

The logo for TEGERA, featuring a green square followed by the word "TEGERA" in a bold, light blue, sans-serif font with a registered trademark symbol (®) to its upper right.

KNOW YOUR MUSCLES

Importance of good working gloves – ErgoSleeve in validating the gloves and measuring arm muscle load

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CASE STUDY – part 1- TEGERA GLOVES

Find out differences in selected types of safety gloves in view of forearm grip ergonomics during hold and release test & torsion test

Glove models in comparison, + bare hand

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TEGERA 325

Soft, synthetic leather glove with good grip and reinforced index finger.

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TEGERA 8801 INFINITY

Super soft, foam finish, palm dipped
Great fingertip sensitivity, suitable for precision work in dry environments.

■ TEGERA®



TEGERA 9102

A glove that never loses its grip
The palm is laminated with our own material Gripforce with a diamond pattern.

CASE STUDY – part 2- GLOVES IN FOOD INDUSTRY

Find out differences in selected types of gloves on forearm muscle load in handling food industry items

Glove models : cut protection gloves (first 4), biomaterial (Tegera 906) eligible for food industry (all) , current glove in use (Maxifoam) and widely used nitril gloves + bare hand

TEGERA 8807



TEGERA 8815



TEGERA 906



MAXIFOAM



NITRIL GLOVES



SUBJECTS AND METHODS

- Subjects
 - 2 subjects (males)
 - Age avg. 44 years
 - Height avg. 179 cm
 - Weight avg. 80 kg
 - Work experience avg. 18 years
- MVC tests for forearm flexors and extensors
- Vertical and horizontal arm and hand movement calibration tests

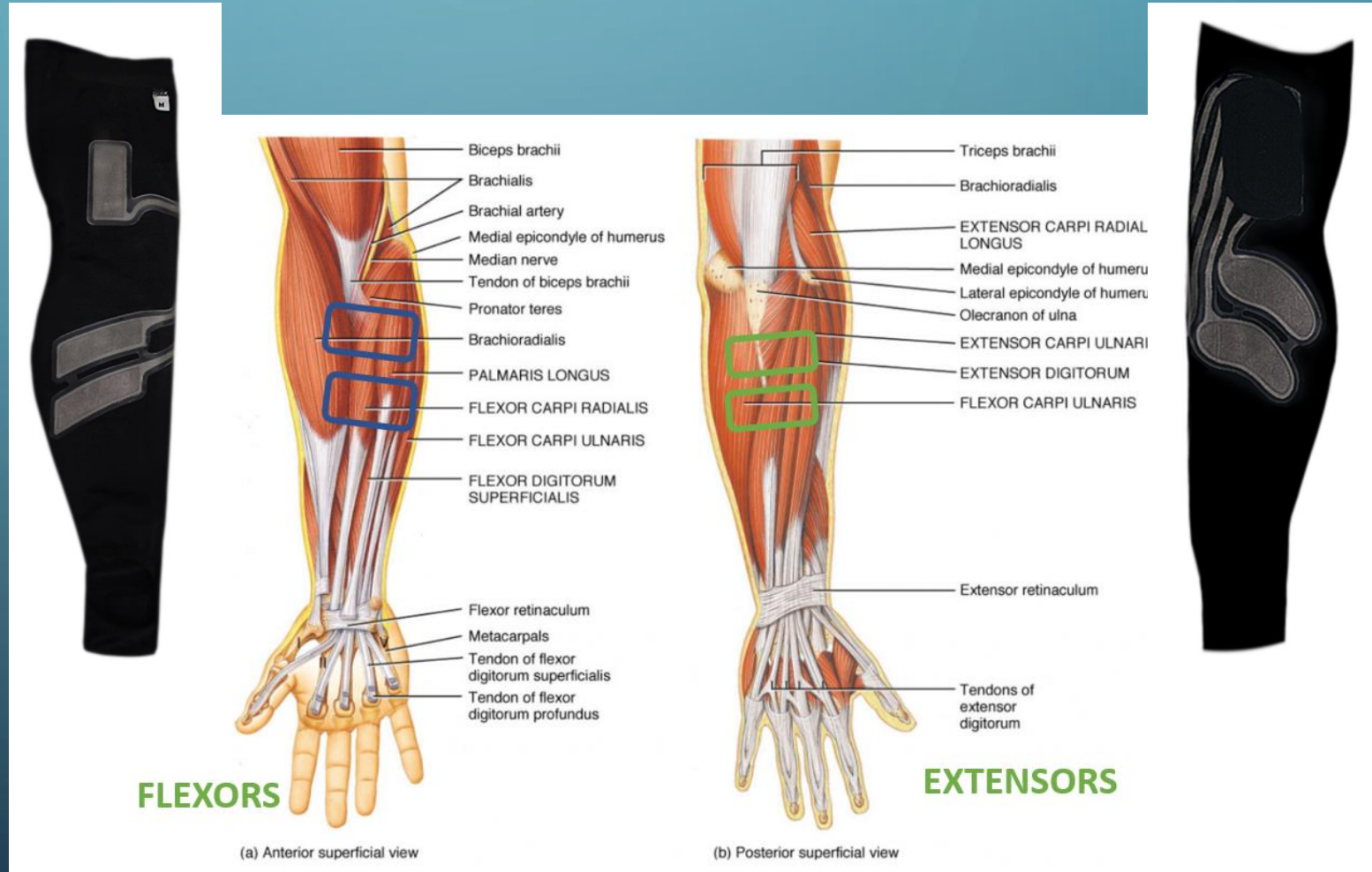


ERGOANALYSIS MEASUREMENT TOOLS

- Full body EMG suite: shirt, shorts, Mbelt, ErgoSleeve, CalfSleeve
 - Muscle groups: forearm, biceps, deltoideus, trapezius, quadriceps, hamstrings, gluteus
- Upper arm elevation
- Trunk forward bending
- Heart rate
- Video



ERGOSLEEVE'S SENSOR POSITIONING ON FOREARM MUSCLE GROUPS



DATA ANALYSIS

- Synchronized video and biosignals
- Reference thresholds for overloading based on scientific studies
- Manual defining areas of interest based on video recording

Ergo Link software

The screenshot displays the Ergo Link software interface. On the left, there is a sidebar with navigation icons. The main area features a video player showing a person working at a table. Below the video is a graph with multiple colored lines representing different biosignals over time. To the right of the video is a table with columns for Start Time, End Time, and Name, listing various activities like 'Pöytätyö' and 'Pöytätyö' with associated weights. Below the table is a section for MVC (Maximum Voluntary Contraction) values for different muscles.

Start Time	End Time	Name
00:04:08	00:05:11	Pöytätyö 10 kg
00:05:16	00:06:32	Pöytätyö 10 kg
00:06:58	00:08:12	Pöytätyö 10 kg
00:08:47	00:09:43	Pöytätyö 15 kg
00:09:56	00:11:28	Pöytätyö 15 kg
00:11:45	00:13:42	Pöytätyö 25 kg
00:14:07	00:15:66	Pöytätyö 27 kg



The composite image shows three data analysis reports. The first report, titled 'KOKO TYÖAIKA', displays 'MUSCLE LOADING' with a bar chart showing peak muscle load for different muscles. The second report, 'ANGULAR VELOCITY', includes a diagram of a hand and wrist, a bar chart of maximum flexion and extension angles, and a 'MICROBREAKS' section showing 59% and 40% values. The third report, 'MUSCLE TENSION', features a bar chart of muscle tension and a 'MEASUREMENT NOTES' section with recommendations.

SIMULATED WORK TESTS

-Average muscle loading during 3 sequential trials

- Part 1: Hold and release test - minimum muscle load just before losing grip
 - sample bottle (~ 1kg) at wide and narrow grip
- Turning torque screwdriver at 3 levels (~ 0,5 Nm, ~1,0 Nm, ~1,5 Nm)
- Part 2: Hold and release test - minimum muscle load just before losing grip
 - 5 grocery store items



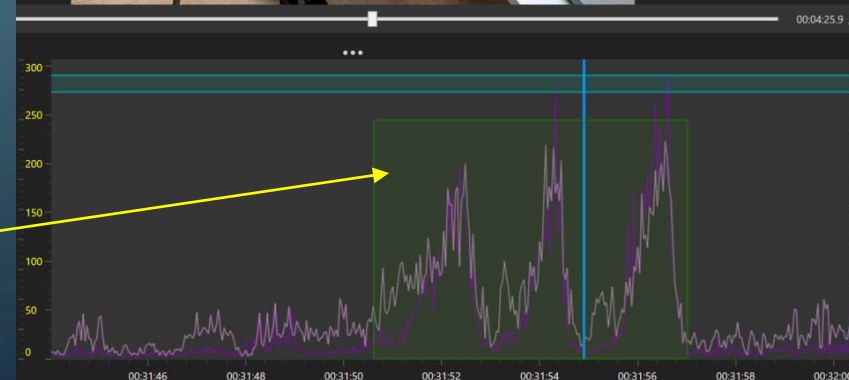
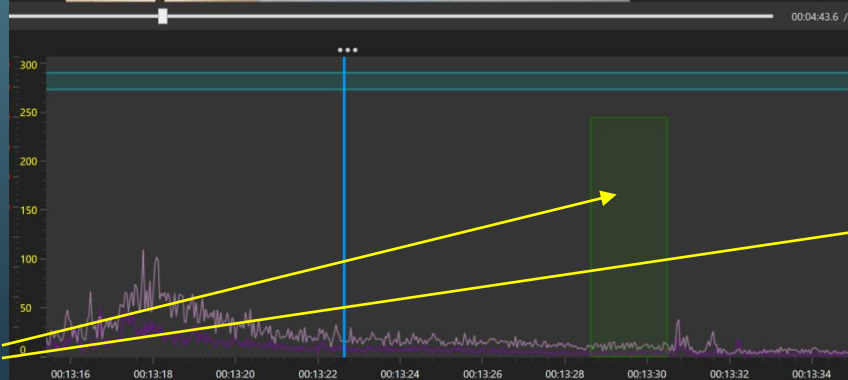
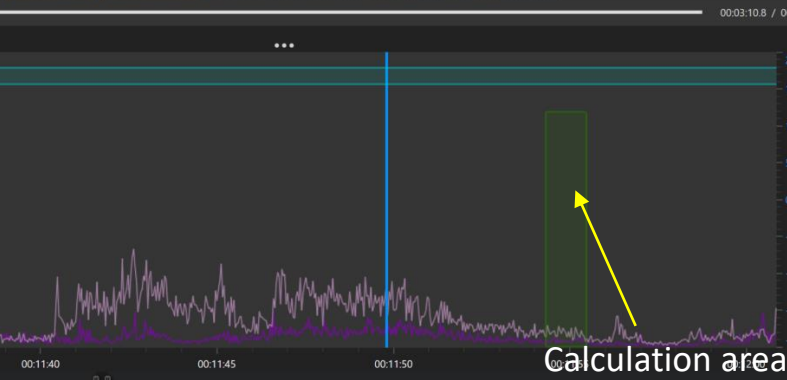
NARROW GRIP



WIDE GRIP



TURNING TORQUE



USER EXPERIENCE SHOULD BE CONSIDERED WITH THE PHYSICAL MEASUREMENTS

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TEGERA 325

Soft, synthetic leather glove with good grip and reinforced index finger.

Soft and stretchable to wear on hand.

Similar performance with regard to ergonomics aspects

■ TEGERA®



TEGERA 8801 INFINITY

Super soft, foam finish, palm dipped

Great fingertip sensitivity, suitable for precision work in dry environments.

Soft, stretchable and very comfortable to wear.

Nice fitting on hand.

Best ergonomics

Nice fitting on hand, but a bit stiff grip feeling.

Lowest muscle loading during strong torsion movements

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RESULTS

PART 2: TEGERA 906 AND MAXIFOAM WERE BEST IN HANDLING GROCERY STORE ITEMS

Glove comparison in food industry

Type of movement

Wrist muscles

Loading % in relation to MVC

Glove models	Nitril	MAXIFOAM	TEGERA 8807	TEGERA 8815	TEGERA 906	STD	Bare hand/dry
1. Soda 1,5 l	17,1	9,5	15,3	14,4	10,4	3,1	10,6
2. Aluminium can 0,5 l	7,5	7,7	7,8	7,2	7,8	0,2	7,5
3. 6-pack beer container	12,8	11,3	10,9	11,3	11,6	0,6	11,9
4. Flour, 1 kg	10,7	10,0	9,8	9,7	10,5	2,9	17,1
5. Small package of screws	2,9	2,8	2,8	2,8	2,6	0,1	2,8
Forearm in total	10,2	8,3	9,3	9,1	8,6		10,0
	STD 5,4	3,3	4,5	4,4	3,6		5,3

EXAMPLE OF EMG IN HANDLING FLOUR BAG WITH A BARE HAND AND A GLOVE



SUMMARY

- The role of gloves on physical load in hand intensive work is small but measurable with wearable EMG
- Lifting and holding may benefit from different types of work gloves compared to the torsion movement
- The best glove in torsion movement was judged as stiff by the users. Such a glove may not be good in other tasks than heavy torsion.
- Handling objects with bare hand is the worst choice
- Measureing small differences and light loads requires prompt measurement protocol including randomization.

PRACTICAL RELEVANCE OF GOOD WORKING GLOVES IN ERGONOMICS

- Importance of working gloves selection: Even small reduction (5-10%) in physical load is meaningful when the task is performed several hours/considerable time during the work day
- EMG is a potential tool in product development and ergonomic aspects should be brought up in product marketing.
- Lightening the work load requires often multiple actions on work, environment and worker performance. Adding up small workload reductions may end up to considerably lighter work load.
- Reducing work load usually makes work more fluent and productive. It also enhances work safety.

THANK YOU!



*“If you can’t measure it,
you can’t manage it.”
– Peter Drucker*