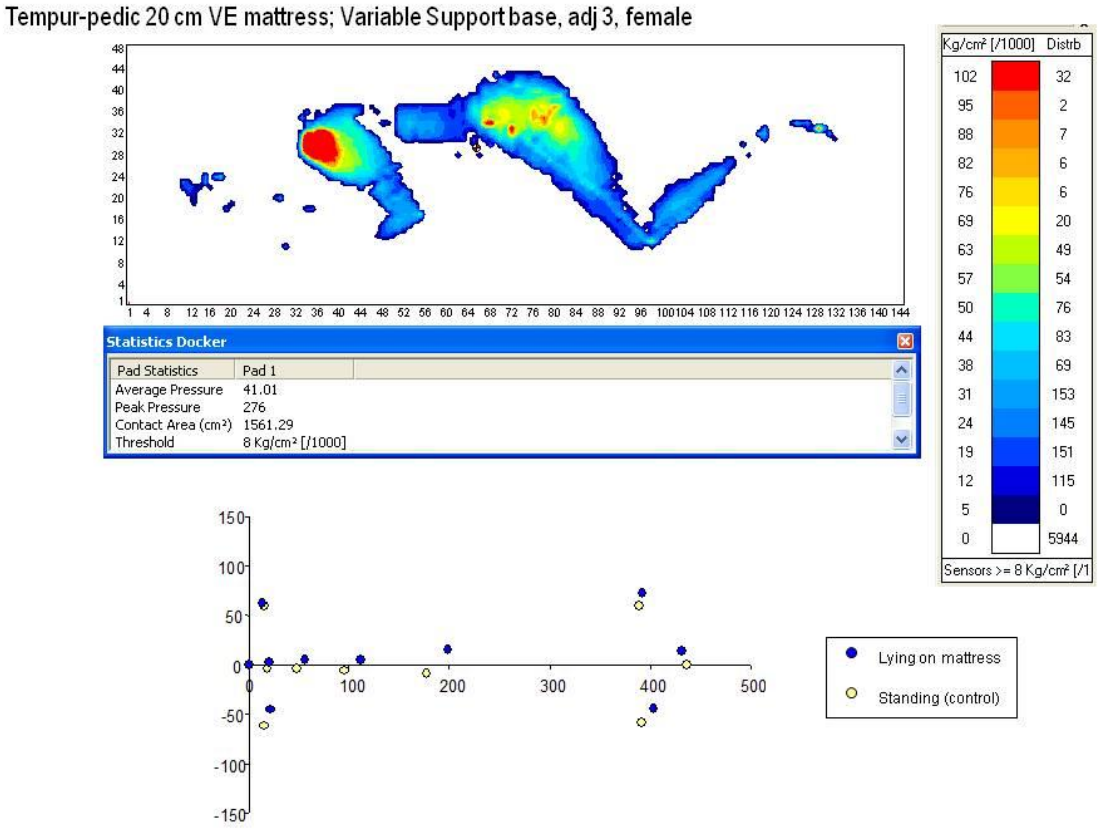
Male ‘J’
Visco-elastic foam mattress on Futura’s Variable Support Base



Female ‘I’
Visco-elastic Foam Mattress on Platform Base



Female ‘J’
Visco-elastic foam mattress on Futura’s Variable Support Base



It is very clear that posture improved on the Visco-elastic foam mattress as Futura’s Base **‘Corrective Capabilities’** were applied.

Test Component 2 – Pressure Mapping

Each bed was fitted with a Pressure Mapping Unit to record the variations of pressure along the human form.

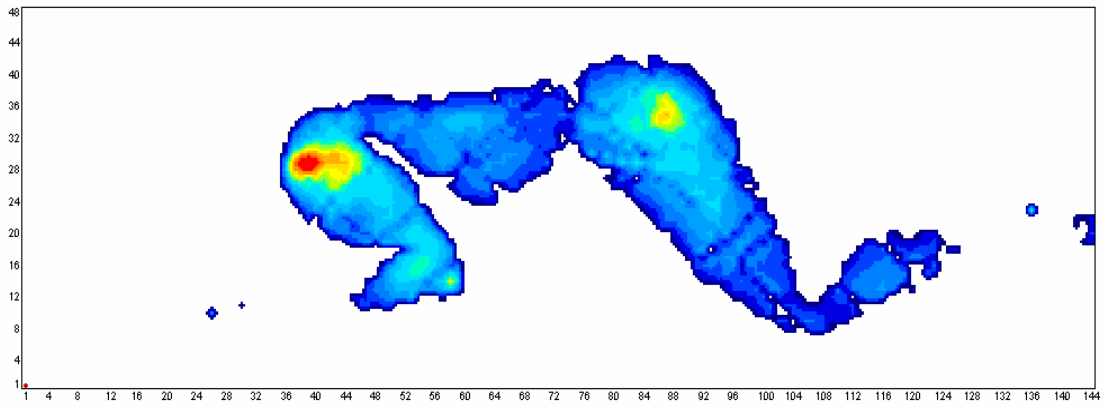
The pressure imaging was captured co-inciding with the capture of the Posture Profile.

This image identifies peak pressure zones (highest level is red zones) and no pressure zones (lowest level is white). Refer to the Pressure Mapping Image in Section 2, "How to Read the Test Results."

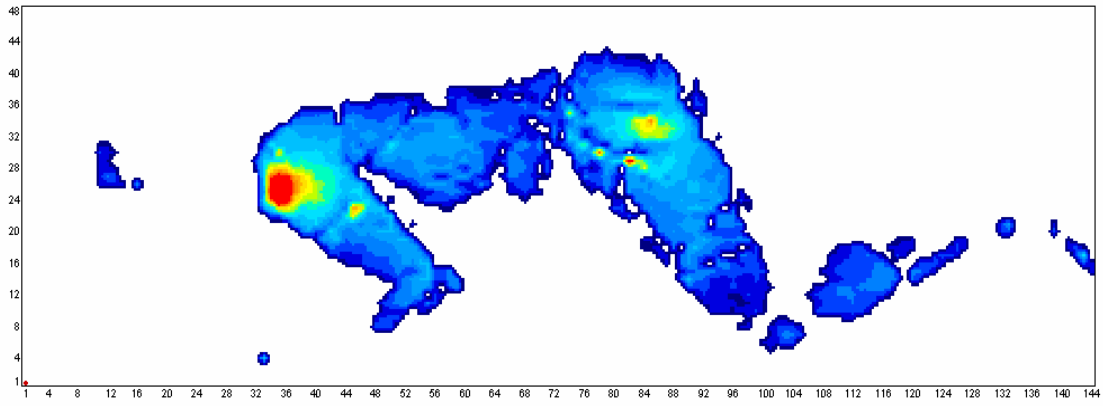
This component of the testing procedures was used to identify the distribution of pressure along the human form and variations in pressure on different bed types.

The Pressure on Spring Mattresses ABC & E for the male are

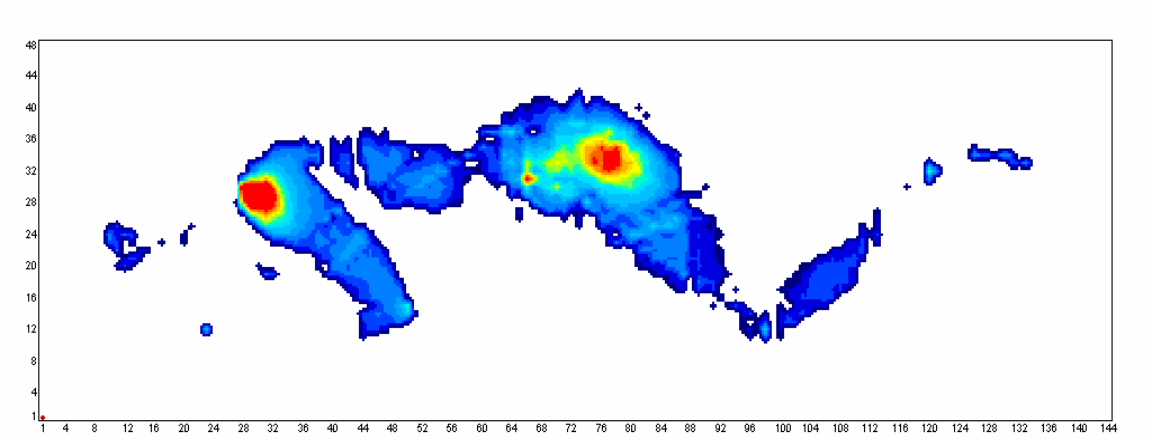
A. Pressure Map of Male on Sleepmaker Classic



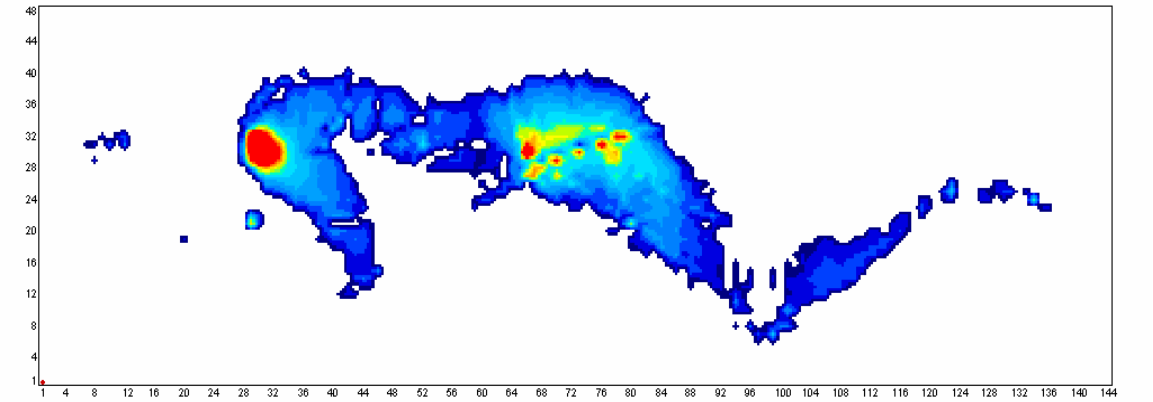
B. Pressure Map of Male on Sealy Posturepedic Prestige



C. Pressure Map of Male on 7 Turn Coilflex Platform Base

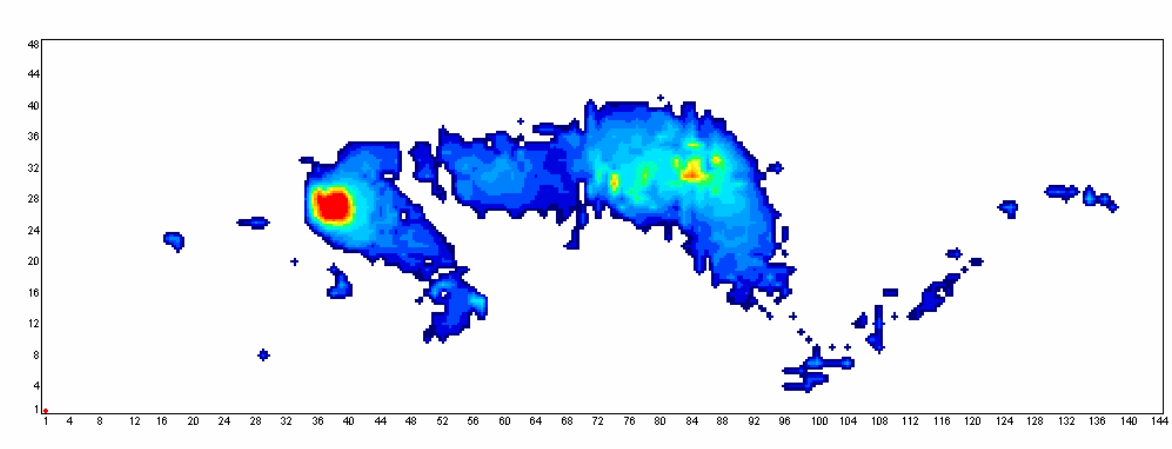


E. Pressure map of Male on Endorsed Mattress

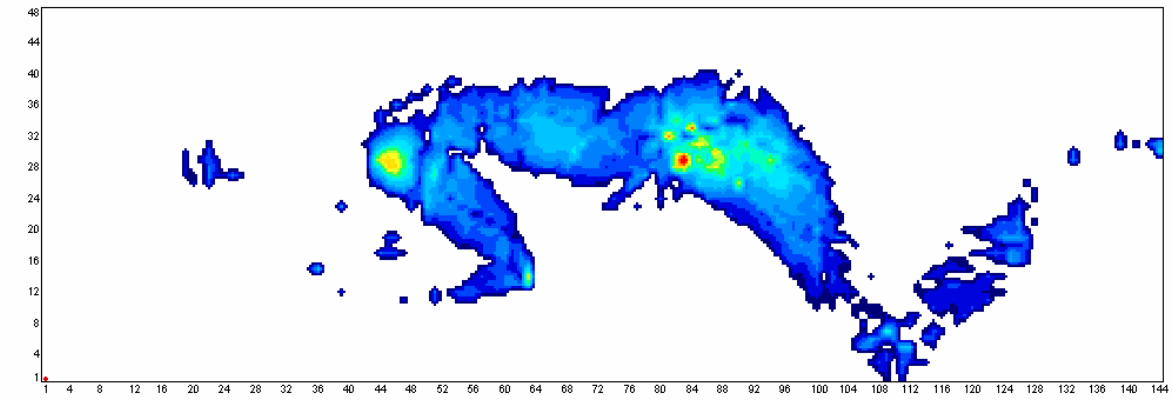


Again, Lumbar Support was increased and the pressure at the hips and shoulders was found to be less with the Latex Mattress on Futura's V S Base compared to the Platform Base

K Pressure Map of Male on Latex Matt on Platform Base

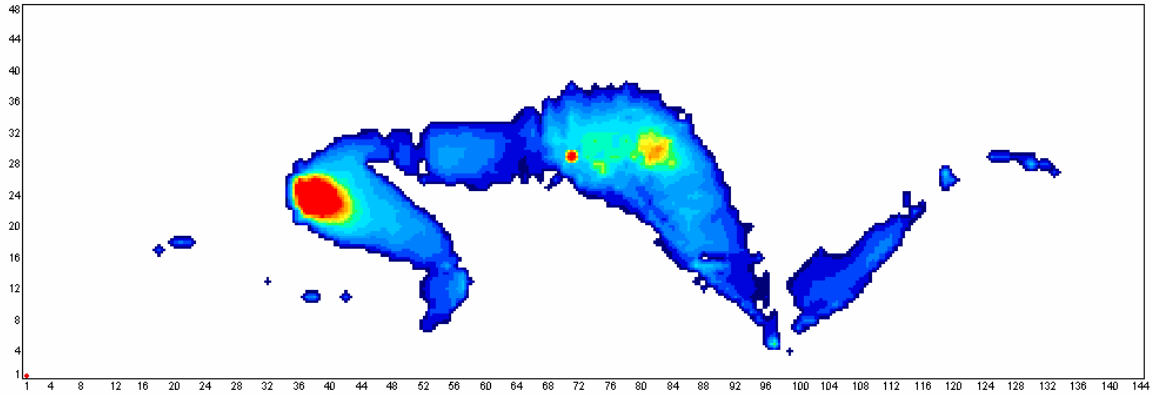


L Pressure Map of Male on Latex Matt on Variable Support Base



And similarly – Lumbar Support was increased and the pressure at the hips and shoulders was found to be less with the Visco-elastic foam Mattress on Futura's V S Base compared to the Platform Base

I Pressure Map of Male on Tempurpedic Mattress on Platform Base



J Pressure Map of Male on Tempurpedic Mattress On Variable Support Base