

Optimizing Ergonomics: The Kaizen Approach

Jeff Smagacz, CPE
Co-Founder / Ergonomist
Risk Management Group, Inc.
615.289.4479
jsmagacz@riskgroup.com



Objectives

By the end of this presentation, participants will be able to:

1. Redefine Ergonomics into a more comprehensive discipline
2. Identify key factors that impact Ergonomics
3. List the steps to conduct an effective and impactful Ergonomics Kaizen Event



What is Ergonomics?



- **Take out a piece of paper and a pen.**
 - Put the pen in your dominant hand.
 - **Now, switch hands and write your full name in cursive.**

Traditional View of Business

Context is Everything



General Industry: Musculoskeletal Disorders



Rank	Industry	Frequency of MSDs	Severity of MSDs (Days Away from Work)
1	Healthcare and Social Assistance	High	Very High
2	Manufacturing	High	High
3	Construction	High	Moderate to High
4	Transportation and Warehousing	High	High
5	Retail Trade	Moderate	Moderate
6	Agriculture, Forestry, Fishing, and Hunting	Moderate	Moderate to High
7	Wholesale Trade	Moderate	Moderate
8	Administrative and Support and Waste Management and Remediation Services	Moderate	Moderate

Pulp and Paper Industry*: Musculoskeletal Disorders



Category	Details
Common Tasks	Lifting heavy rolls of paper, repetitive motions in machine operation, prolonged standing, awkward postures during maintenance and repair activities.
Common MSDs	Back injuries, shoulder injuries, carpal tunnel syndrome, tendonitis.
Frequency of MSDs	High - The industry experiences a higher-than-average rate of MSDs due to the physically demanding nature of many tasks.
Severity of MSDs	High - Workers often require significant recovery time due to the severity of injuries, with common cases involving back and shoulder strains.
Contributing Factors	Heavy lifting, repetitive motion, prolonged standing, use of vibrating tools, awkward postures.

**Part of Manufacturing Sector*

Safety: The Cost of MSDs



Musculoskeletal Disorders (MSDs):

- Account for about **35%** of all U.S. lost workday injuries and illnesses
- Ergonomics-related injuries and illnesses represent over **\$20.7** billion in direct annual U.S. workers compensation costs.
- Ergonomic claims require **more time off the job** than other types of workplace injuries and illnesses (11 days versus 8 days).
- Back injuries will affect 80% of the working population throughout their career.

The Workplace Safety Index: injury rankings by type, 2018 to 2023

The Workplace Safety Index: injury rankings by type, 2018 to 2023

Cause	2018	2019	2020	2021	2022	2023
Overexertion involving outside sources	1	1	1	1	1	1
Falls on same level	2	2	2	2	2	2
Falls to lower level	3	4	4	3	4	3
Struck by object or equipment	4	3	3	4	3	4
Other exertions or bodily reactions	5	5	5	5	5	5
Roadway incidents involving motorized land vehicle	6	6	6	6	6	7
Slip or trip without fall	7	7	7	7	7	9
Caught in or compressed by equipment or objects	8	8	10	9	8	8
Struck against object or equipment	9	10	9	8	9	
Repetitive motions involving microtasks	10	9	8	10		
Non-roadway incidents involving motorized land vehicle					10	
Exposure to other harmful substances						6
Pedestrian vehicular incidents						10

Lean: Controlling Production Cost


Reduce Costs and Improve Efficiency via WASTE Elimination



1. **OVER-PRODUCTION:** Only produce to customer demand.
2. **INVENTORY:** Control inventory.
3. **TRANSPORTATION:** Link processes.
4. **WAITING:** Balance lines.
5. **DEFECTS/REWORK:** Fix problems when they occur.
6. **OVER-PROCESSING:** Don't exceed customer expectations.
7. **UNDER-UTILIZATION OF PEOPLE:** Involve employees.
8. **MOTION:** Awkward postures, forceful and fatiguing motions (force, frequency, posture).

FACTOID:

Employees with musculoskeletal discomfort **lose an average of 20 minutes** per day in productivity. This equates to **thousands of dollars lost** annually per employee.

Three black interlocking gears of different sizes are arranged in a cluster on the right side of the text box.

Source: National Bureau of Economic Research, March 2021

What is a Kaizen event?

KAIZEN

Japanese word for continuous and incremental improvement.

Kai = change, Zen = good

改善

A Kaizen Event helps us make **simple, impactful,** and **sustainable** improvements to many areas of the workplace to improve quality, process efficiency, and **safety.**

Kaizen: Small Changes Make a Big Impact



PROBLEM

- x Down too low.
- x Bottle drain pan too low, causing operators to bend at the waist to dump bottles.



SOLUTION

- ✓ Raised drain pan by 12 inches.
- ✓ Eliminated almost 100% of the back bending.
- ✓ Operators love it!
- ✓ Cost to implement: \$15.
- ✓ Can process 100 bottles 12% faster

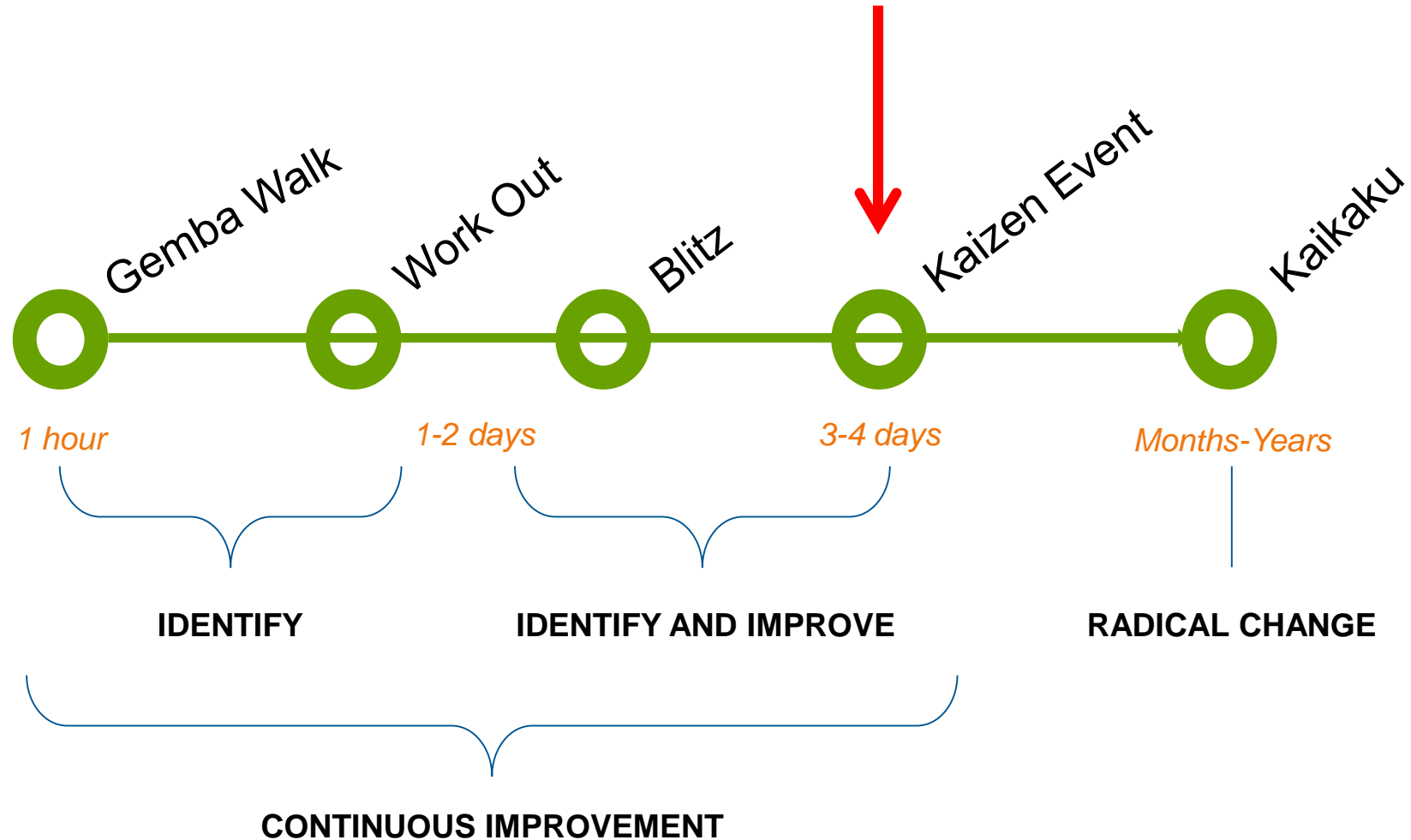
Sample of Kaizen Results



LOCATION	IMPROVEMENT GOAL	# OF IMPROVEMENTS	% TO GOAL	ACTION PLAN (30-60-90 DAYS)	AVERAGE COST/ IMPROVEMENT
Boaz	33	53	161%	14	\$113.01
Skokie #1	39	53	136%	4	\$24.84
Juarez	60	70	117%	4	\$34.09
Vegas	42	61	145%	12	\$40.00
Port Elizabeth	30	48	160%	9	\$15.00
Smithville	33	56	170%	9	\$31.22
Chapel	10	11	110%	20	\$19.78
Glasgow	38	94	247%	9	\$13.18

Averages	36	56	156%	10	\$36.36
-----------------	-----------	-----------	-------------	-----------	----------------

Understanding Kaizen Elements of Change



Where Can Kaizen Be Deployed? Anywhere People Work



- Manufacturing

- High volume, Low product mix (HVLP)
- Low volume, high product mix (LVHP)

- Non-manufacturing

- Offices
- Hospitals/Primary care
- Maintenance
- Call Centers
- Retail
- Anywhere people work



Executing Kaizen Events

Key Elements

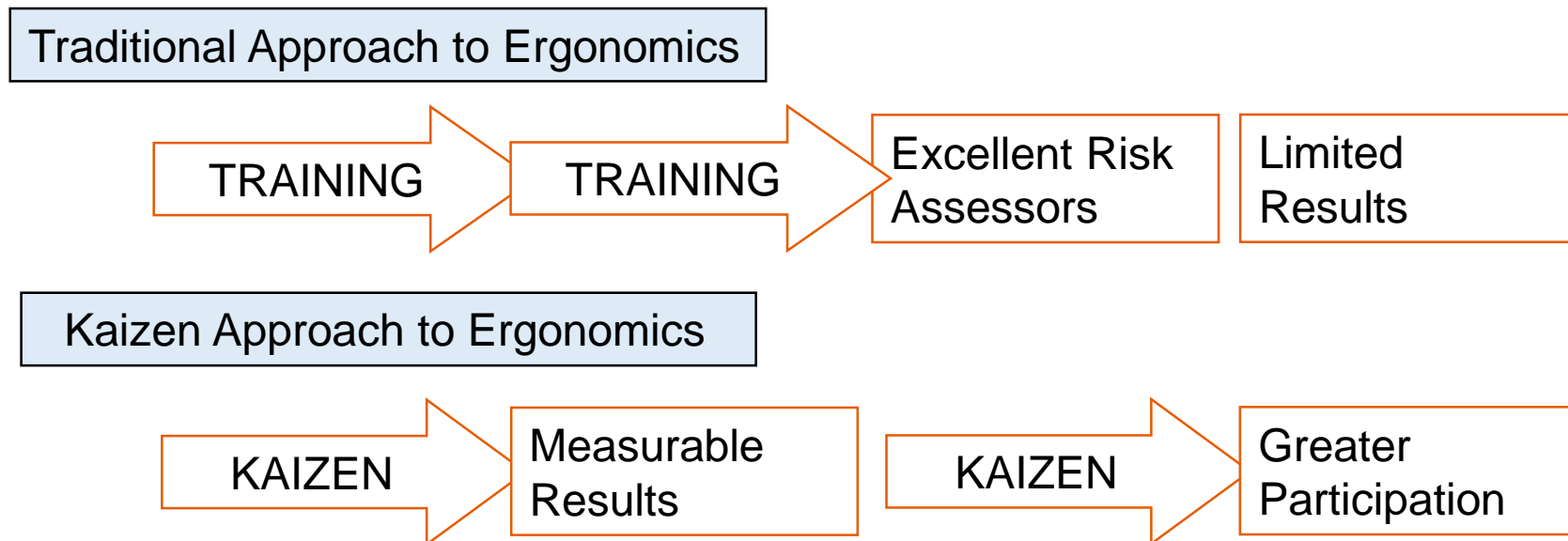


Key 1 – Lead with Results

Kaizen Approach is More Effective Than Training



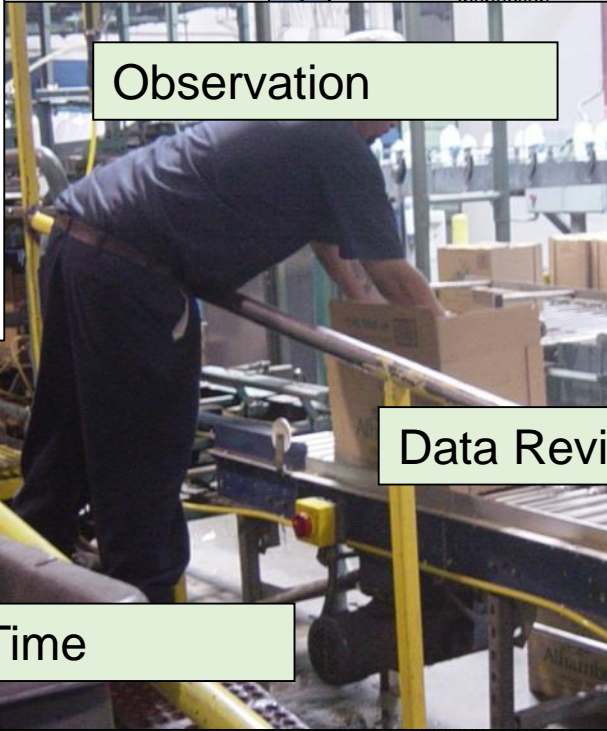
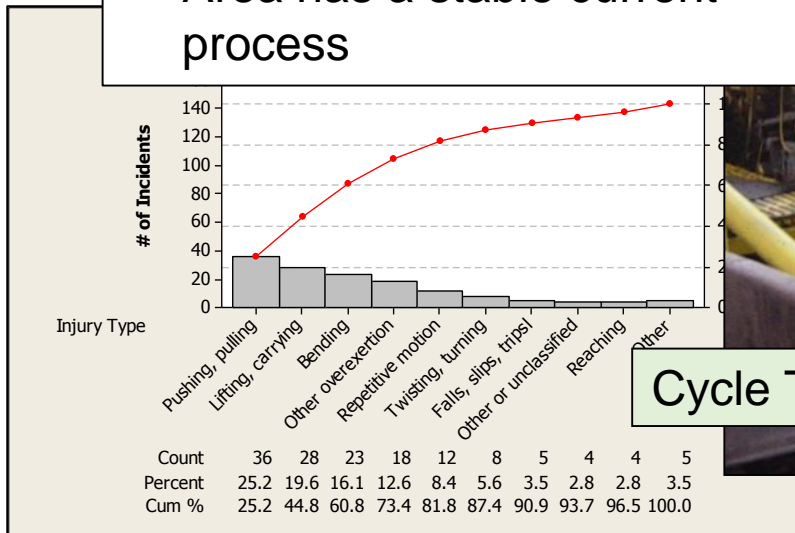
- Leading with Kaizen Events produces **greater** long-term program:
 - Visibility
 - Results/success,
 - Sustainability
 - Employee Participation



Key 2 – Choose Focus Area(s) Impacts Overall Success



- High likelihood of success
- Results will be highly visible
- Makes a significant impact to the organization
- Solves operational problems, not management issues
- Area has a stable current process



Observation

Cycle Time

Assessment			Risk Score
Rank			
1	Autolines E - Combo Operator	Autolines	16.0
2	#1 Grinder 263	Bushings	13.5
3	Inspection	Inspection	13.0
		Bushings	12.5
		Material Prep	12.5
	or	Autolines	12.0
		Inspection	11.5
		Material Prep	11.5
		Bushings	10.5
		Bushings	10.5
		Material Prep	10.0
		Ship/Rec	10.0
	ht)	Inspection	9.5
		Bushings	9.0
		Inspection	8.5
		Material Prep	8.0
		Material Prep	8.0
		Material Prep	8.0
		Autolines	7.5
		Autolines	7.0
		Bushings	7.0
		Bushings	7.0
		Bushings	7.0
		Autolines	6.5
		Bushings	6.5
		Bushings	6.5
		Material Prep	6.0
		Autolines	5.0
		Bushings	5.0
31	Pullback Press	Samples	5.0
32	Washer Press	Bushings	4.5
33	Washer	Tray Room	4.5
34	Sanding Line	Material Prep	4.0

Data Review

Key 3 – Select the Right Team

Identify Natural Problem Solvers



- One group of 10-15 employees
 - Divided into smaller teams
- A cross-functional team is important
 - Health & Safety (1)
 - Management (1)
 - Hourly Employees (2)
 - Maintenance (1-2)
- Maintenance participation is critical
 - “Turn wrenches”
 - Get improvements done



Key 4 – The Facilitator is Critical

Use Outside Support if Necessary







- The Event success is strongly influenced by the Facilitator running the Event.
- Factors to consider in a Facilitator
 - Expertise
 - Leader
 - Team Member
 - Shop-floor Oriented
 - Change Agent
 - Time Management / Event Control
 - Flexible
 - Organized
 - Fun



Key 5 – Plan the Event

Pre / During / Post



DAY 1	DAY 2	DAY 3	DAY 4
 Introduce Kaizen Method and Tools	 Identify Problems and Solutions (80%)	 Implement Solutions (80%)	 Summarize Results
<ul style="list-style-type: none"> ▶ Set goals, objectives, operating rules ▶ Learn and practice ▶ Begin to identify problems ▶ Report Out 	<ul style="list-style-type: none"> ▶ Start improving (20%) ▶ Begin documentation ▶ Report Out 	<ul style="list-style-type: none"> ▶ Keep finding conditions (20%) ▶ Report Out 	<ul style="list-style-type: none"> ▶ Verify Solutions ▶ Prepare management presentation ▶ Establish 30-60-90 day plan

- Event planning begins 3-4 weeks prior to the Event and concludes up to 90-days after the Event
- Use a Kaizen prep guide to help organize all facets of the Event

Key 6 – Use Proper Identification Tools Need to See Issues and Know How to Address

You must have the right tools with the right information talking the right language






PROBLEM

Through observation, use the card to quickly “see” or identify workplace issues.


SOLUTION

Use this section to brainstorm ideas and approaches that will reduce/eliminate workplace issues.

Is the process better today than it was yesterday?
ERGONOMICS

PROBLEM	SOLUTION	REMEMBER
 DOWN TOO LOW	▶ RAISE IT UP	Above knee = 22" Preferred = 31"
 UP TOO HIGH	▶ BRING IT DOWN	Below shoulder = 54" Preferred = 46"
 OUT OF REACH	▶ KEEP IT CLOSE	Within 16" of body, no more than 22"
 BEND & TWIST	▶ KEEP IT STRAIGHT	In front of the body
 OVER-LOADED	▶ LIGHTEN THE LOAD	Less force and weight
 OVER & OVER	▶ ONLY HANDLE IT ONCE	No double-handling


www.riskgroup.com



Learning to See

Is the process better today than it was yesterday?

ERGONOMICS

PROBLEM	SOLUTION	REMEMBER
 DOWN TOO LOW	▶ RAISE IT UP	Above knee = 22" Preferred = 31"
 UP TOO HIGH	▶ BRING IT DOWN	Below shoulder Preferred = 48"
 OUT OF REACH	▶ KEEP IT CLOSE	Within 16" of body, no more than 22"
 BEND & TWIST	▶ KEEP IT STRAIGHT	In front of the body
 OVER-LOADED	▶ LIGHTEN THE LOAD	Less force and weight
 OVER & OVER	▶ ONLY HANDLE IT ONCE	No double-handling

www.riskgroup.com



Condition

- ✓ Scraper tool required extensive reaching and bending to help agitate seasoning the seasoning hopper.

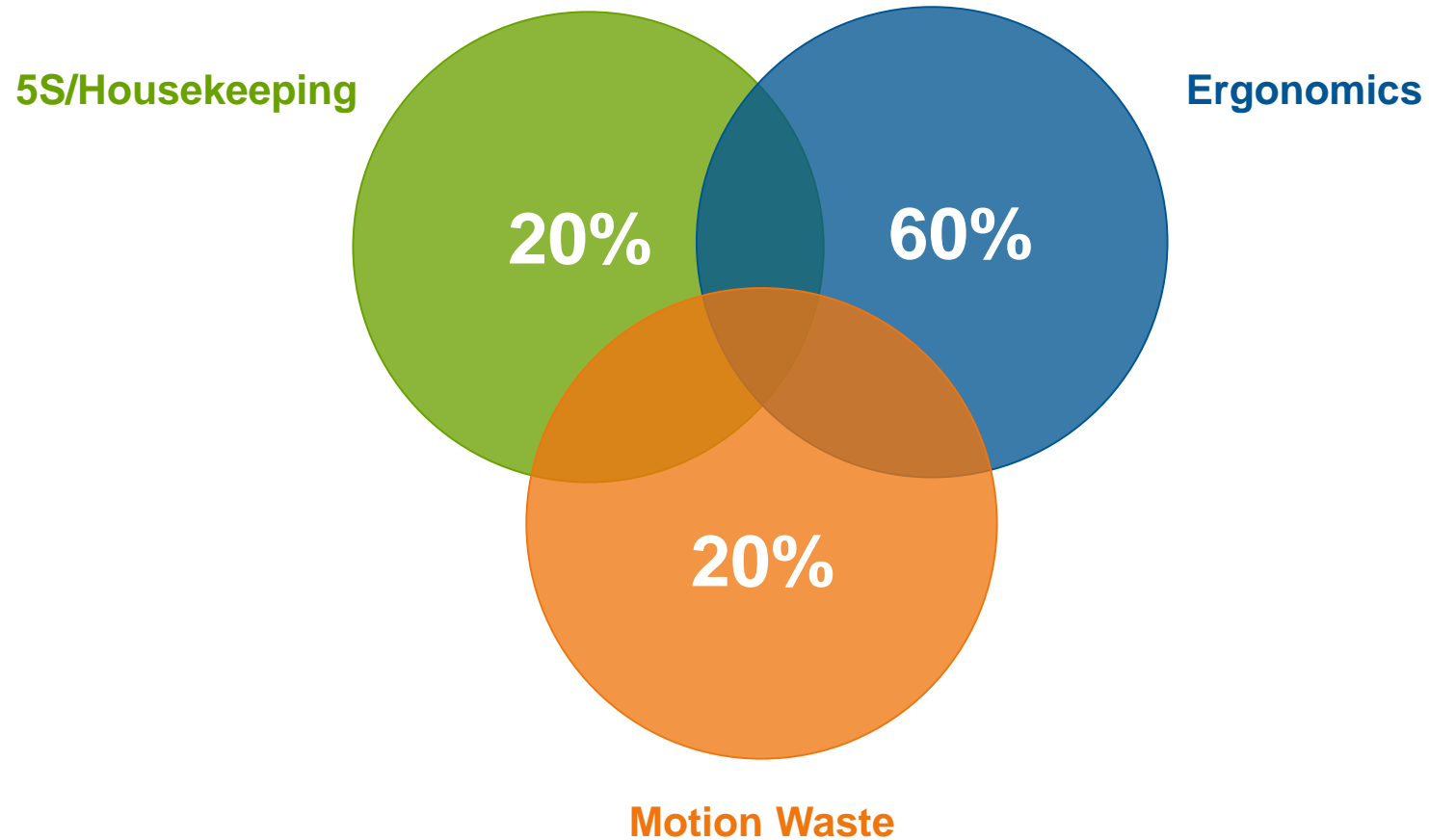
Solution

- ✓ Bent the tip of the tool and extended 12" to reduce reaching by 90% and back bending by 60%.
- ✓ Did not increase tool weight
- ✓ Process is 33% faster
- ✓ Employees love it.

Key 7 – More Than Ergonomics



KaizenWorks! has specific emphasis in three areas:



Multi-element approach is the most effective.

Motion Savings: Pulling Cases



PROBLEM

- x Out of Reach
- x Down too Low
- x Extensive back bending and reaching to reach to the back of the 40" x 48" pallets



SOLUTION

- ✓ Turned pallets 90 degrees to reduce reaching by 8" (18% reduction)
- ✓ Reduced extreme back bending and 15% back twisting
- ✓ Can pick cases 4% faster with less ergo issues

OSHA Violation

5S / Blocked Cabinets



Condition

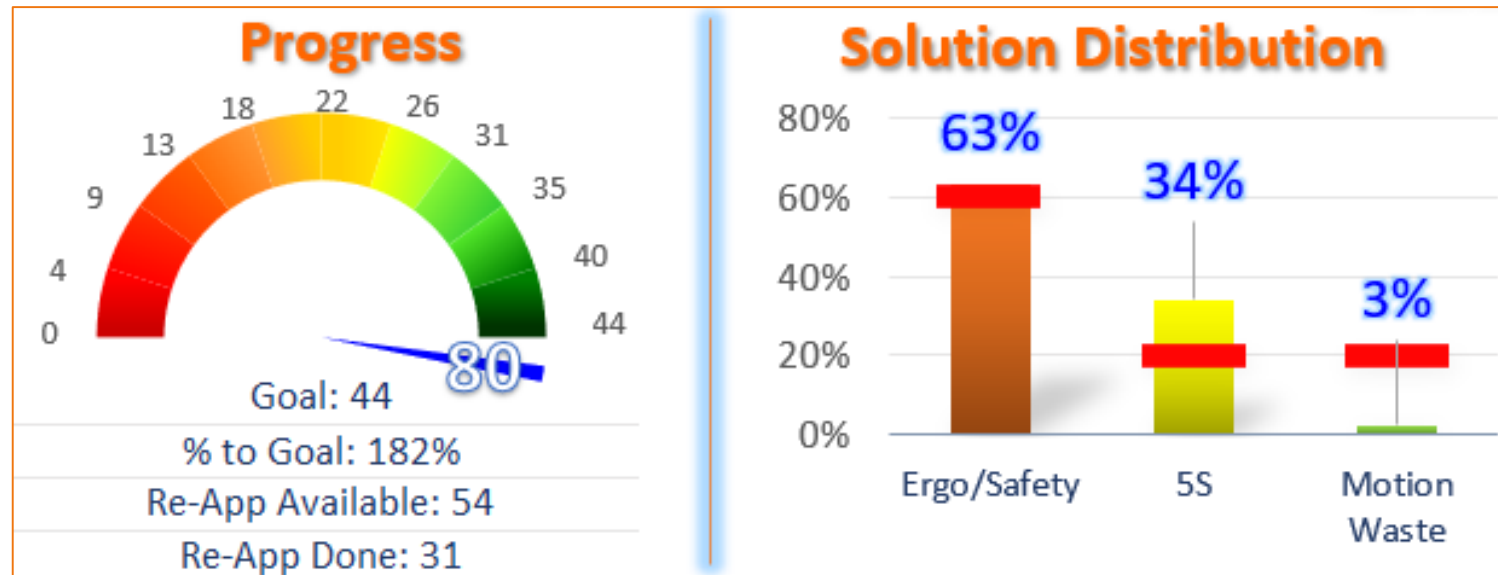
- ✓ Cluttered and obsolete equipment
- ✓ Fire hazard / OSHA compliance

Solution

- ✓ Discarded equipment
- ✓ Cost avoidance: \$7000 base fine.

Key 8 – Track Success

Good Data Drives Great Decisions



Key 9 – Have Fun!

Fun is a Requirement for Success



Studies illustrate that people learn more, do more, and retain more during “enjoyable experiences.”



Key 10 – Plan for Success

What to Avoid

- Poor team selection
- Facilitator not prepared
- Brainstorming the wrong solutions that don't address the real issues
- Lack of follow-up, no support for action item accomplishment
- Improper scope
- Getting off course, sideline discussions
- Not conducting multiple events



Success

A Global Company



Problem

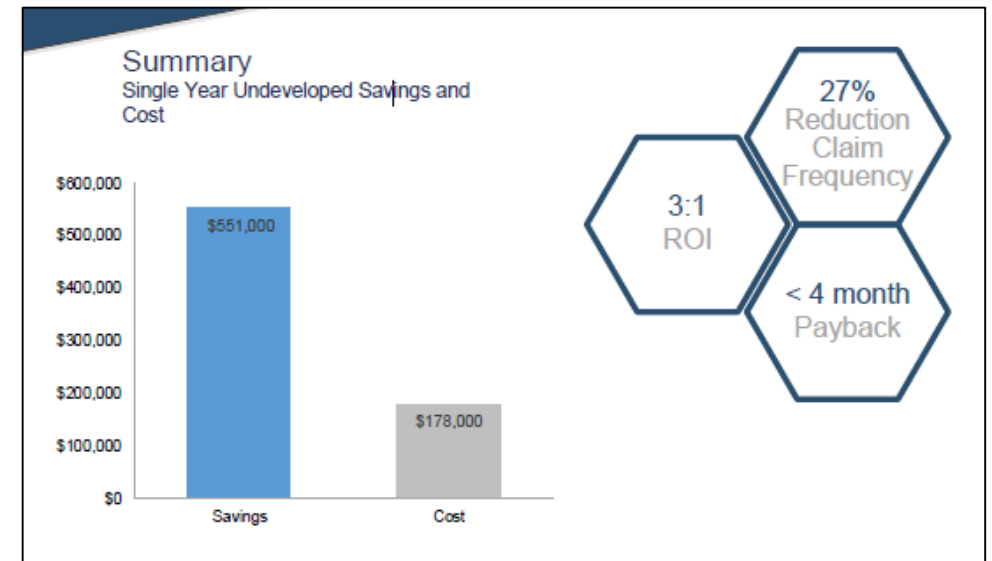
- A large manufacturing company was experiencing an increase in musculoskeletal disorders (MSDs) year over year.
- Seven (7) departments were identified as elevated risk based on loss runs, site observations, employee feedback and production bottlenecks.
- These departments totaled 56 claims with an average cost per claim over \$36,000 and over \$2 million in incurred costs (estimated > \$3 million when fully developed).

Approach

- One 3-day Kaizen Event was conducted in each of the seven departments.
- A total of 275 workplace improvements were implemented with an average cost of \$114 per improvement, totaling \$31,350 plus professional fees.

Results

- One year later, each of the seven departments were re-evaluated to determine how many of the ergonomics kaizen fixes were still in place. An impressive **97% (268 of the 275)** of the improvements were still being used by the employees.
- The following year, the seven departments had a total of 46 claims, a **27% reduction**. This reduction in claims saved the client over **\$550,000**.
- The return on investment (ROI) for the kaizen events was calculated at **3.1** (total savings divided by the total costs). Total costs included the claims cost, event costs, travel fees and the improvement cost.
- NOTE: Time savings and quality improvements also resulted but were not measured.



Optimizing Ergonomics: The Kaizen Approach

Jeff Smagacz, CPE
Co-Founder / Ergonomist
Risk Management Group, Inc.
615.289.4479
jsmagacz@riskgroup.com



Scan me!