



# Vinci Construction Ltd

## ViSafe Assessment Report

### Traditional vs EcoSpot mortar boards

June 2015

# Project aims

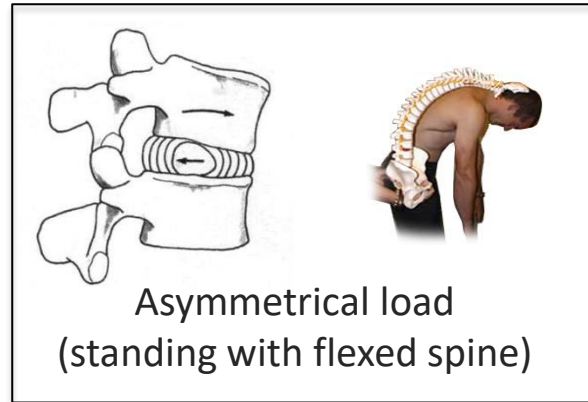
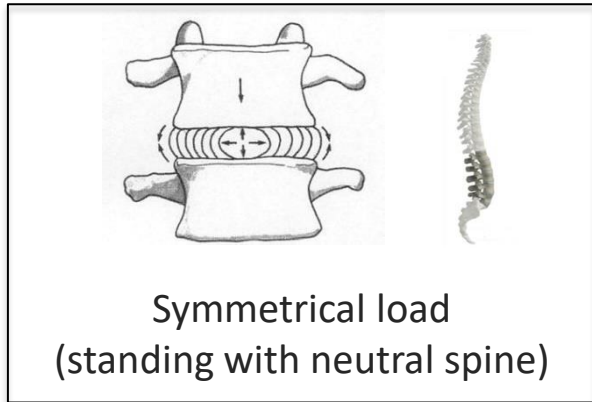
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A comparison study of the physical demands of bricklaying using a traditional mortar board and the EcoSpot board, using ViSafe technology to provide objective data of the required movements and muscle activity of the low back and shoulders while on task.

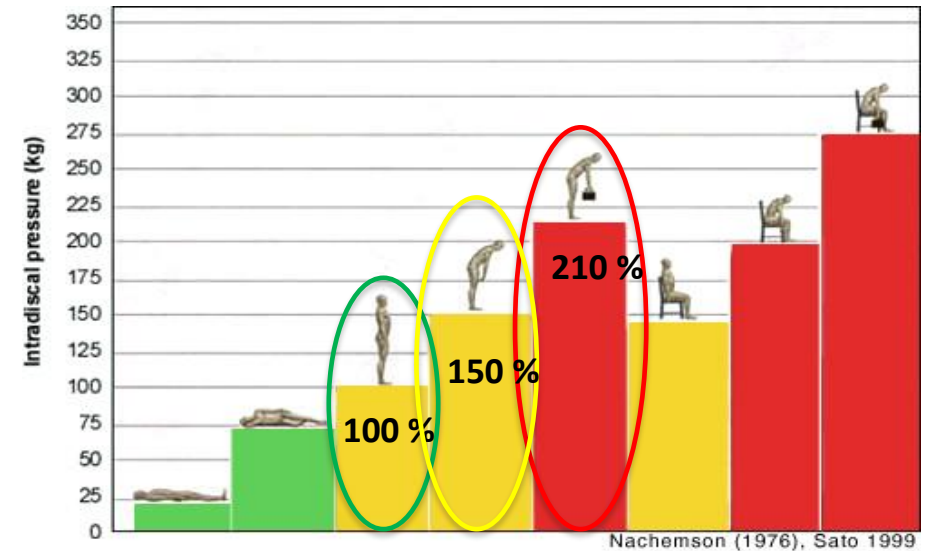


# Injury risks: Effects of poor posture on the spine

Disc is strongest in neutral position



Disc pressure in various postures relative to unloaded, upright standing



Ergonomists, literature and clinicians agree on the effects of cumulative poor posture on the lumbar and cervical spine and the potential for disc and musculoskeletal injuries to occur.

# Injury risks: Effects of sustained shoulder elevation

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- Sustained elevation and internal rotation can lead to decreased blood flow to critical tendons around the rotator cuff.
- Ergonomists, literature and clinicians agree on the undesirable effects of sustained elevation on shoulder tendons.



# Assessment Overview

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- **Date:** 16<sup>th</sup> June 2015
- **Location:** Swansea – Vinci site of new build University
- **Workers:** 2 workers from a bricklaying subcontractor volunteered to be assessed. Their company has been using EcoSpot on this site for several months. They were given detailed information ahead of the session and both signed a consent form
- **Set up:** 2 areas of wall to be built were prepared next to each other on site. One had the 'traditional' mortar spot board to work with and one had the adjustable EcoSpot board in place. The 'traditional' mortar board in this case was a square spot board placed on a manhole ring on the floor, approximately 25cm off the ground
- **Design:** We employed a cross over design for this comparison study to control confounding variables as far as possible (e.g., fatigue, height of wall)

# Assessment: Methodology

## Cross over design :

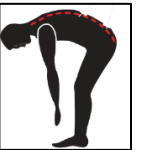
	EcoSpot Board	Traditional Spot Board
Session 1	Worker 1	Worker 2
Session 2	Worker 2	Worker 1
Session 3	Worker 1	Worker 2
Session 4	Worker 2	Worker 1



## Postural risk factors measured during ViSafe Assessment:

### Back

- Lumbar flexion
- Trunk inclination
- Pelvic angle
- Electro-muscular activity



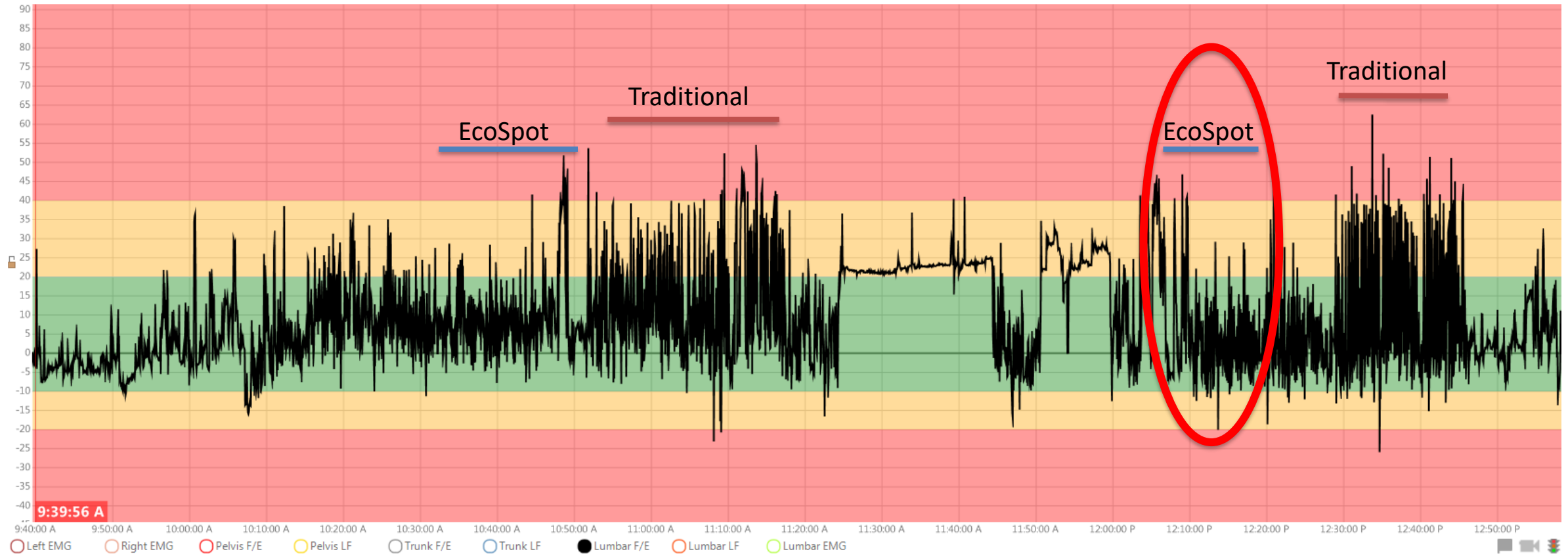
### Shoulder

- Upper arm elevations
- Electro-muscular activity





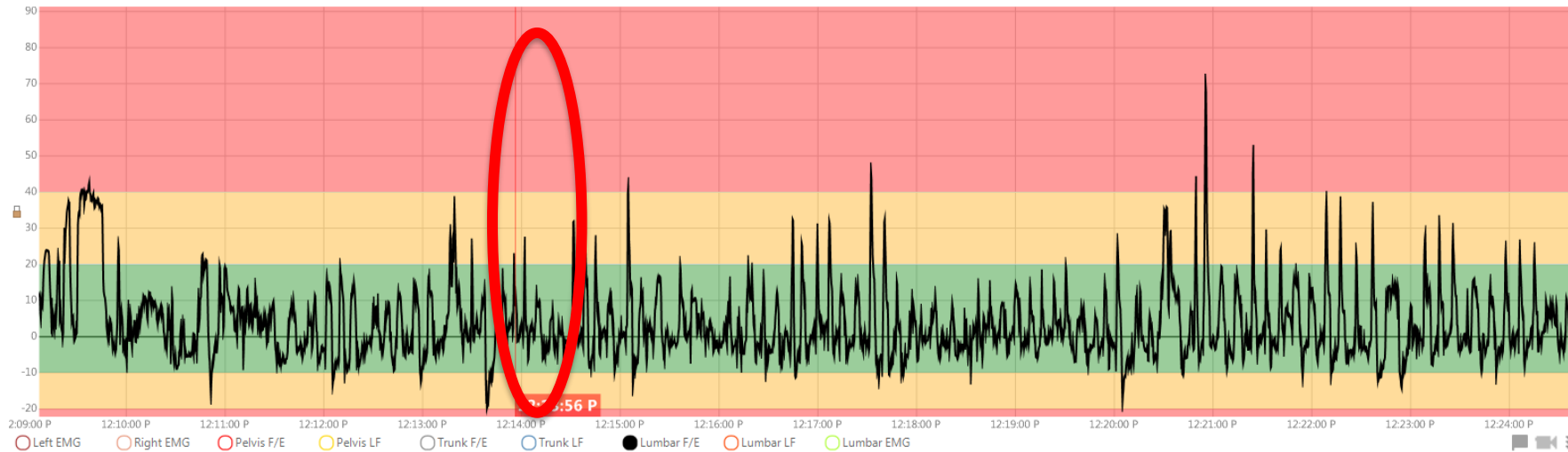
# Example: Raw data (back)



~ 3 hrs – whole session



# Example: Raw data (back) – EcoSpot

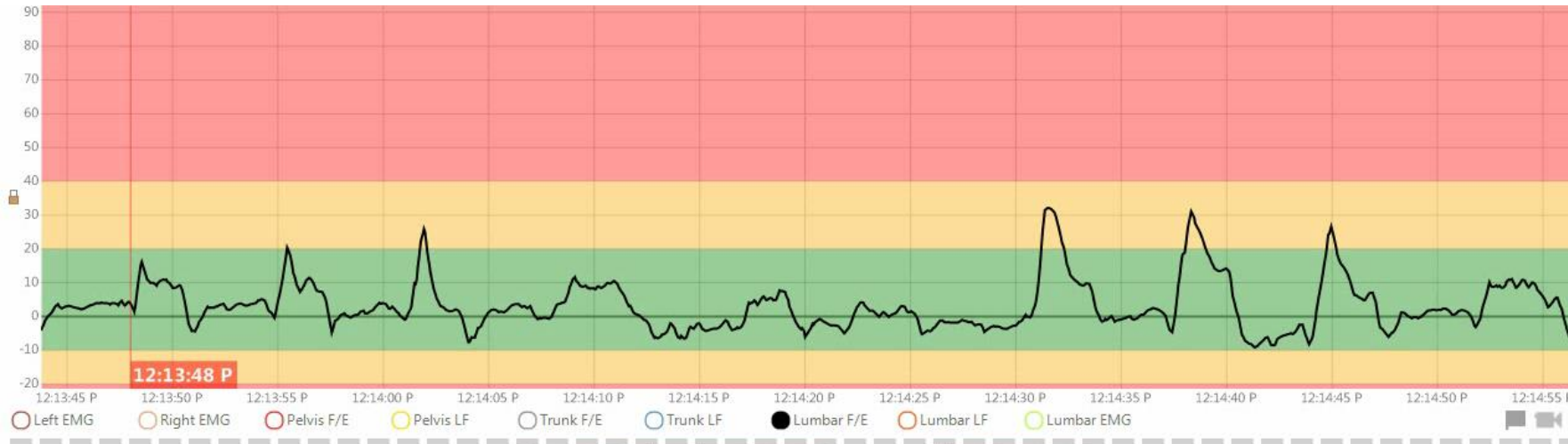


~ 25 minutes - one task





# Example: Raw data (back) – EcoSpot





# Example: Raw data (back) – Traditional



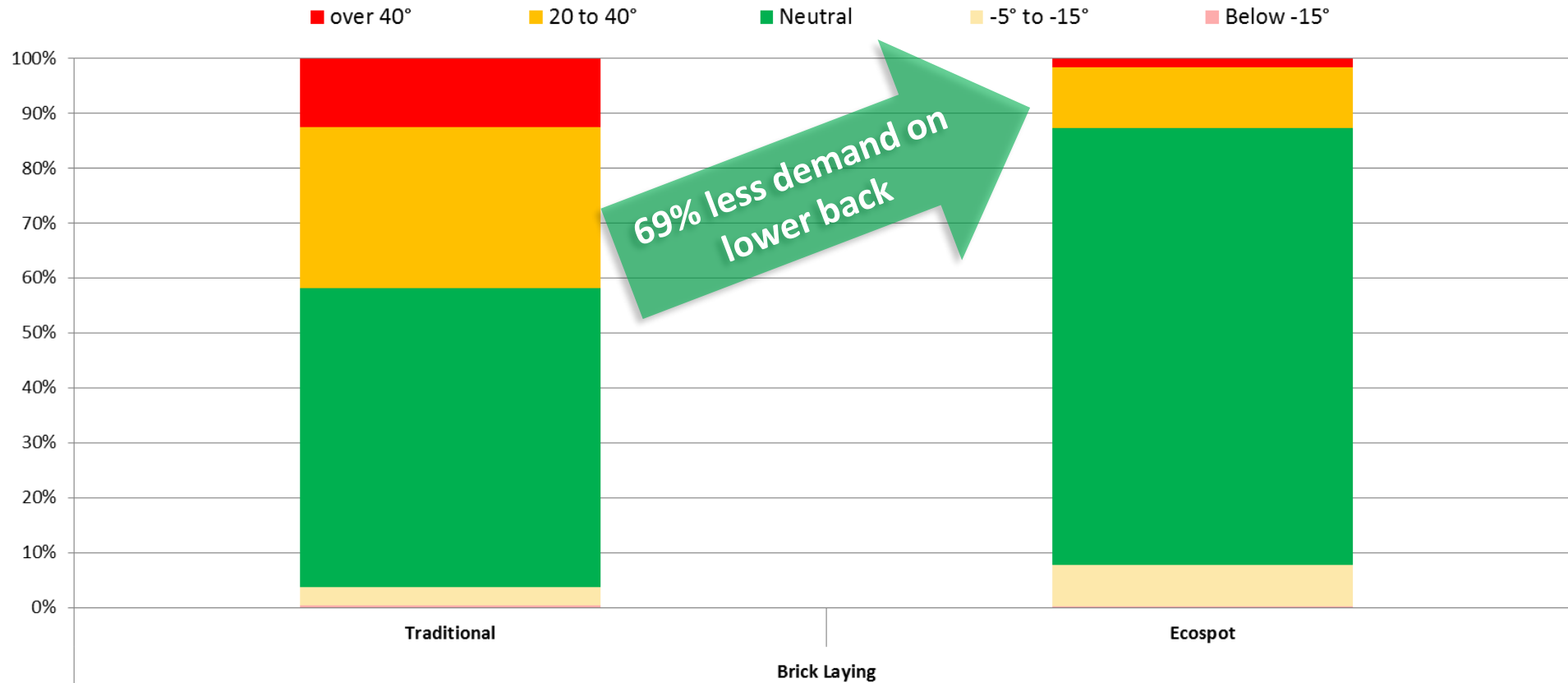
# Bricklaying: Back flexion comparison



# Brick Laying: Back - Summary



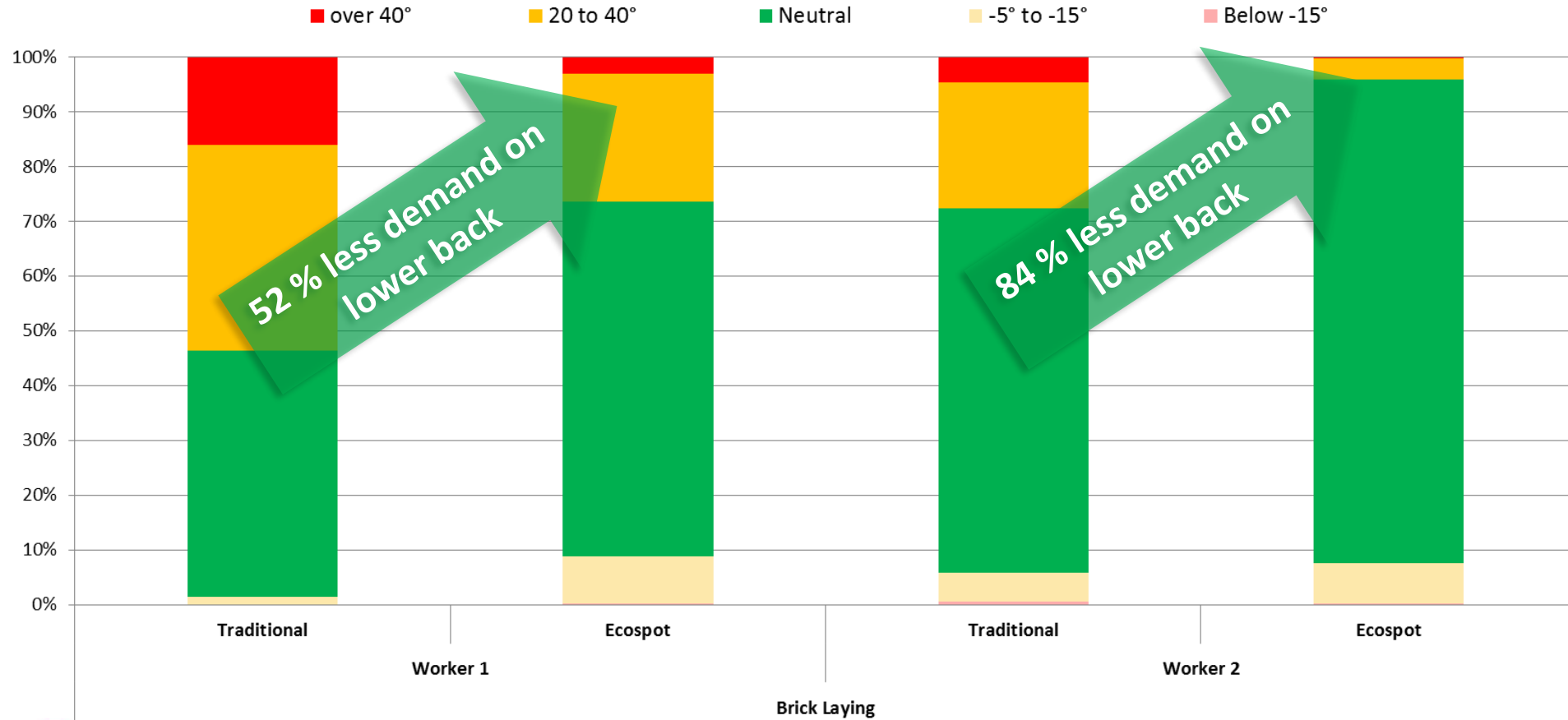
Proportion of time spent at various degrees of lumbar flexion



# Brick Laying: Back – by worker



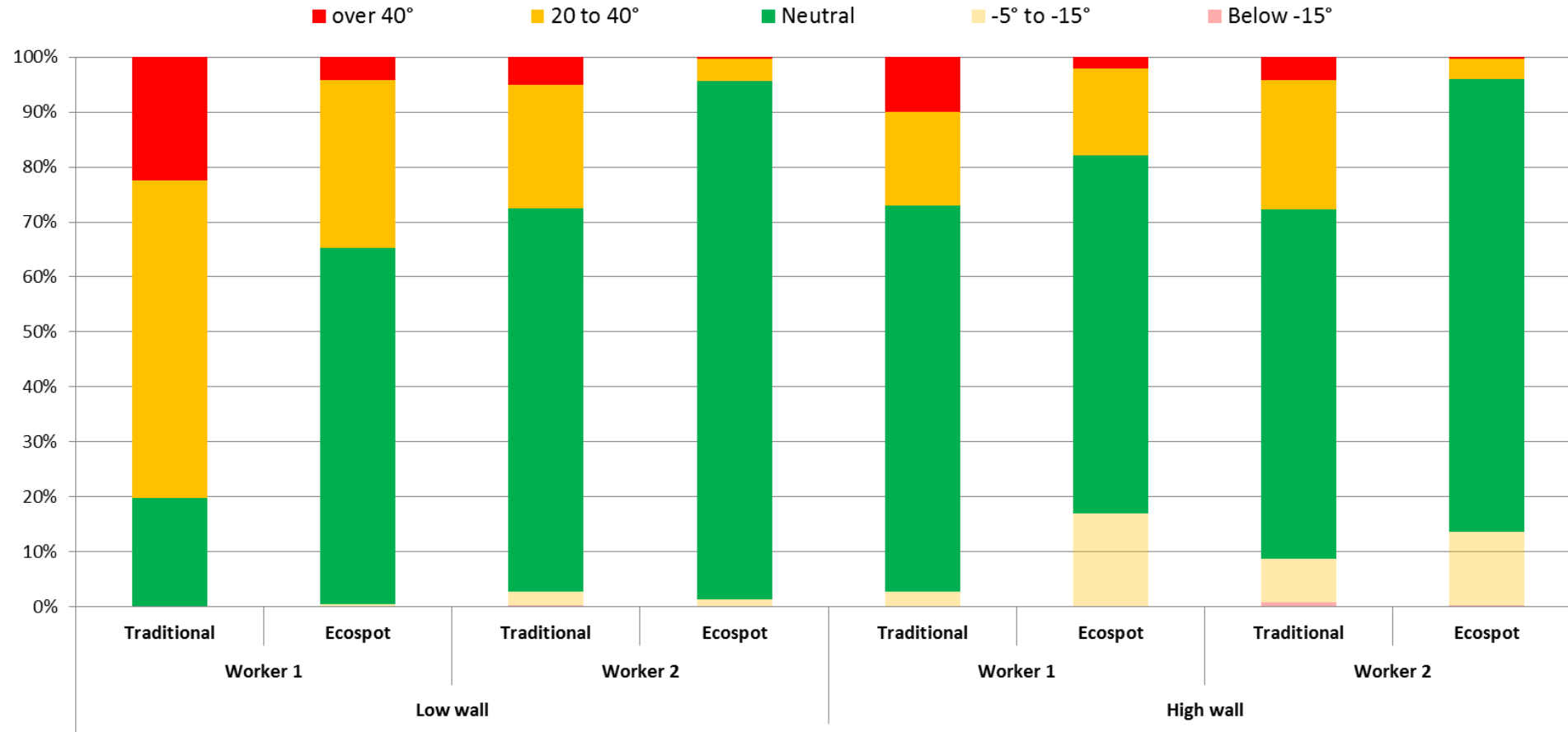
Proportion of time spent at various degrees of lumbar flexion



# Brick Laying: Back

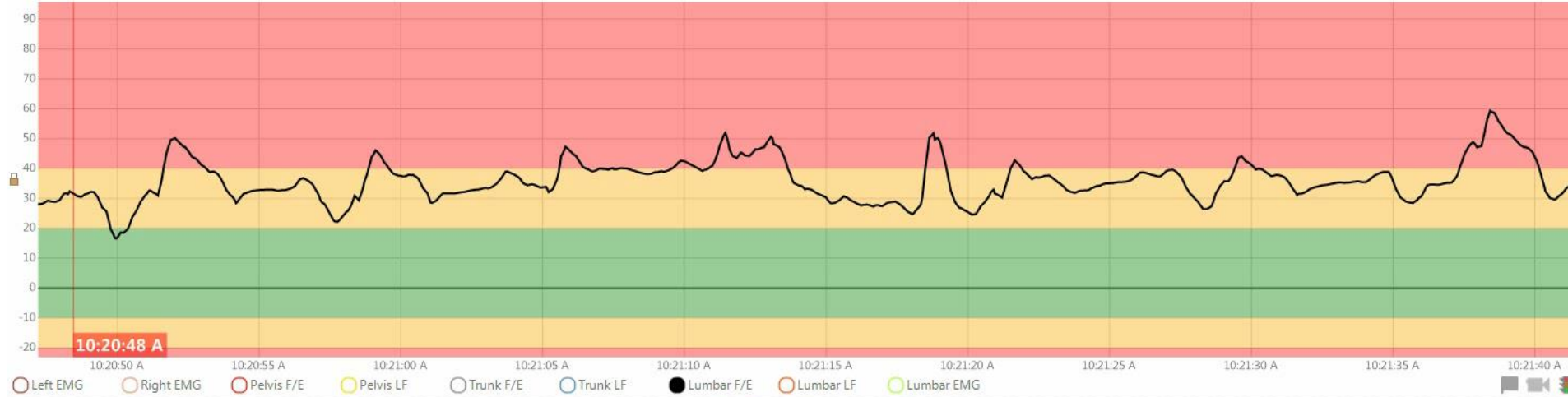


Proportion of time spent at various degrees of lumbar flexion



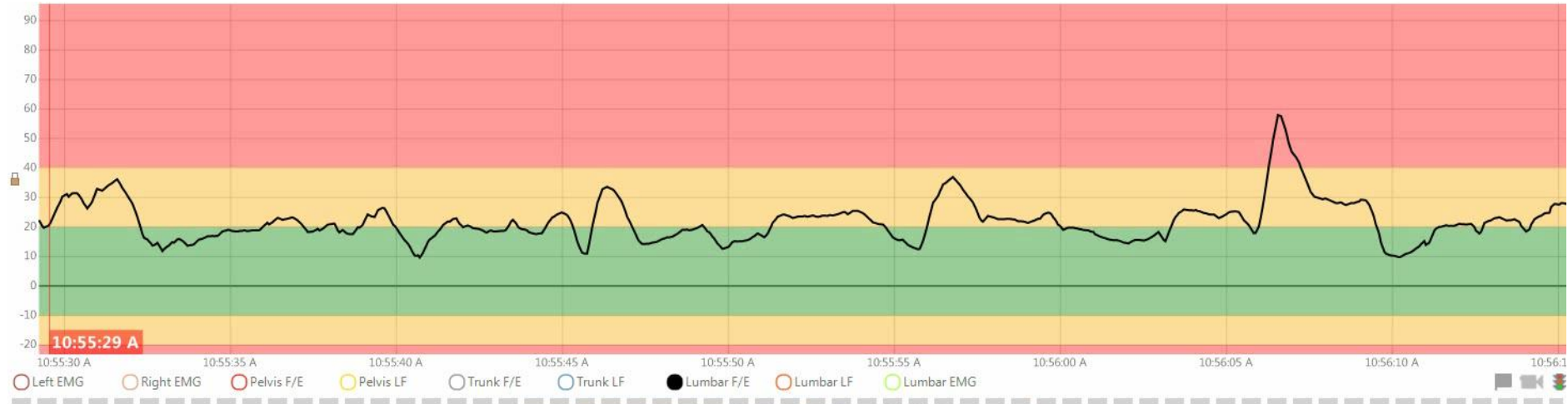


# Example: Raw data (back) – Traditional





# Example: Raw data (back) – EcoSpot

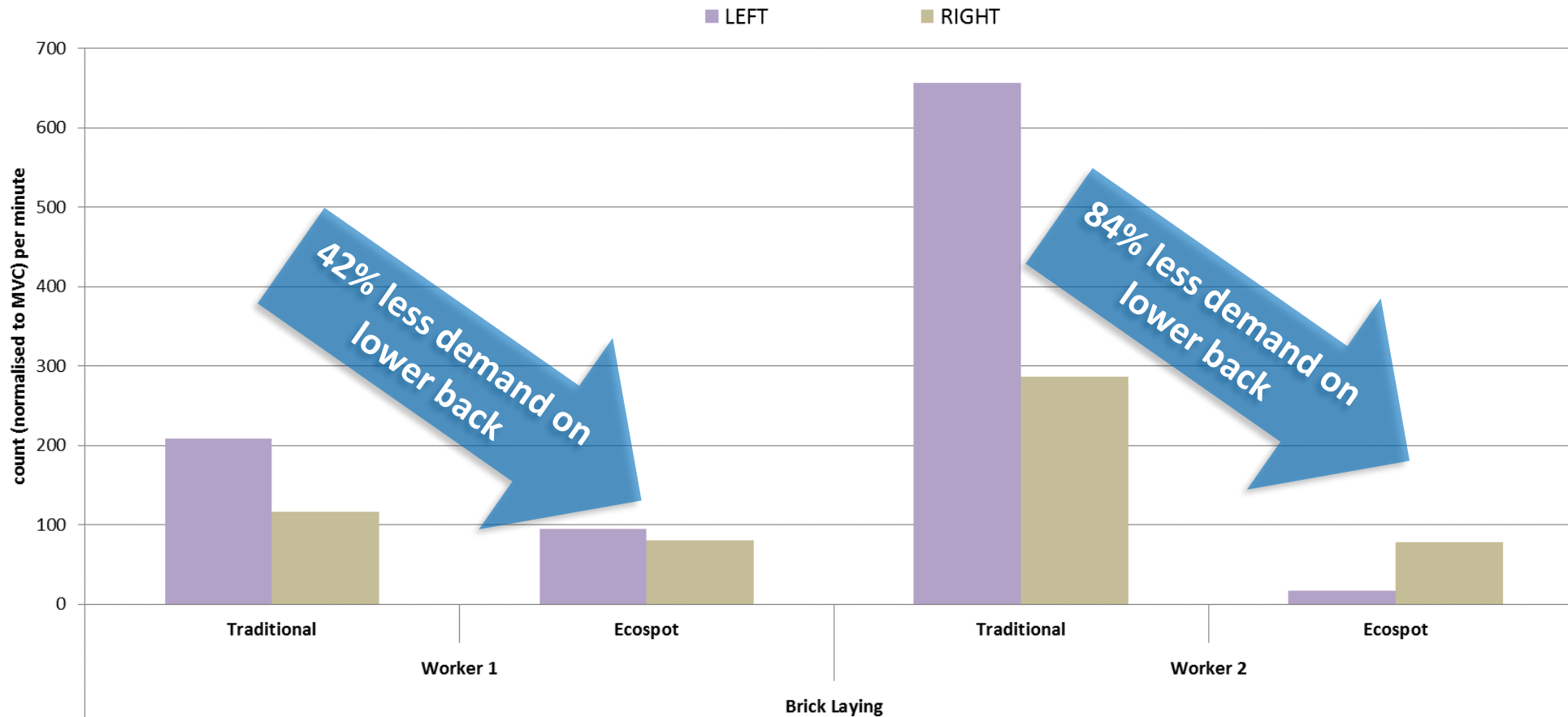




# Brick Laying: Back EMG - Summary



Lumbar EMG (normalised to MVC) per minute



# Overall Assessment Summary



Worker	Task	Subtask	Variation A	Potential injury area	
				Back	Shoulder
Worker 1	Brick Laying	Traditional	High wall	x	x
			Low wall	x	◆
		EcoSpot	High wall	◆	x
			Low wall	◆	x
Worker 2	Brick Laying	Traditional	High wall	x	x
			Low wall	x	x
		EcoSpot	High wall	◆	x
			Low wall	◆	x
	Filling board	Traditional		x	x
		EcoSpot		✓	x

### Best Practice:

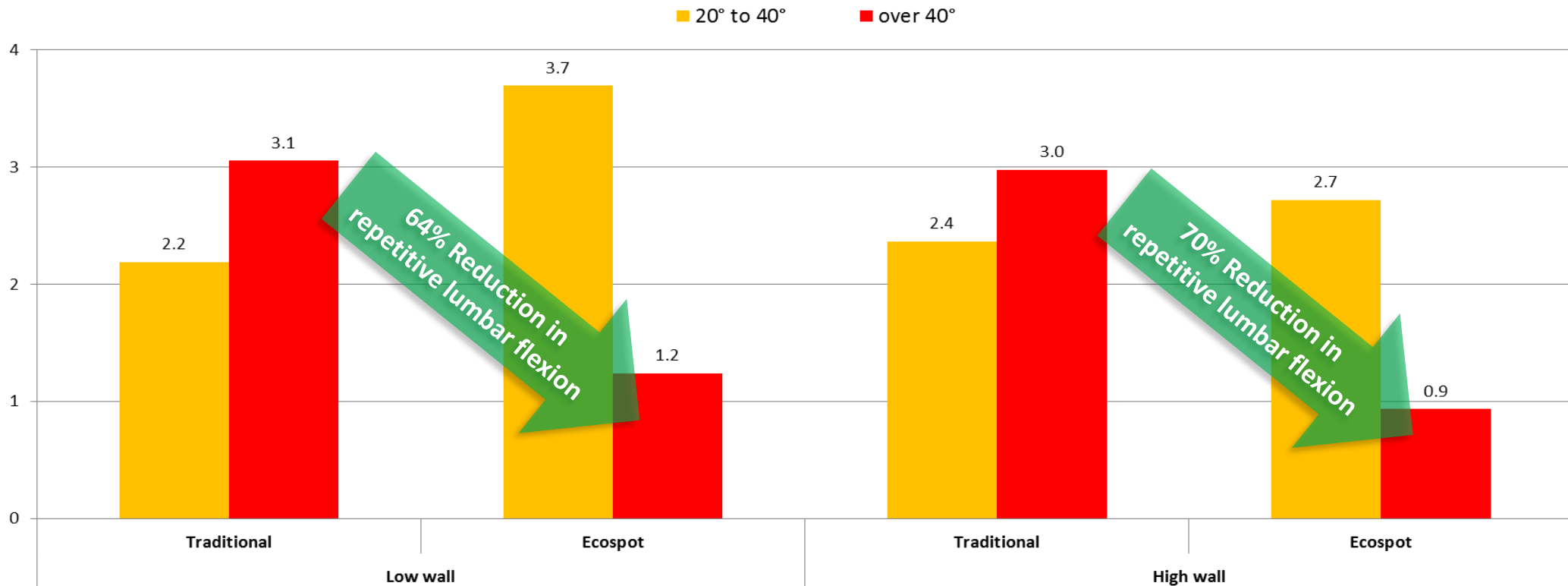
- ✓ No action
- ◆ Action advised
- x Action

# Brick Laying: Back Repetitive - Summary

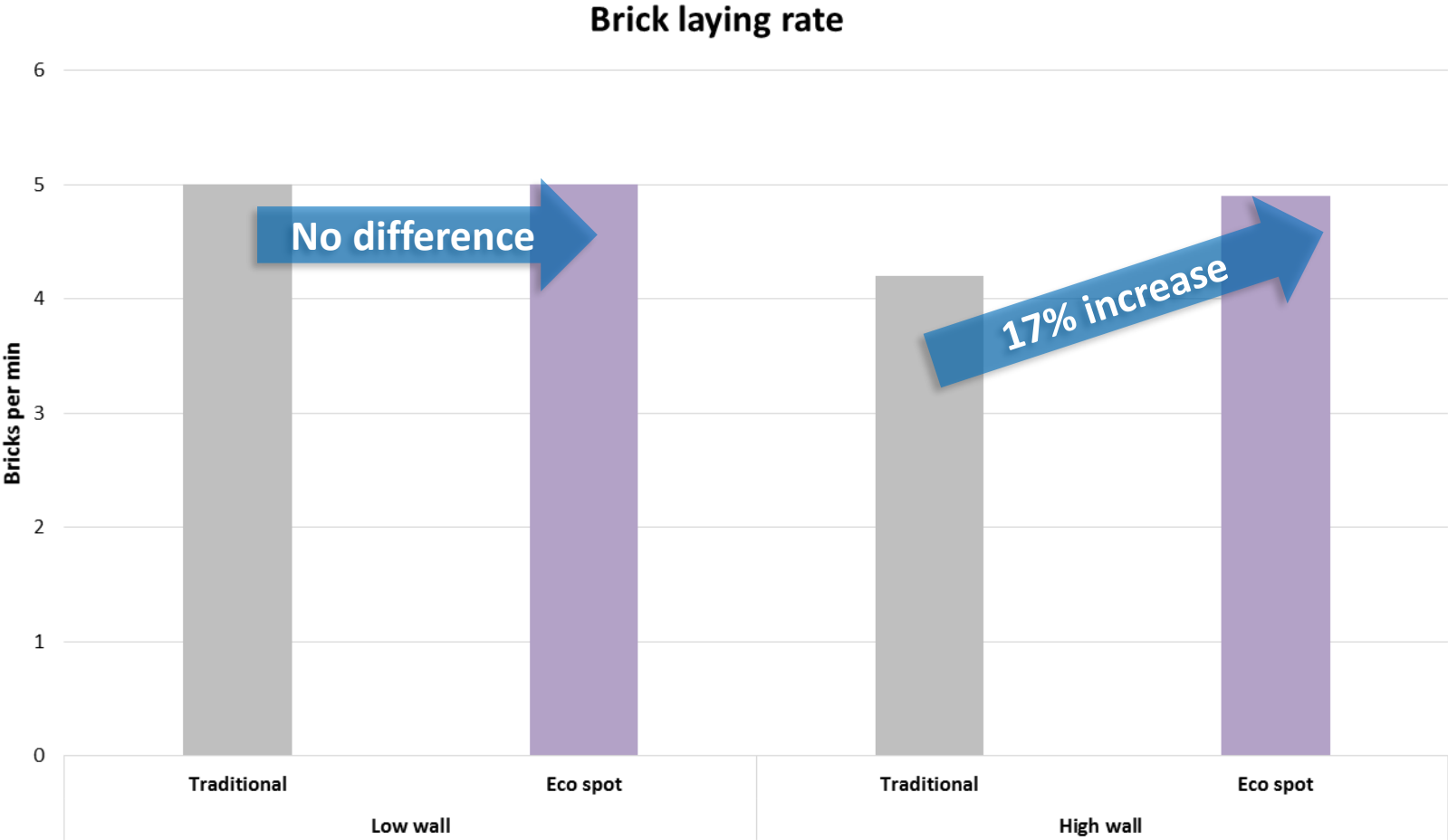


## Lumbar flexions over threshold (per minute)

NOTE: Extrapolated and/or averaged values



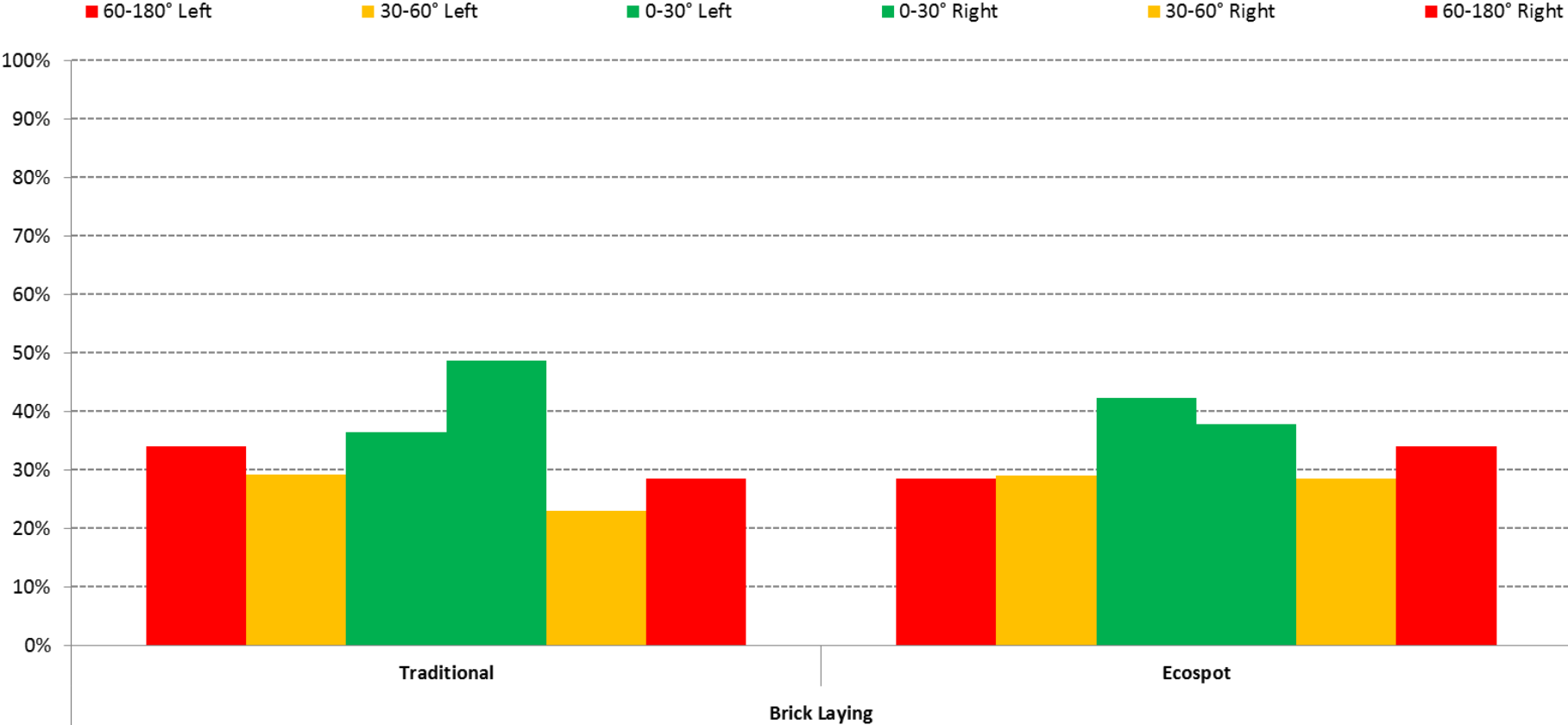
# Brick Laying: Rate of laying bricks



# Brick Laying: Shoulder



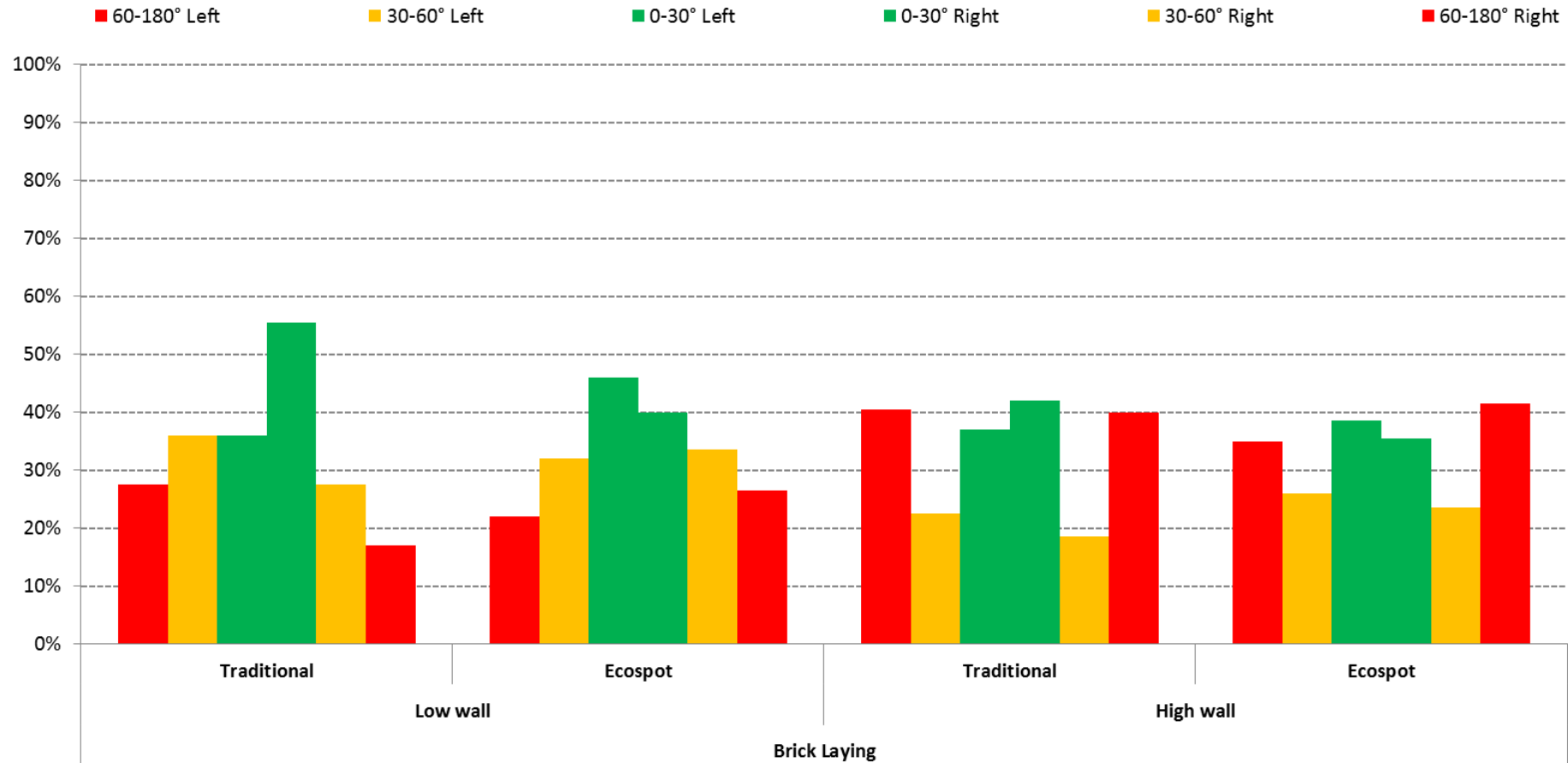
Proportion of time spent at various degrees of shoulder elevation



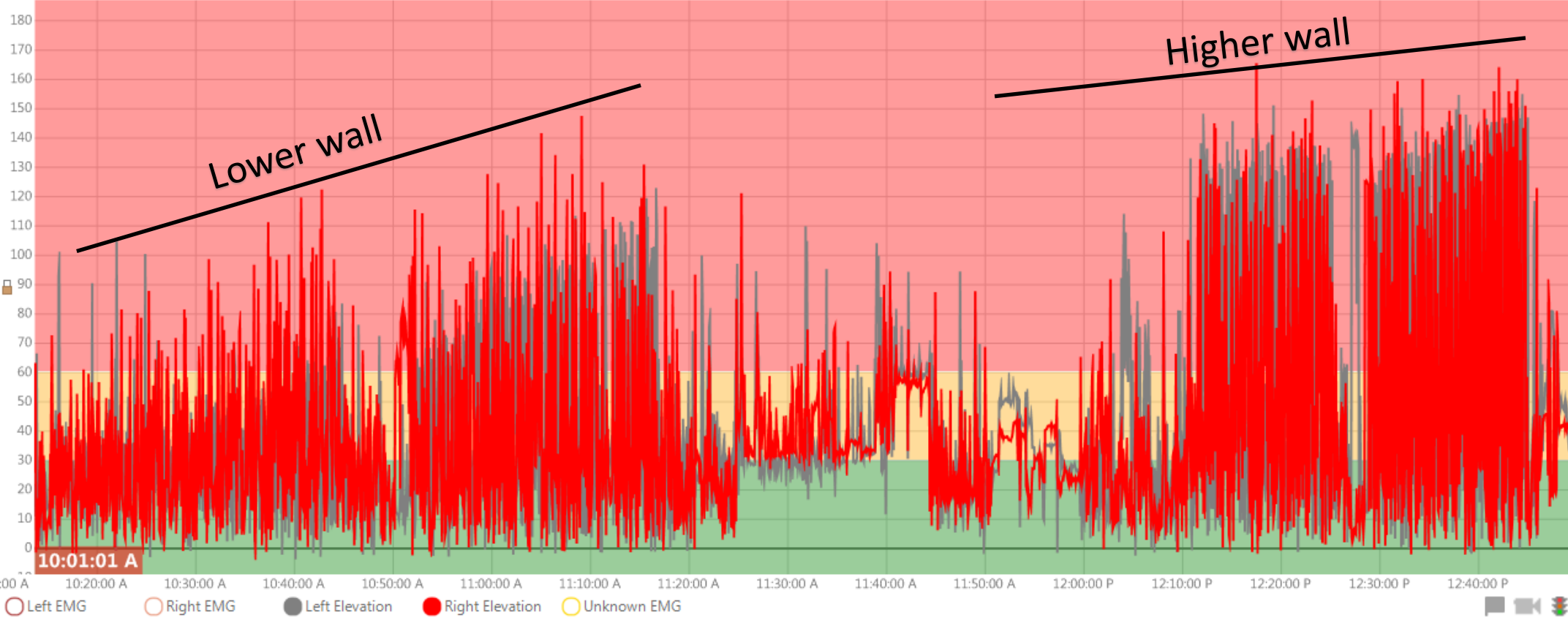
# Brick Laying: Shoulder



Proportion of time spent at various degrees of shoulder elevation



# Brick Laying: Shoulder



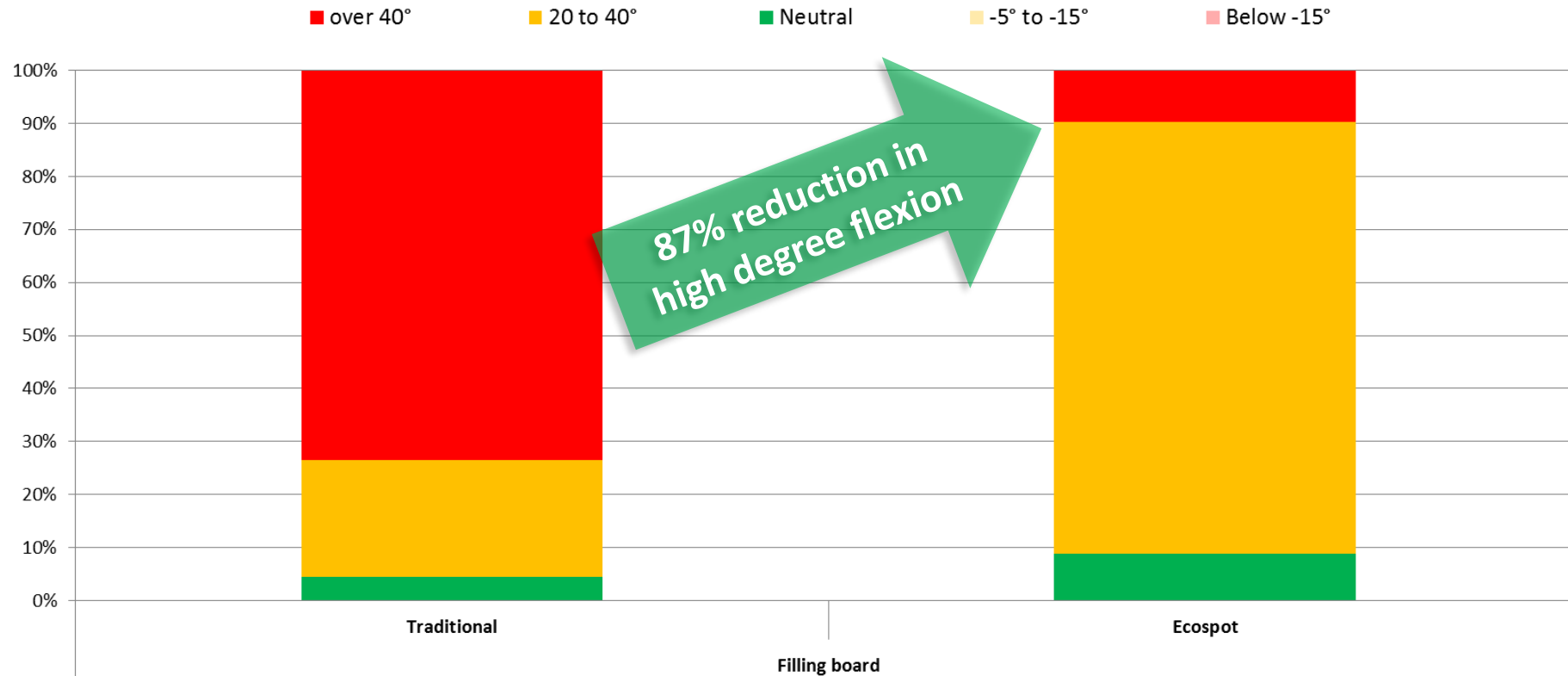
~ 3 hours – whole session



# Filling Board: Back (snapshot)



Proportion of time spent at various degrees of lumbar flexion

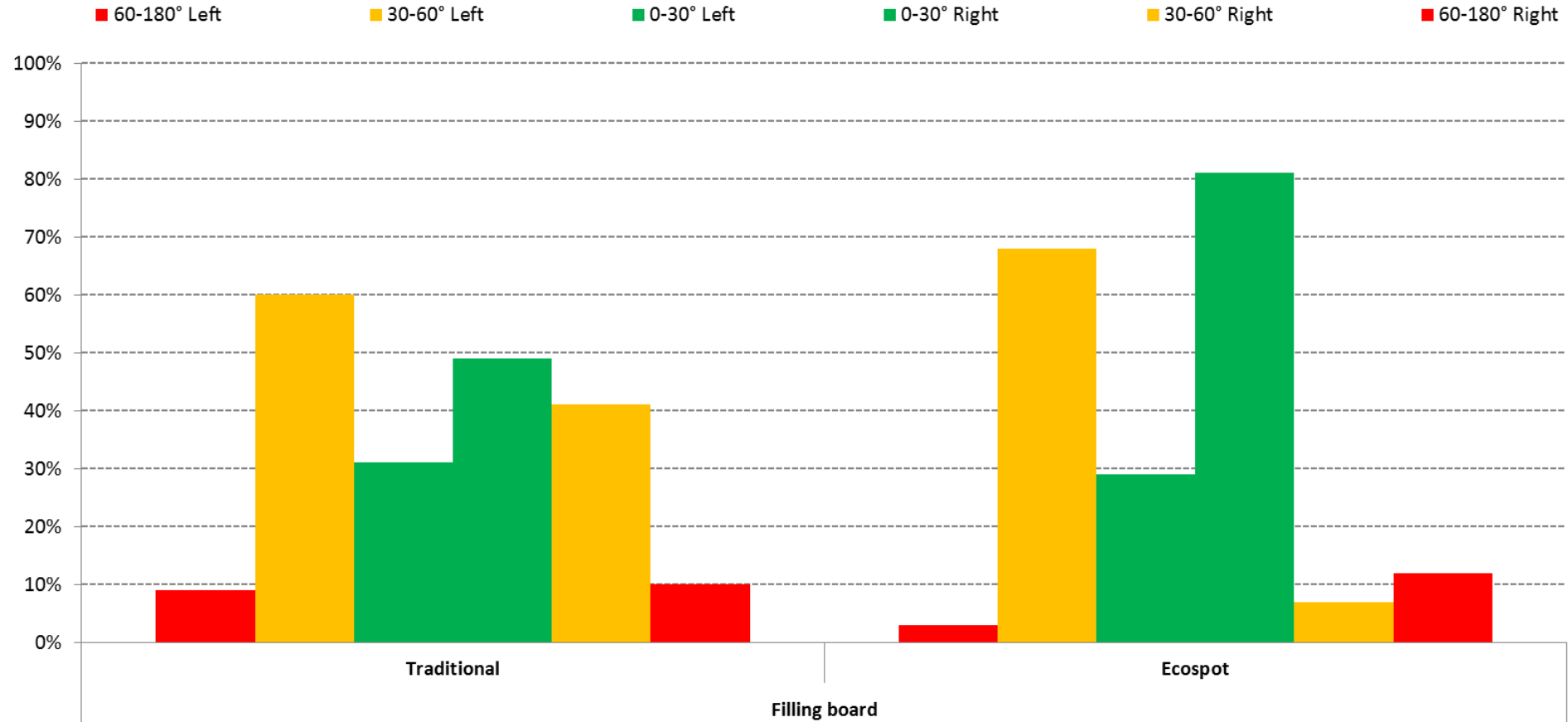




# Filling Board: Shoulder

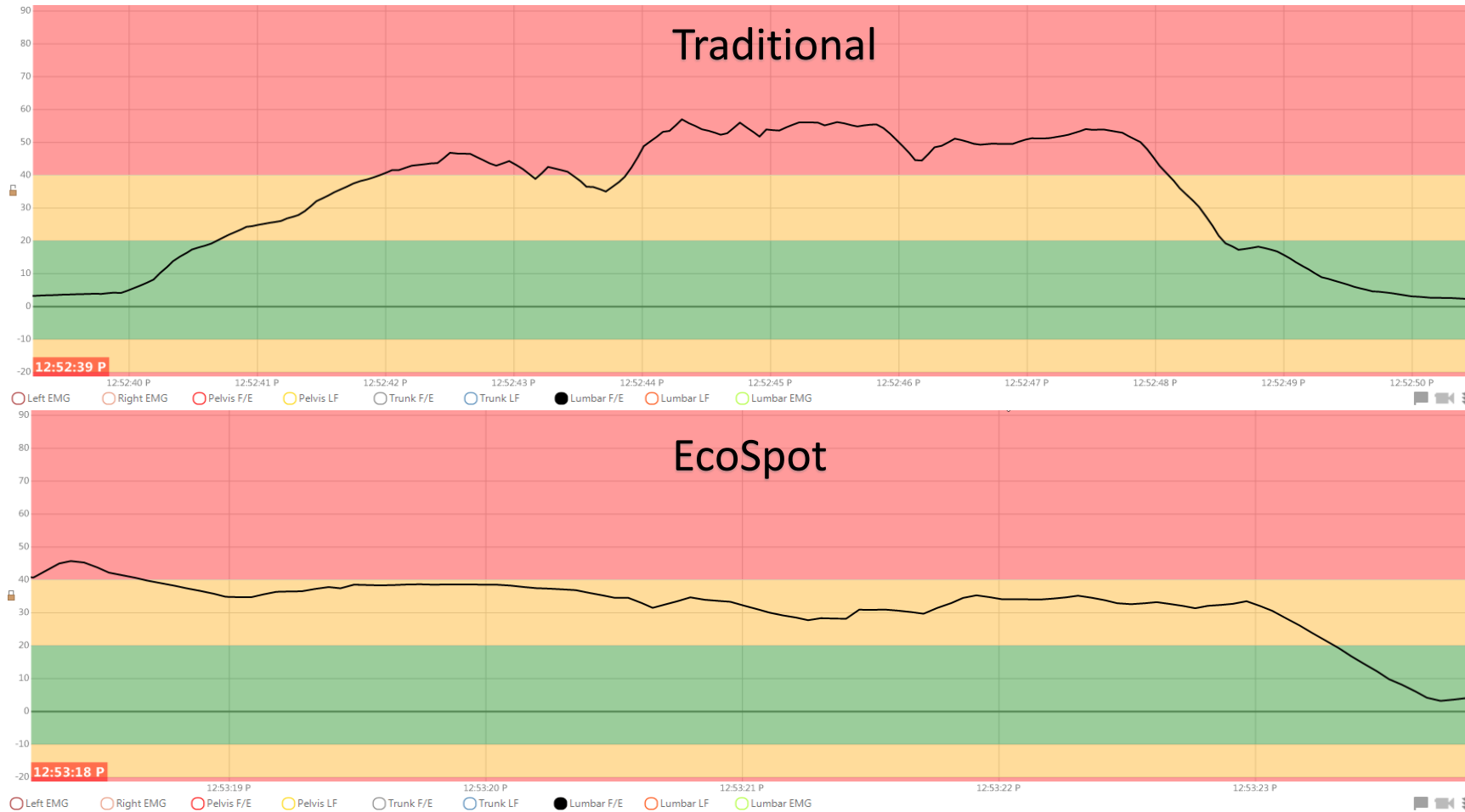


Proportion of time spent at various degrees of shoulder elevation





# Filling Board: Back flexion comparison



# Summary & Outcomes

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**EcoSpot Board = *reduced* risk of back injury**

- Up to **84% less strain** on low back muscles
- Time spent with back bent over 20 degrees **reduced by up to 85%**
- Repetition of higher risk movements **reduced by up to 70%**
- **17% increase** in productivity, measured in bricks per minute