TuMeke Ergonomics

Harnessing AI for Injury Prevention

Smarter safety: from clipboards to computer vision

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About Me

Jenny Zhao, CPE

Customer Success Manager & Ergonomist

Jenny is a Certified Professional Ergonomist (CPE) with over 7 years of working experience in office, industrial, laboratory, and beyond.
She holds a Bachelor of Science in Human Factors and Ergonomics from Cornell University. She has operated out of NYC, LA, and Singapore and now is based in New York.

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Elephant in the room: AI

Which one best describes you?

Don’t know much at all about AI

Somewhat familiar

Experienced, or currently using

Elephant in the room: AI

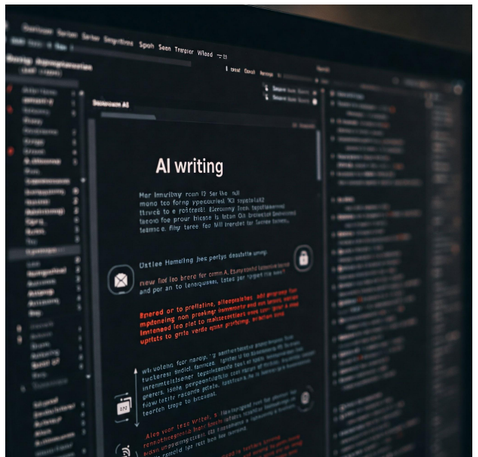
How do you feel about it?

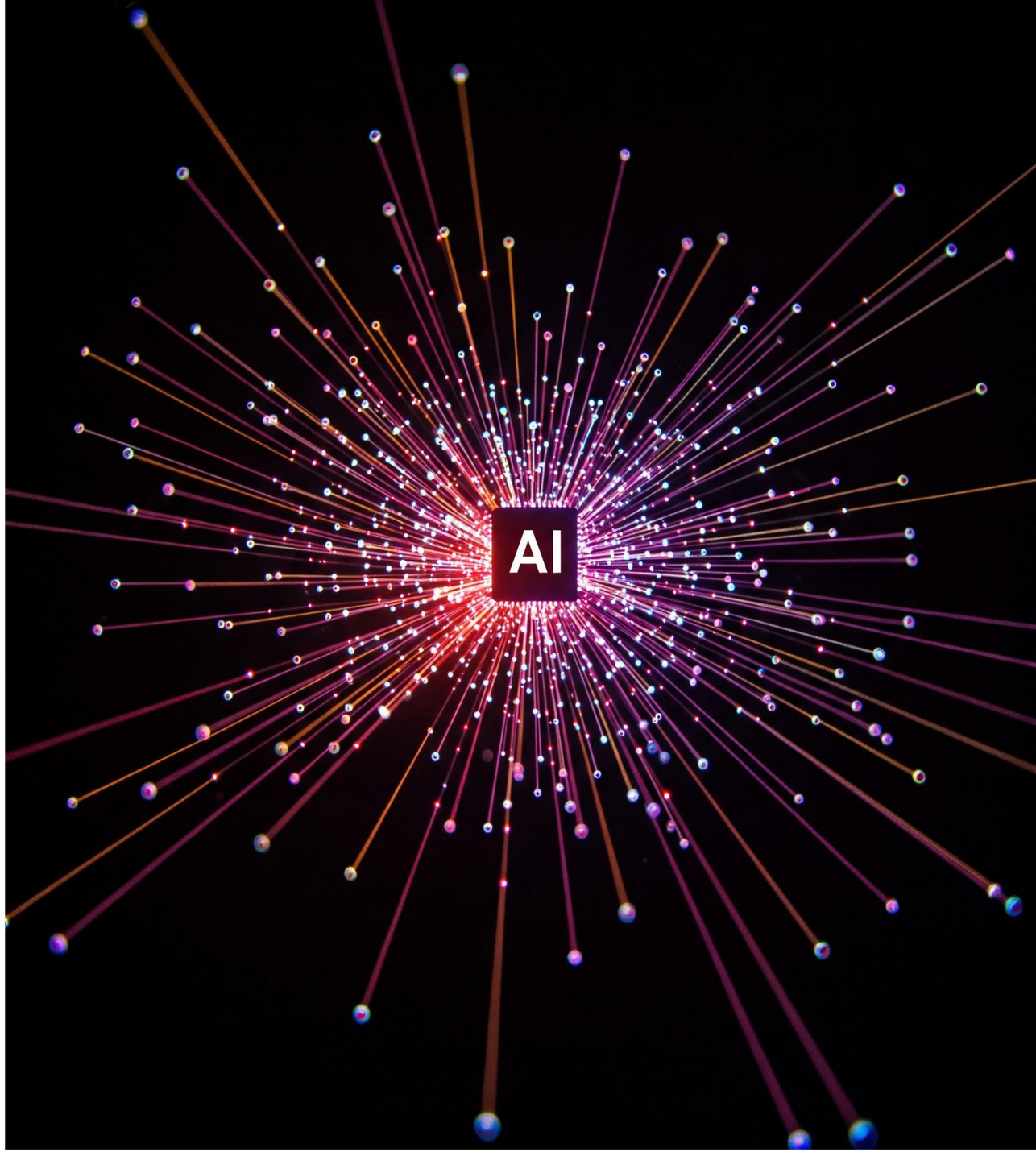
Really excited about it

Neutral

The Robot Overlords are going to overtake humanity!

Wait a minute... What is AI?





A brief history and milestones

1956 – The Birth of AI (Literally)
👉 The term “Artificial Intelligence” is coined at a summer research workshop at Dartmouth College.

1997 – AI Beats the World Chess Champion
👉 IBM’s Deep Blue defeats Garry Kasparov in chess.

2011 – Watson Wins on Jeopardy!
👉 IBM’s Watson beats Jeopardy! champs using natural language processing.

2012 – The Deep Learning Breakthrough
👉 A computer learns to recognize cats on YouTube.

2016 – AlphaGo Beats the Best at Go
👉 AI from Google DeepMind beats the world champ at a game that’s *way* more complex than chess.

2020s – AI Enters the Workplace
👉 AI starts being used in everything from self-driving cars to injury prevention tools on factory floors.
(*It’s no longer “someday” — it’s here.*)


The $17 Billion Problem

The $17B problem we can’t ignore

$17 billion in MSD costs annually, $13 billion of which is overexertion injuries.

MSDs = 40% all non-fatal workplace injuries

Productivity, absenteeism, lower morale, increased turnover, reputational damage

The Problem with Traditional Ergonomics

Manual, time-consuming, reactive
Plus shortage of resources

Fewer Assessments

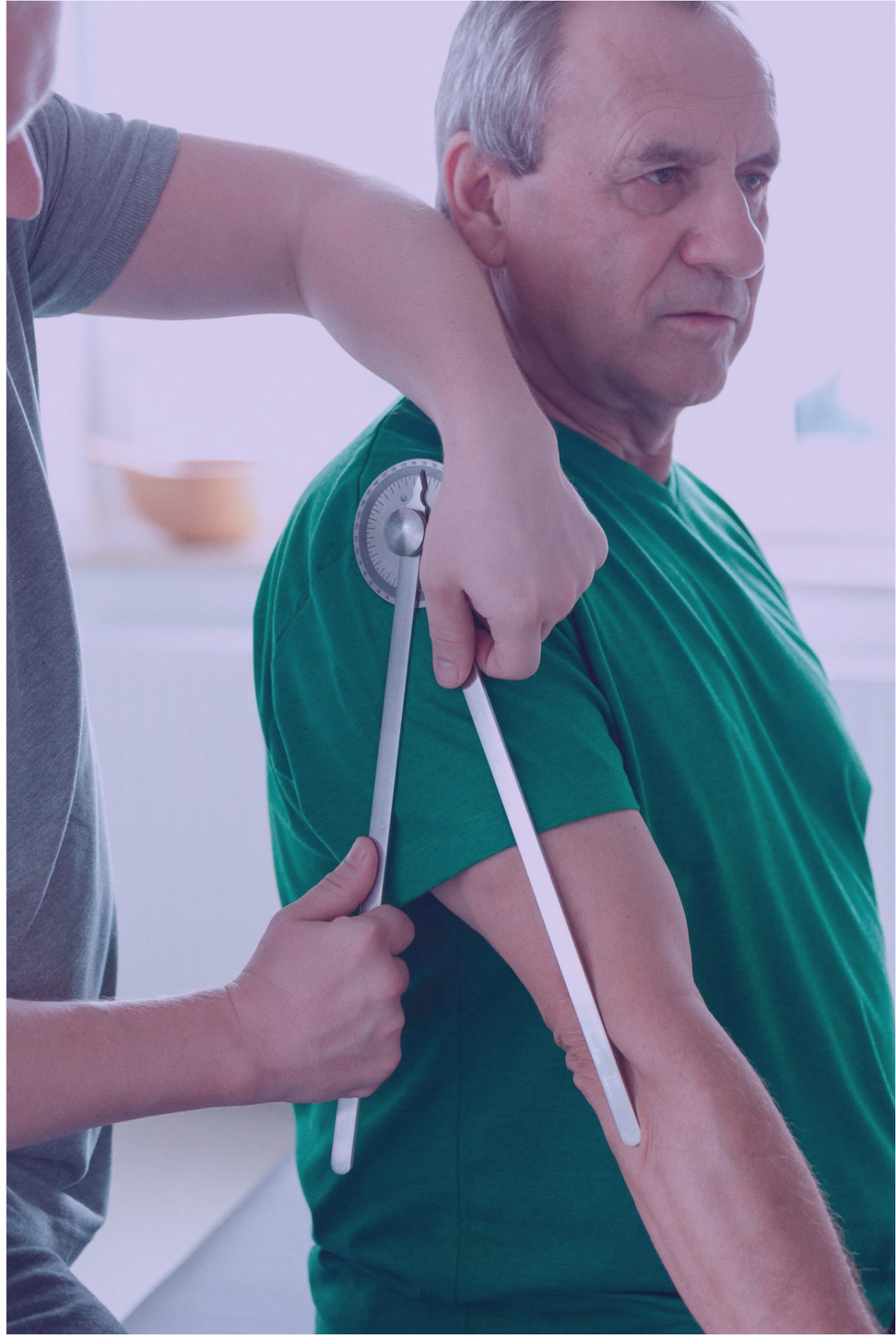
Tedious nature of traditional approaches leads to fewer assessments being conducted

More Injuries

Less time to complete assessments or implement changes leads to increased number of injuries

Negative Impact

Injuries reduce productivity while increasing workers' comp payouts, absenteeism and turnover



REBA Employee Assessment Worksheet

TuMeke Ergonomics

A. Neck, Trunk and Leg Analysis

Step 1 : Locate Neck Position

Neck Score

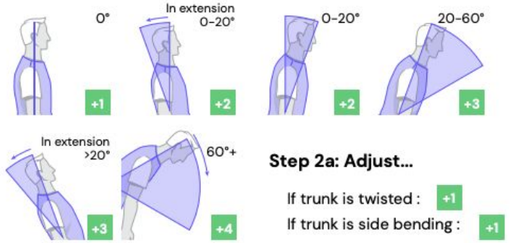
Step 1a: Adjust...

If neck is twisted : +1

If neck is side bending : +1

Step 2: Locate Trunk Position

Trunk Score



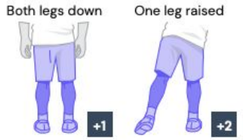
Step 2a: Adjust...

If trunk is twisted : +1

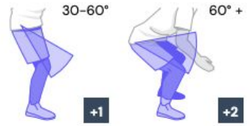
If trunk is side bending : +1

Step 3: Legs

Leg Score



Adjust...



Step 4: Look-up Posture Score in Table A

Using values from steps 1-3 above, locate score in **Table A**

Posture Score A

\+

Step 5: Add Force/Load Score

If load < 11 lbs : **+0**

If load 11 to 22 lbs : **+1**

If load > 22 lbs: **+2**

Adjust: If shock or rapid build up of force: **+1**

Force/Load Score

=

Step 6: Score A, Find Row in Table C

Add values from steps 4 & 5 to obtain Score A.

Find Row in Table C.

Score A

SCORES

Table A

Legs	Neck 1				2				3			
	1	2	3	4	1	2	3	4	1	2	3	4
Trunk Posture Score 1	1	2	3	4	1	2	3	4	3	3	5	6
2	2	3	4	5	3	4	5	6	4	5	6	7
3	2	4	5	6	4	5	6	7	5	6	7	8
4	3	5	6	7	5	6	7	8	6	7	8	9
5	4	6	7	8	6	7	8	9	7	8	9	9

Table B

Wrist	Lower Arm 1			2		
	1	2	3	1	2	3
Upper Arm Score 1	1	2	2	1	2	3
2	1	2	3	2	3	4
3	3	4	5	4	5	5
4	4	5	5	5	6	7
5	6	7	8	7	8	8
6	7	8	8	8	9	9

Table C

Score A	Score B 1	2	3	4	5	6	7	8	9	10	11	12
1	1	1	1	2	3	3	4	5	6	7	7	7
2	1	2	2	3	4	4	5	6	6	7	7	8
3	2	3	3	3	4	5	6	7	7	8	8	8
4	3	4	4	4	5	6	7	8	8	9	9	9
5	4	4	4	5	6	7	8	8	9	9	9	9
6	6	6	6	7	8	8	9	9	10	10	10	10
7	7	7	7	8	9	9	9	10	10	11	11	11
8	8	8	8	9	10	10	10	10	10	11	11	11
9	9	9	9	10	10	10	11	11	11	12	12	12
10	10	10	10	11	11	11	11	12	12	12	12	12
11	11	11	11	11	12	12	12	12	12	12	12	12
12	12	12	12	12	12	12	12	12	12	12	12	12

Table C Score + Activity Score = **REBA Score**

REBA Scoring

1	negligible risk
2 or 3	low risk, change may be needed
4 to 7	medium risk, further investigation, change soon
8 to 10	high risk, investigate and implement change
11 +	very high risk, implement change

B. Arm and Wrist Analysis

Step 7 : Locate Upper Arm Position

Step 7a: Adjust...

If shoulder is raised: +1

If upper arm is abducted: +1

If arm is supported or person is leaning: -1

Upper Arm Score

Step 8 : Locate Lower Arm Position

Lower Arm Score

Step 9 : Locate Wrist Position

Wrist Score

Step 9a: Adjust...

If wrist is bent from midline or twisted : +1

Step 10: Look-up Posture Score in Table B

Using values from steps 7-9 above, locate score in Table B

Posture Score B

\+

Step 11: Add Coupling Score

Well fitting Handle and mid range power grip	good, +0
Acceptable but not ideal hand hold or coupling acceptable with another body part	fair, +1
Hand hold not acceptable but possible	poor, +2
No handles, awkward, unsafe with any body part	Unacceptable: +3

Coupling Score

=

Step 12: Score B, Find Column in Table C

Add values from steps 10 &11 to obtain Score B.

Find column in **Table C** and match with Score A in row from step 6 to obtain Table C Score.

Score B

Step 13: Activity Score

+1 1 or more body parts are held for longer than 1 minute (static)

+1 Repeated small range actions (more than 4x per minute)

+1 Action causes rapid large range changes in postures or unstable base

Automate this asssessment with Computer Vision! Find us at www.tumeke.io

Original Worksheet Developed by Dr. Alan Hedge. Based on Technical note: Rapid Entire Body Assessment (REBA), Hignett, McAtamney, Applied Ergonomics 31 (2000) 201-205

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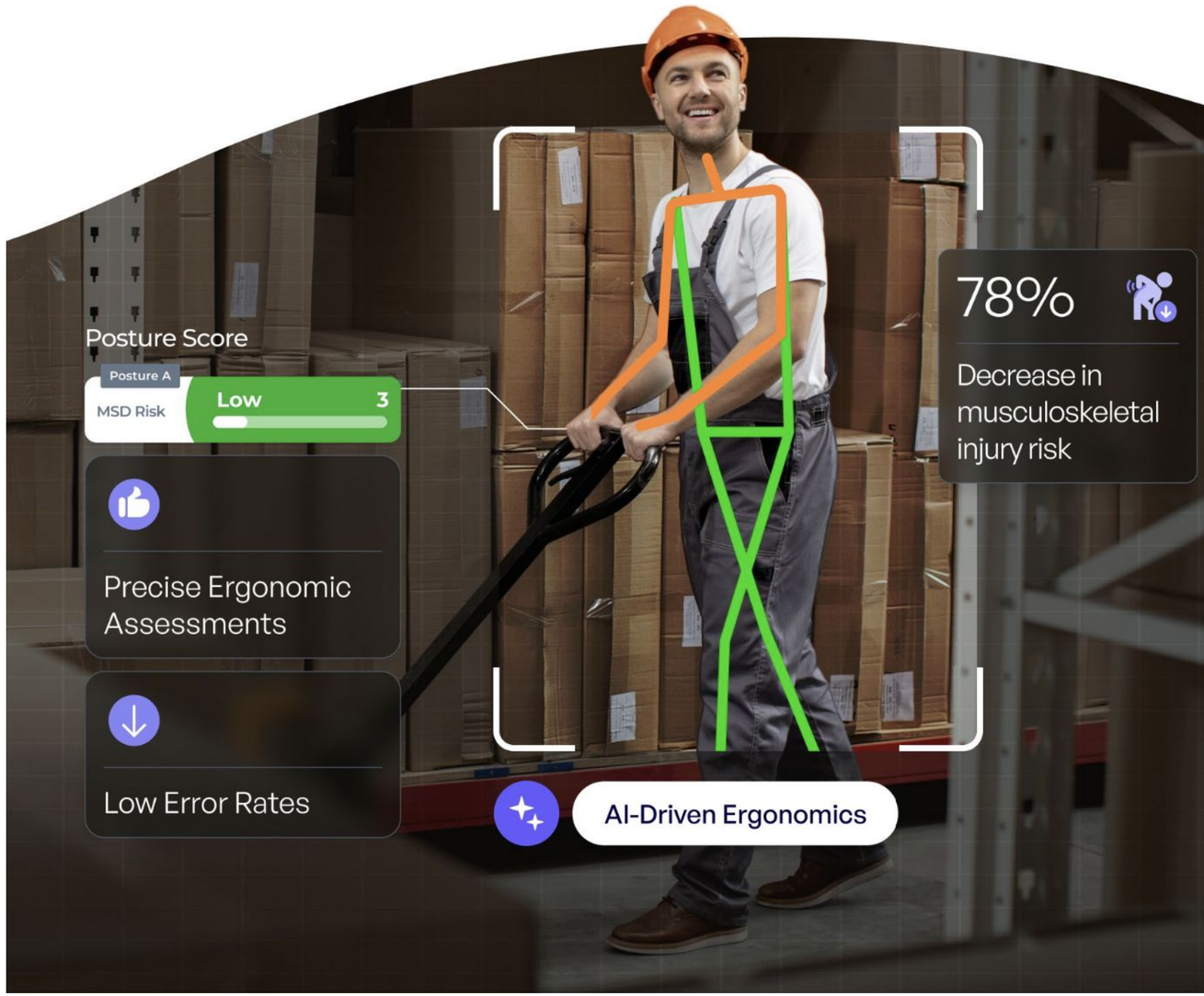
60
55
5
50
10
45
15
40
20
35
30
25

How AI can help

Real time, scalable, cost-efficient
Go from: REACTIVE to PROACTIVE
Democratizing ergonomics

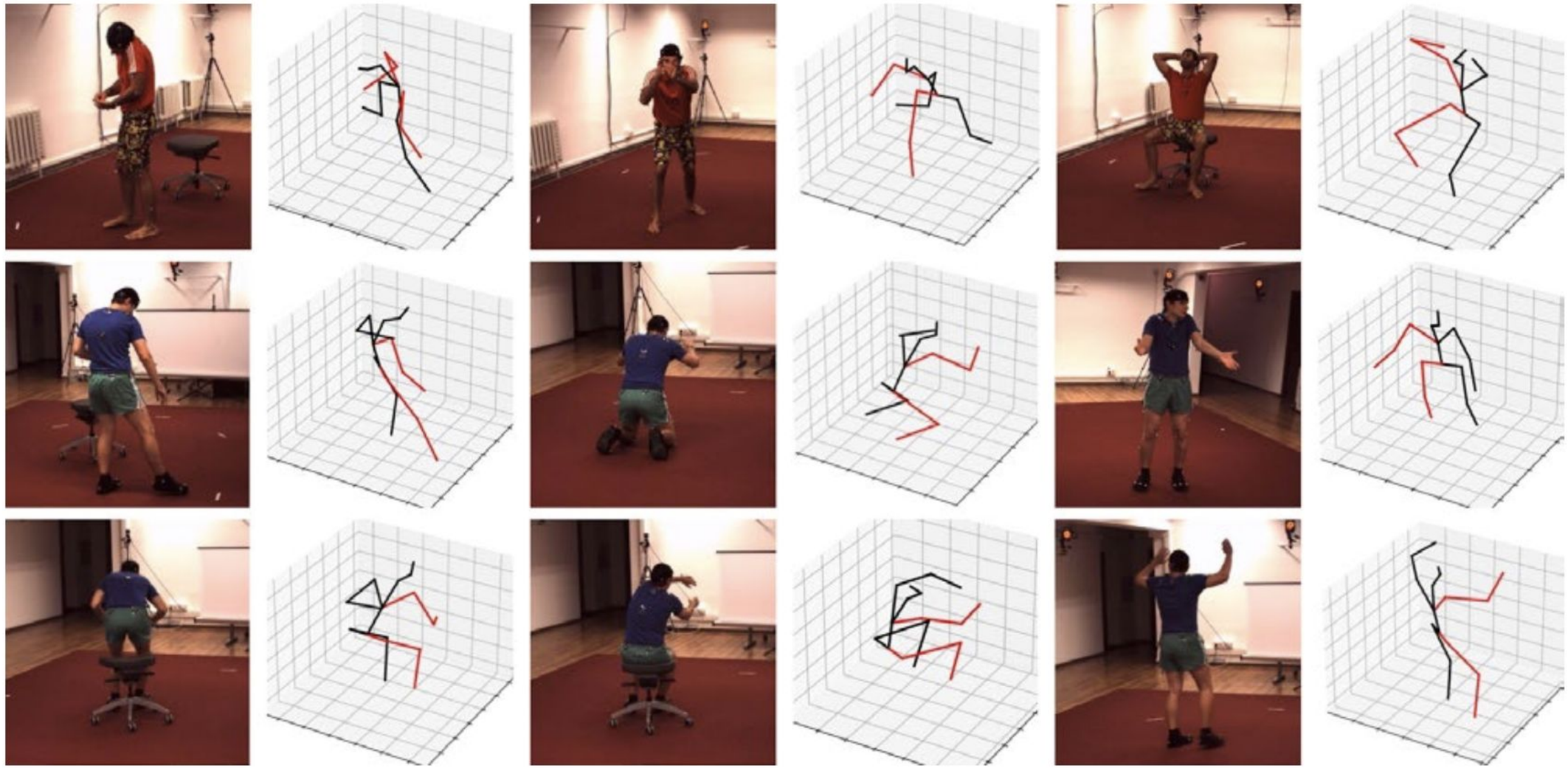
Ergonomics

TRADITIONAL	AI-DRIVEN
Reactive approach	**Proactive** approach
Time-consuming monitoring	**Real-time** monitoring



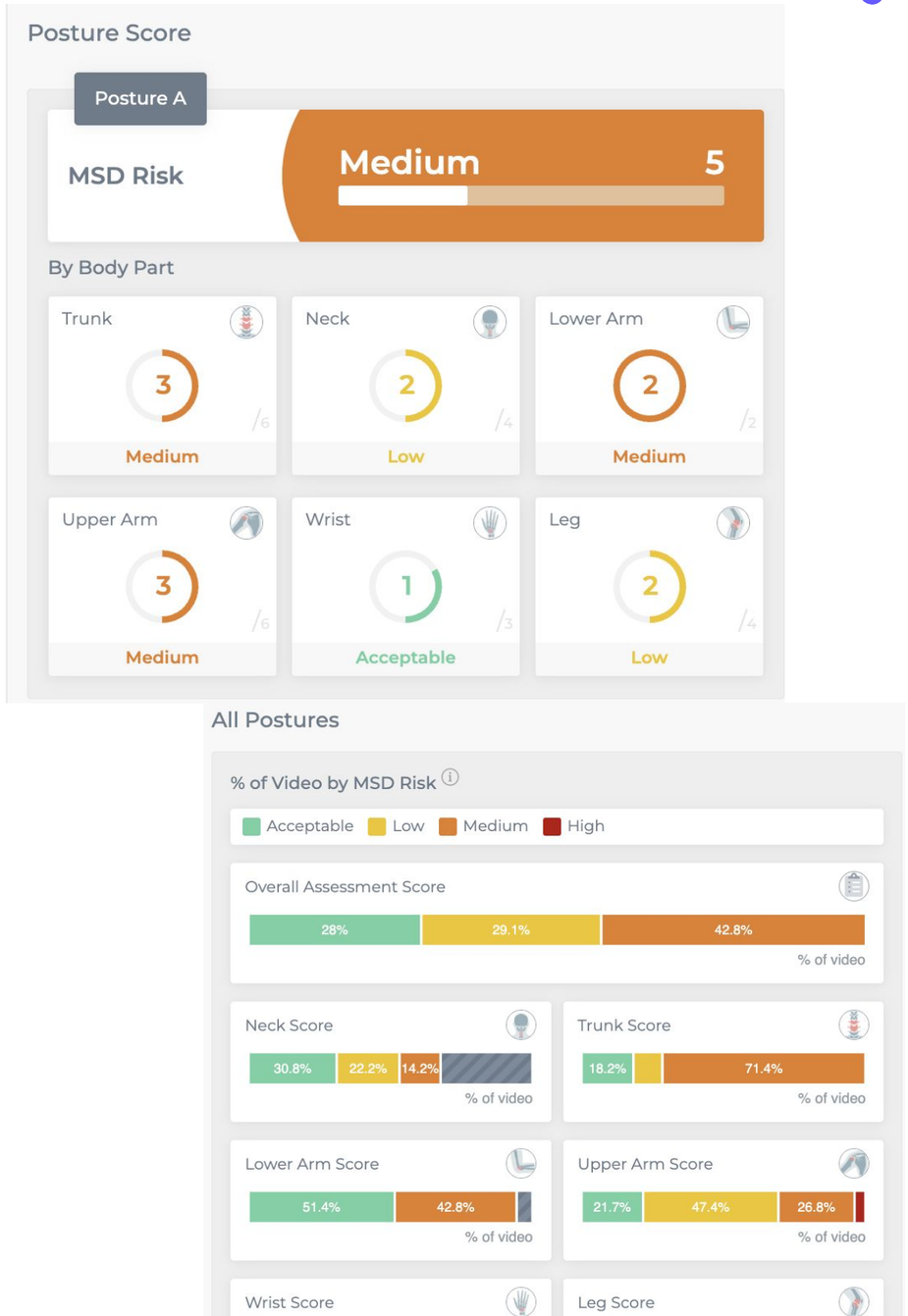

Democratization of ergonomics

Computer Vision Explained



How it works

Capture > Analyze > Recommend



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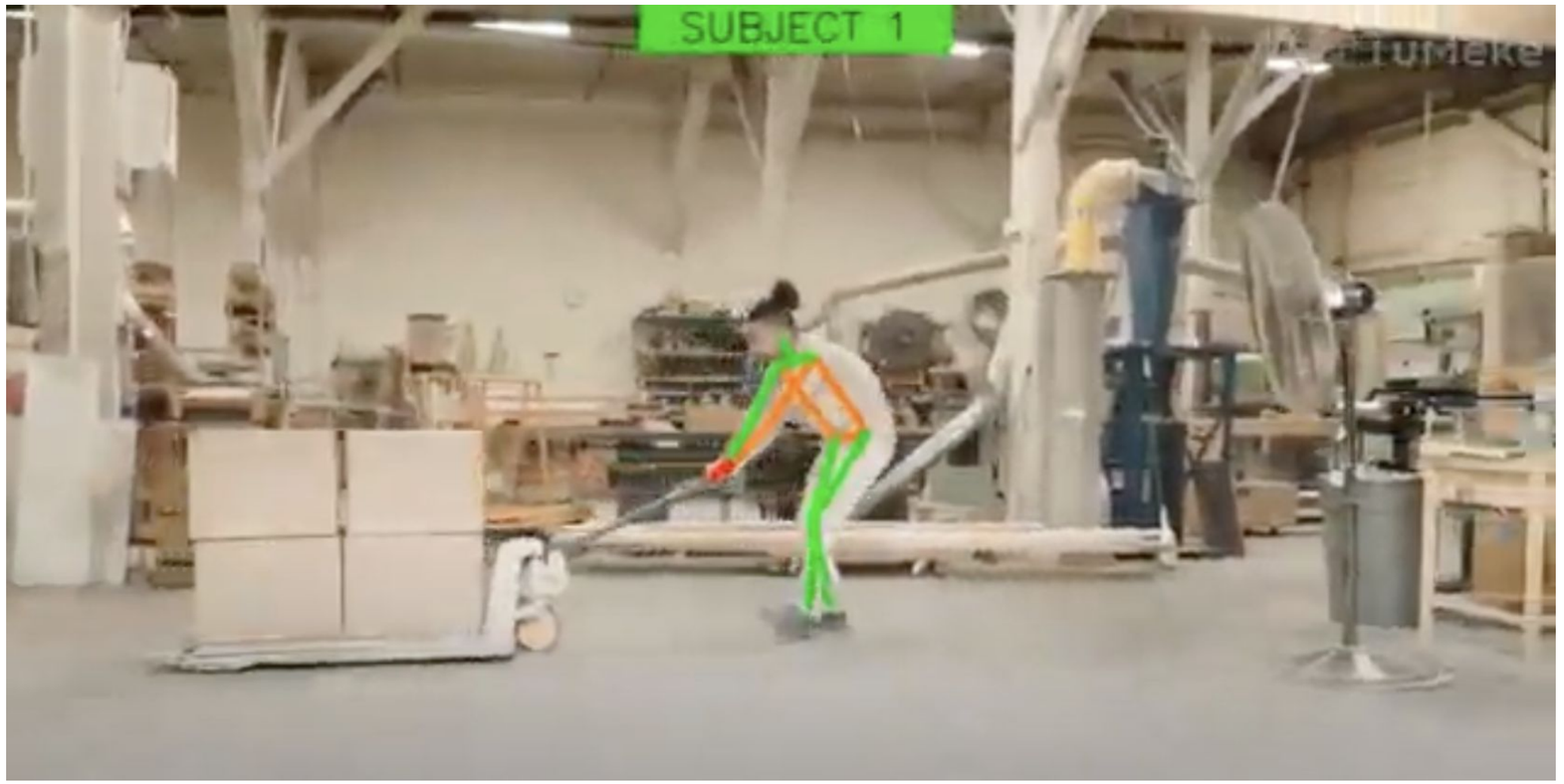


Consider Fixing

1 **Issue:** Trunk bent forward too much — Fixes

Trunk Angle
20° - 60° forward

Benefits of fixing

Lower overall risk to **Low** from Medium

40% reduction in overall risk score

2 **Issue:** Neck bent — Fixes

Neck Angle
20°+ forward/backward

Benefits of fixing

20% reduction in overall risk score

3 **Issue:** Upper arm bent forward — Fixes

Upper Arm Angle
45° - 90° in front

Benefits of fixing

20% reduction in overall risk score

4 **Issue:** Lower arm not in neutral 90° position — Fixes

Lower Arm Angle
0° - 60° OR 100°+

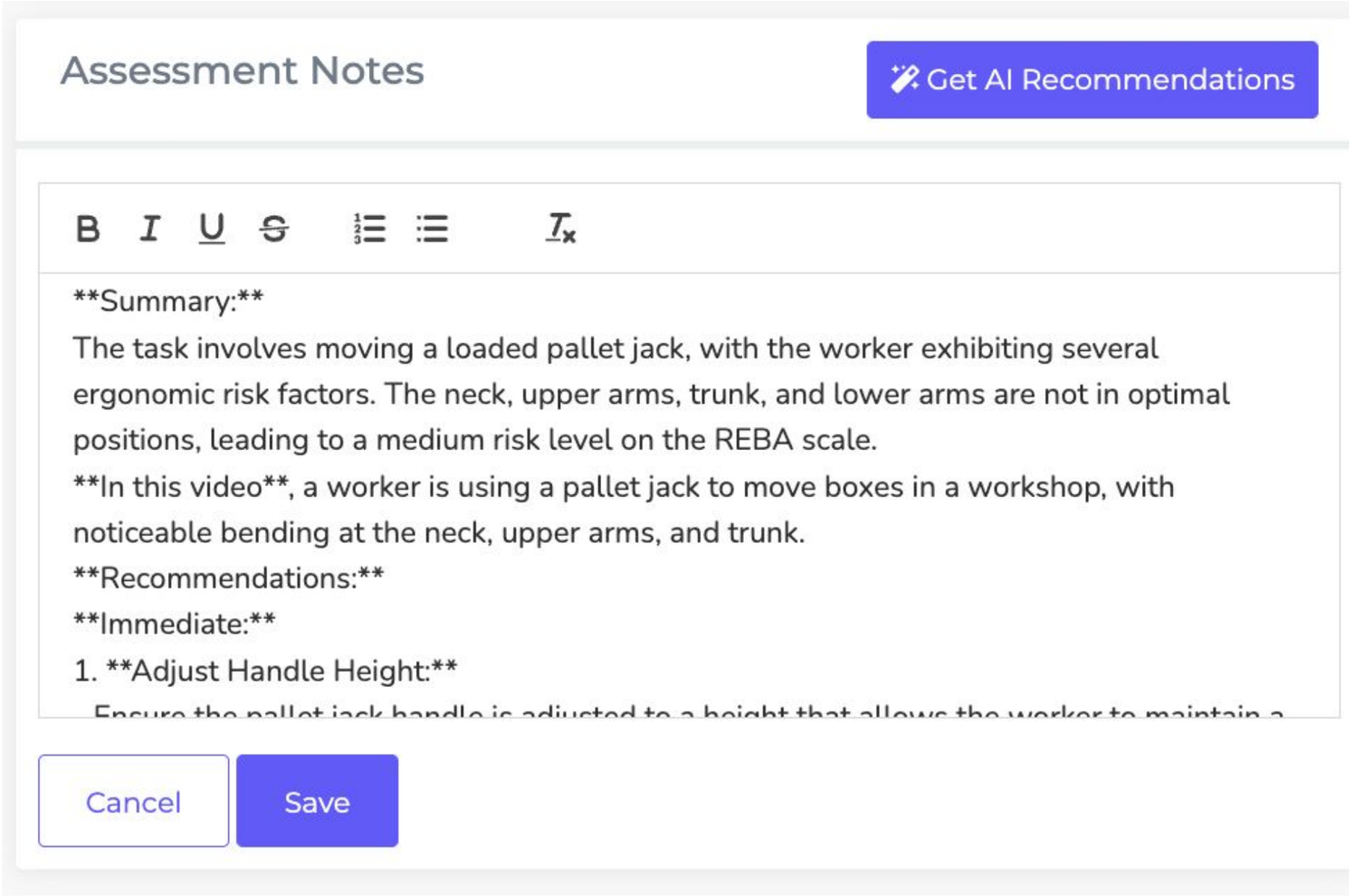
Benefits of fixing

20% reduction in overall risk score

How it works

Capture > Analyze > Recommend

Automatically generated recommendations with AI



Assessments We Automate

REBA

Rapid Entire Body Assessment

Evaluates static and dynamic whole-body activities like lifting, bending, reaching, and pushing/pulling.

RULA

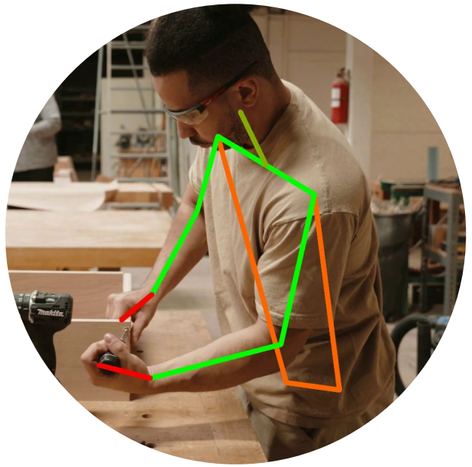
Rapid Upper Limb Assessment

Assesses static or repetitive work involving upper limbs, whether sitting, standing, or in motion.

NIOSH

Revised NIOSH Lifting Equation

Focuses on safety of lifting/lowering tasks with stable loads to prevent overexertion.



RSI

Revised (Hand) Strain Index

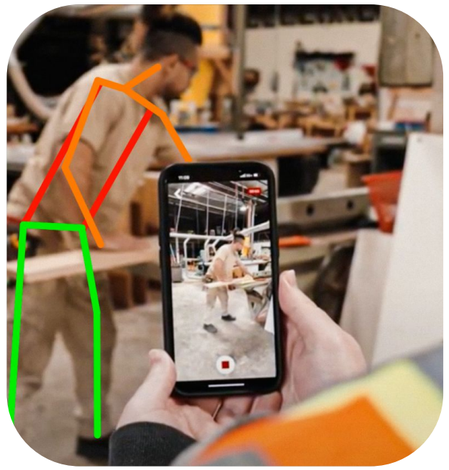
Analyzes repetitive hand-intensive work such as gripping, twisting, and using hand tools.

Snook Tables

Liberty Mutual Material Handling

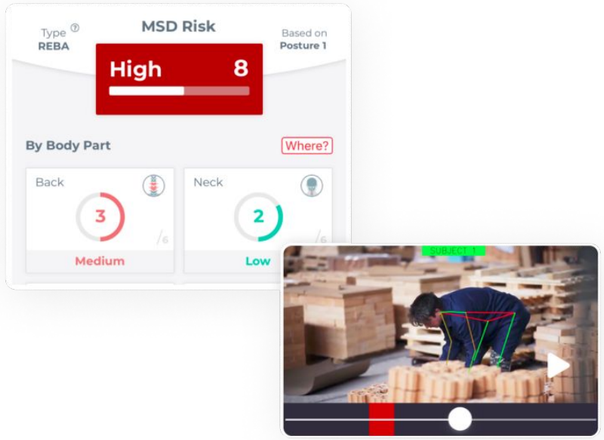
Evaluates manual handling tasks such as lifting/lowering, pushing/pulling, and carrying.

More efficient process



Collect Recordings

Record a job being performed on your phone or upload a pre-recorded video.

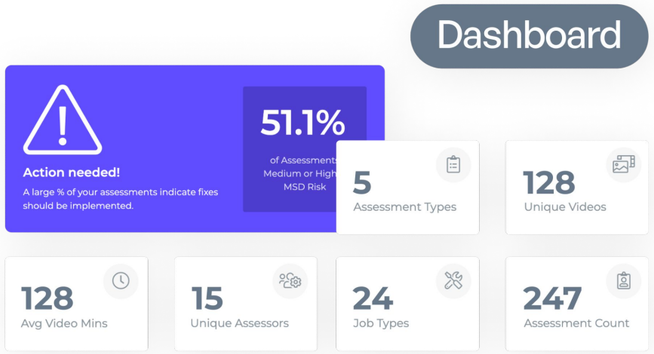


Understand Injury Risk

Get an instant risk summary highlighting the highest risks needing immediate attention.

Make Improvements

Implement solutions to reduce risks and compare before and afters to measure effectiveness.



Uncover Insights

Analyze risk data across jobs, sites, and more to identify trends and focus your efforts.

Case Study: Logistics Center Reduces Injuries

World Wide Technology

Client Background

World Wide Technology (WWT) is a logistics and tech integration provider with ~10,000 employees globally.

Challenge

- Frequent lifting of heavy items (50–100+ lbs) causing injuries.
- Awkward postures in lab work and equipment testing.
- Gaps in communication and implementation of ergonomic plans.
- Need for consistent, scalable training for employees.

Solution

WWT chose TuMeke to enable faster assessments, real-time feedback, and scalable ergonomic improvements across sites.

Results

- **83 hours saved for every 100 assessments.**
- **42% decrease in ergonomic injuries in 8 months.**
- 78% risk improvement using new equipment.
- Justified $34,000 investment, with >5x ROI over three years.
- Improved safety culture and expanded TuMeke use across sites.

Before

NAIC3 L4 Single Lift 1RU from pallet to table

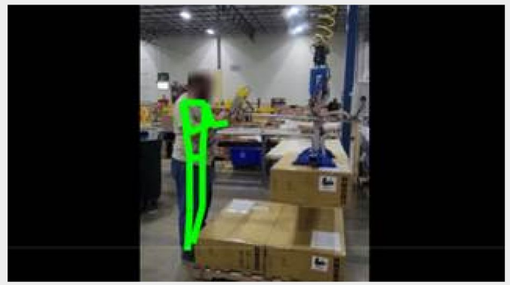
Posture Score

Posture A

MSD Risk High 9

After

NAIC3 L4 Single Lift 1RU with lifting assistance



Posture Score

Posture A

MSD Risk Low 2

WWT identified high risk heavy lifting tasks and purchased lifting equipment to help workers, **resulting in a 78% reduction in injury risk.**

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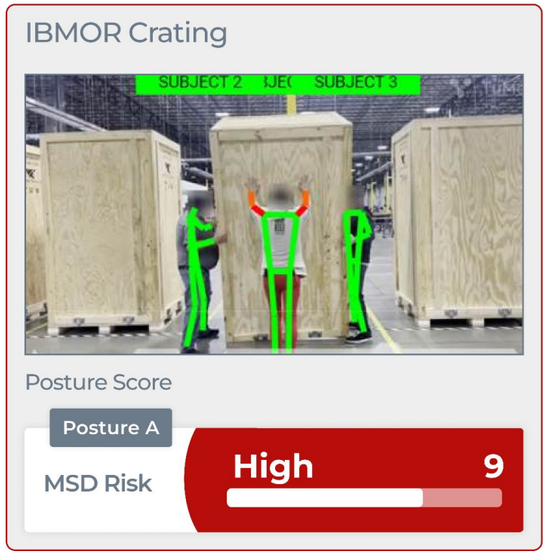
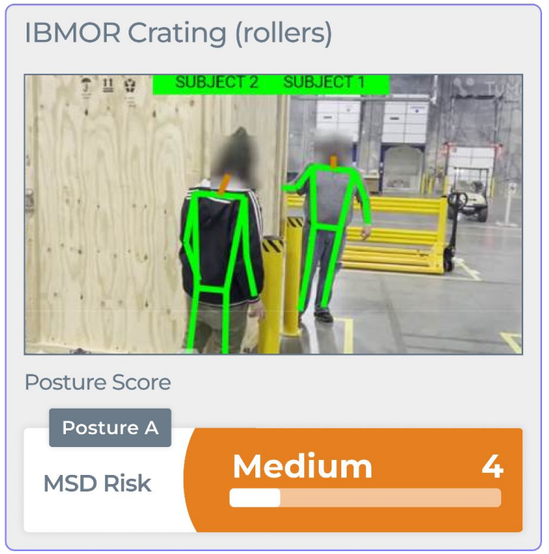
Before



After



WWT identified high risk in a multi-worker task moving heavy crates redesigned the task with new equipment, **resulting in a 55% reduction in injury risk.**

Case Study: Auto Manufacturer Reduces Injuries

HITACHI Astemo

Client Background

Hitachi Astemo manufactures engine management and vehicle control systems with ~90,000 employees globally.

Challenge

- High risk of MSD injuries related to upper limbs, back, and lifting.
- Needed to implement proactive ergonomic culture to improve employee safety, job satisfaction, and tenure.
- Sought a solution to assess and prevent MSD risks and develop safety improvements.

Solution

TuMeke provided easy-to-understand data for risk assessments and guided ergonomic improvements across multiple workstations, moving Hitachi from a reactive to proactive strategy.

Results

- 57% risk reduction in packing process by raising work surfaces.
- 50% risk reduction in a metal tube retrieval process by optimizing object stacking.
- Significant improvements in employee satisfaction and well-being.

Before

Posture A

MSD Risk Medium 6

After

Posture A

MSD Risk Low 3

50% reduction in injury risk

Latham Pools **Reduces Injuries By 91%** and Saved Significant Workers' Comp Costs with TuMeke

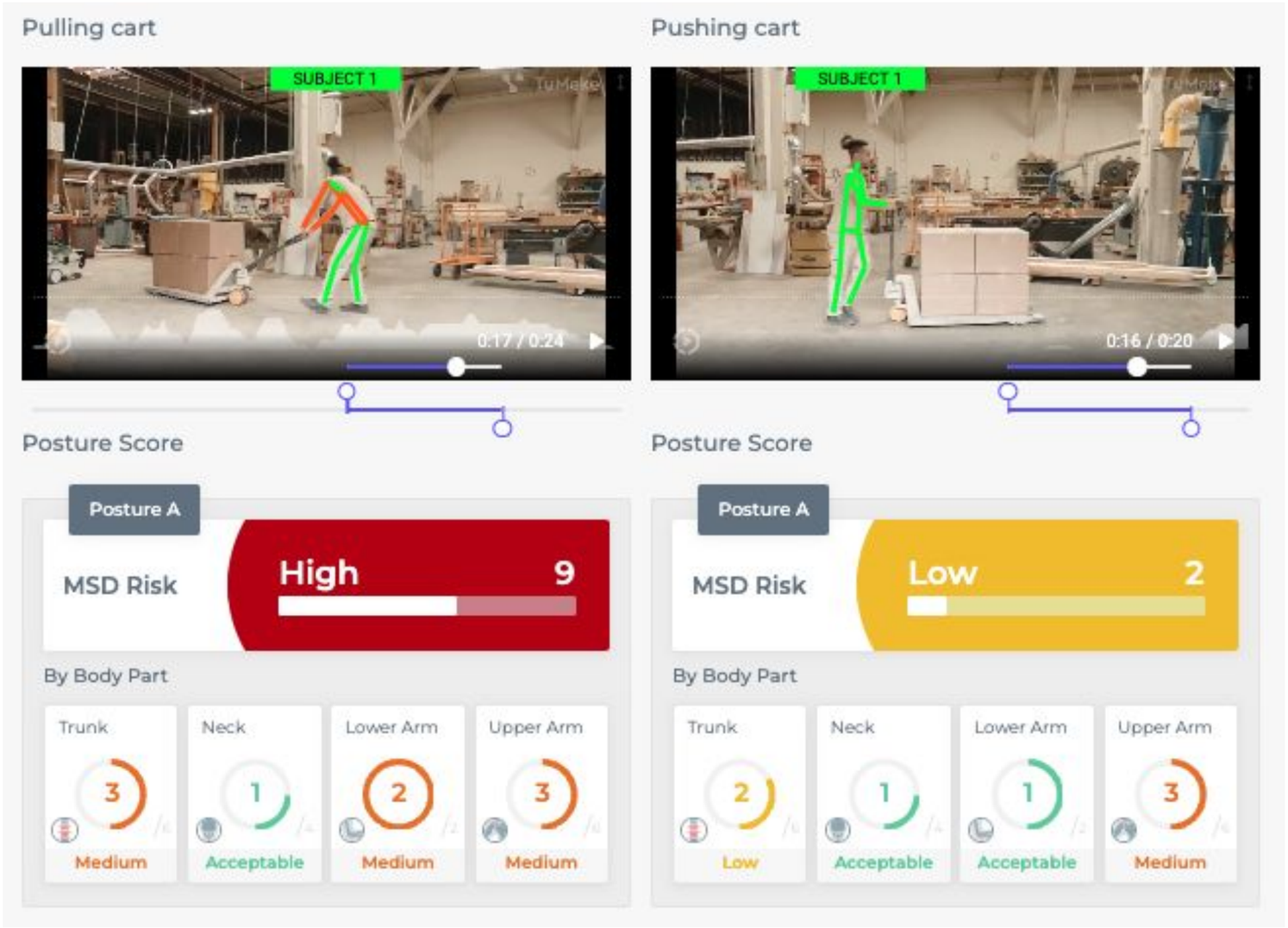
By leveraging TuMeke's technology, Latham is proving that proactive ergonomic safety is not just possible—it's essential to running a successful, large-scale operation.

"TuMeke has changed the game for us. It's not just a tool for validation, it's a way to ensure our employees stay safe and healthy, which ultimately improves our bottom line."

Angelica Daniels
Regional EHS Manager

latham

Minimize Injuries with Effective Employee Training

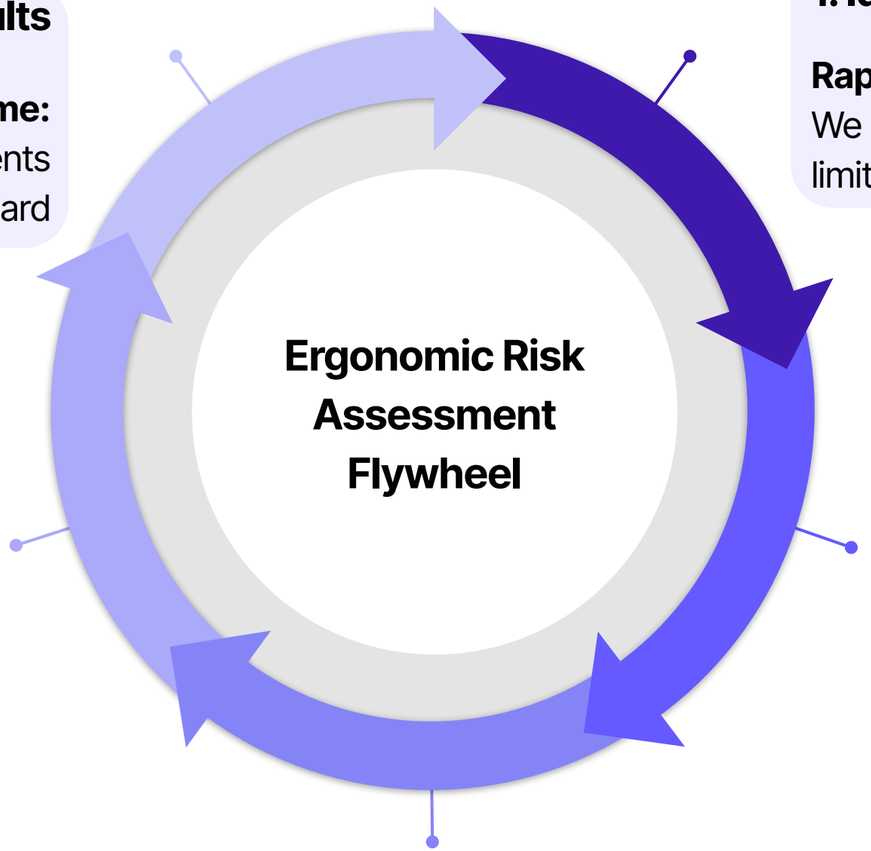


Streamline Training Programs
Reduce training time by automating risk identification.

Measure Training Effectiveness
Understand and confirm the impact of training on risk.

Boost Employee Engagement
Increase participation with clear, actionable insights that employees can immediately apply.

How AI Integrates with Safety Programs



1. Identifying Risks

Rapid Screening:
We help you isolate where to focus your limited resources

2. Measuring Risks

Automatic Assessments & Reports:
Industry standard assessments completed with AI/ML

3. Examining Solutions

Recommendations:
We give directional recommendations that provide guidance to safety teams

4. Implementing Solutions

Help with Training:
3D skeletal joint overlay visualizes risk for ease of comprehension

5. Monitoring Results

Evaluate Improvement Over Time:
Periodically reassess to see improvements by job and location in our dashboard

🔙 Pushbacks & Concerns

1. “Is this going to replace jobs?”
2. “We don’t have time or resources to learn new tech.”
3. “How do we know it’s accurate?”
4. “What about privacy and surveillance?”
5. “Sounds expensive.”

✅ Strategies & Reframes

1. Job Replacement → Job *Enhancement*
2. Overwhelming Tech → Plug-and-Play Simplicity
3. Accuracy Doubts → Data-Driven Confidence
4. Privacy → Respect-First Design
5. Cost Worries → ROI in Weeks

   “Injury prevention pays for itself fast — in fewer claims, better morale, and saved time. One company saved 4x the investment in year one.”

The Win-Win: Benefits for All

How AI Benefits Workers

1. Preventing Injuries Before They Happen
2. Increasing Comfort, Engagement, and Job Satisfaction
3. Supporting Long-Term Well-Being

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How AI Benefits Employers

1. Reducing Healthcare and Workers' Compensation Costs
2. Boosting Productivity and Operational Efficiency
3. Reducing Absenteeism and Turnover Rates
4. Empowering Safety Teams with Data-Driven Insights

The future:

Predictive, proactive, and
powered by “the human in the loop”

support@tumeke.io (415) 349-5121

Key takeaways

- Injuries are expensive, and ergo is time-consuming
- **AI isn’t here to replace jobs, it’s here to make life easier and safety/ergonomics more accessible**
- People feeling better = business performing better

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Questions?

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TuMeke Ergonomics

Thank You

Ergonomics Simplified, Safety Amplified

Get a FREE TRIAL:

https://www.tumeke.io/start-free-trial

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