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## Cost Justification for Ergonomic Improvements

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## Session Objectives

- Review the Starting Point “Essentials”
- Recognize that ergonomics by any other name...
- Understand ergonomics can be difficult to sell
- Consider Management’s Perspective
- Learn about the broader scope of benefits to Ergonomics
- Review some basic number stuff about costs/benefits
- Think about styles of making decisions and using this to your advantage.
- Discuss some practical tips on justifying ergonomic improvements




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## The Essentials

- You have a reason to improve something
- You've considered several alternative approaches
- You are CONFIDENT in the efficacy of your chosen improvement.
- You know WHO you have to convince.
- You know it's going to COST something.
- You know there's going to be BENEFITS.




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## Ergonomics is an Approach to Improve Things NOT:

- A type of chair, keyboard, mouse
- A word you add to something to make it sound “cool”
- Marketing hype
- Limited to repetitive motion, wrist injuries, or back pain
- Only for office jobs



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**The Ergonomics Perspective is, in it's simplest form, recognizing true things about real people and not what you WISH was true about them.**

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## What is Ergonomics?

**The multidisciplinary science that is concerned with the design of products, tasks, jobs and systems such that the capabilities and limitations of the people involved are carefully considered.**

*In a Nutshell: the design of jobs to match the capabilities and limitations of workers.*




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## Ergonomics doesn't care that you call her "Ergonomics"

What might be a reason to avoid using the word?



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## Resistance to Ergonomic Recommendations is Natural

- Resistance to ANY change is natural
- Implies change is needed
- Requires effort (often > \$ concern)
- Hints of criticism

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### The Bias of Causation Findings (Perrow, 1986)


*“...finding that faulty designs were responsible would entail enormous shutdown and retrofitting costs, finding that management was responsible would threaten those in charge; but finding that operators were responsible preserves the system, with some soporific injunctions about better training...”*

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## Management's Perspective – not just \$

- Cost versus benefit
- Employee morale
- Legal implications
- Political implications
- Public Perception/Press
- Risk of injury
- Quality issues
- Resource allocation
- Limits of expertise
- In-house or sub-contract
- How much time will it take
- Will the change disrupt operations/productivity


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## Management's Key Questions



- Money
- Time
- Change
- Benefits



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## The Benefits of Ergonomics

- Reduced accident and injury costs
- Enhanced performance
- Enhanced quality of work life
- Less human error
- Reduced design and construction costs
- Enhanced product quality
- Reduced maintenance/service time
- Reduced absenteeism
- Reduced turnover




## Assessing the Effectiveness of Ergonomic Interventions

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**Goggins, et al., 2008**

- 250 Ergonomic Interventions
  - Programs (154) and Specific Interventions (96)
  - Internet case studies as well as scientific journal articles
- Average WMSD Incidence Rate ↓ of 65% N=53
- Average WMSD WC Costs ↓ of 68% N=52
- Turnover ↓ of 48% N=34
- Productivity ↑ of 25% N=61
- Payback in **0.7 years** N=36
- Bias toward reporting positive results



## Assessing the Effectiveness of Ergonomic Interventions (Goggins, et al., 2008)

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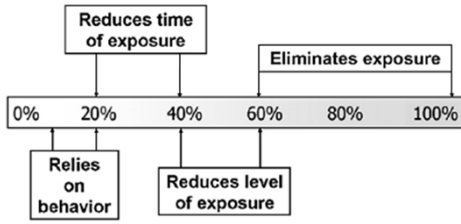




Fig. 2. A proposed relationship between level of control and estimates of effectiveness based on results from case studies.



## Costs of NOT implementing Ergonomics

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- WC Direct Costs (medical and indemnity)
- Indirect Injury Costs
  - Insurance cost versus Claims costs
  - Replacement Worker Costs
  - Lower productivity from replacement workers
  - Lower quality from replacement workers
  - More supervision/training for replacement workers
  - Increased overtime
- Increased Turnover
- Increased Absenteeism
- Opportunity for Increased Productivity lost
- Opportunity for Increased Quality lost
- Increased implementation cost the longer you wait to implement



## Additional Injured Worker Costs


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1. Costs of replacement workers	A. Hiring costs for permanent replacement, plus training and other costs B. Additional costs for temporary workers who may have lower work skills
2. Lower productivity	A. Fewer units per hour B. Lower yields C. Damage to material or equipment that would occur with an experienced worker
3. Lower quality	A. Rejects B. Rework C. Timeliness of product delivery
4. Increased supervision	To manage/train less skilled worker
5. Training to develop and maintain job skills	A. Time of worker B. Time of trainer



## What else often happens to compensate for workers who are off work due to injury?


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## Increased Overtime Costs


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<u>Item</u>	<u>Costs</u>
Overtime (0.5 pay/hour X \$8.00/hr for 6 days X 8hr/day)	\$192.00
Lower productivity (12 units/day X \$4.00 profit/unit for 6 days)	\$288.00
Quality (1 reject)	\$36.00
(5 reworks at \$10 each)	\$50.00
<b>Total additional costs</b>	<b>\$566.00</b>




### Ergonomic Interventions: Potential Enhanced Performance

<b>Productivity</b>	Fewer bottlenecks in production lines, higher output, fewer missed shipments, less overtime, labor reductions, better line balancing
<b>Quality</b>	Fewer critical operations, more tasks within every operator's control and capacity, fewer assembly errors
<b>Operating uptime</b>	Faster setups, fewer operating malfunctions, less operator lag time
<b>Faster maintenance</b>	Increased access, faster part replacement, fewer tools needed, more appropriate tools, more power and faster tools speeds




### Employee Turnover

- Seldom measured
- Turnover is a significant problem
- Turnover costs can range from a few hundred dollars to several thousand dollars per hire




### Costs Associated With Employee Turnover

<b>Recruitment and screening</b>	Recruitment/advertising; screening/review of applicants; interview time
<b>Hiring and orientation</b>	Drug screening; physicals; hiring/addition to wage roles; adding to benefits plan; orientation expenses; trainer costs
<b>Training</b>	Off-the-job training; on-the-job training; trainer costs; lower output; quality problems/rework/reject projects
<b>Separation</b>	Close of an employee's files; document retention




### Cost of Human Error

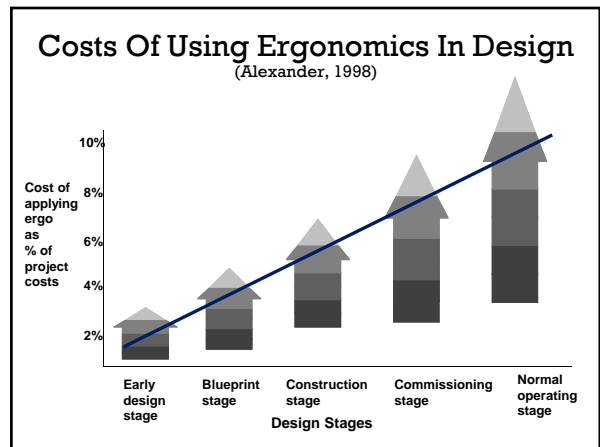
- Cognitive errors
- Operating errors
- Shipping errors
- Malfunctions



### Design and Construction Costs

- Lower costs when designed right the first time!
- Costs of correcting ergonomic design at initial part of design project is about 10% of the cost that will occur later





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## Cost of Worker Injuries

- Benefit/cost ratio\* example:
  - A sewing job with 40 workers working day and evening shifts
  - 3 lost time back and shoulder injuries occur each year with average costs of \$1,000 each or \$3,000 per year
  - Assume all can be prevented i.e. effectiveness = 100%
  - Ergonomic improvements cost \$500 per workstation X 20 workstations = \$10,000

From David Alexander, Strategies for Cost Justifying Ergonomic Improvements, *Industrial Engineering Solutions*, March, 1998

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## Cost of Worker Injuries

- Benefit/cost ratio\* example (cont.)
  - Value of benefits = \$3,000 saved annually for 5 years
  - Present value of intervention costs is \$10,000 since costs are incurred immediately
  - Present value of \$3,000 over 5 years is \$3,000 X 3.993 (from present value tables) = \$11,979
  - Benefit/cost ratio is \$11,979/\$10,000 = 1.1979 (or about 20%)

From David Alexander, Strategies for Cost Justifying Ergonomic Improvements, *Industrial Engineering Solutions*, March, 1998

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## Detailed Model by Oxenburgh\*

- Considers direct and indirect costs
- Indirect costs are costs of worker absence from work
  - Calculate productive hours
  - Calculate wage or salary costs
  - Calculate employee turnover and training costs
  - Calculate productivity short-fall losses
  - Total cost/employee/productive hour

\*From *Increasing Productivity and Profit Through Health & Safety*, Maurice Oxenburgh, CCH Australia Limited, CCH International, 1991

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## OSHA's Indirect Cost Ratios

<http://www.osha.gov/dcsp/smallbusiness/safetypays/background.html>

Direct Costs	Indirect Cost Ratio
\$0 - \$2,999	4.5
\$3,000 - \$4,999	1.6
\$5,000 - \$9,999	1.2
\$10,000 or more	1.1

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## Payback period

- Estimated total benefits (direct and indirect)
- Obtain cost of improvements
- Payback period =

$$\frac{\text{Cost of improvements}}{\text{Estimated Annual Benefit}}$$

From *Increasing Productivity and Profit Through Health & Safety*, Maurice Oxenburgh, CCH Australia Limited, CCH International, 1991

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## OSHA's Revenue Estimator

<http://www.osha.gov/dcsp/smallbusiness/safetypays/estimator.html>

**Direct Costs**

- Select an injury type from the drop-down menu OR enter the total workers' compensation costs.
- Enter the profit margin (leave blank to use default of 3%).
- Enter the number of injuries (leave blank to use default of one).
- Select "Indirect Calculator" to compute the total direct and indirect costs.
- Repeat the step to add additional injuries to the list.

Injury Type or Workers' Compensation Costs:  or

Enter Profit Margin (%):

Enter Number of Injuries:

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**Estimated Total Cost**

The extent to which the employer pays the direct costs depends on the nature of the employer's workers' compensation insurance policy. The employer always pays the indirect costs.

Injury Type	Instances	Direct Cost	Indirect Cost	Total Cost	Additional Sale (Indirect)	Additional Sale (Total)
Claims Cost	03	\$ 276,000	\$ 303,600	\$ 579,600	\$ 2,160,000	\$ 2,739,600

**Totals**

Estimated Direct Costs: \$ 276,000

Estimated Indirect Costs: \$ 303,600

Combined Total (Direct and Indirect Costs): \$ 579,600

Sales To Cover Indirect Costs: \$ 2,160,000

Sales To Cover Total Costs: \$ 2,739,600

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**Do you know your company's profit margin?**


### Top 10 Industry Profit Margins

Industry Rank	Industry	2008 Profits as % of Revenues
1	Network and Other Communications Equipment	20.4
2	Internet Services and Retailing	19.4
3	Pharmaceuticals	19.3
4	Medical Products and Equipment	16.3
5	Railroads	12.6
6	Financial Data Services	11.7
7	Mining, Crude-Oil production	11.5
8	Securities	10.7
9	Oil and Gas Equipment, Services	10.2
10	Scientific, Photographic, and Control Equipment	9.9

<http://money.cnn.com/magazines/fortune/fortune500/2009/performers/industries/profits/>


### Cost Exercise

- What is your profit margin? (Profit as a % of Revenue).
- Based on your 12-month direct WC costs, how much Revenue do you have to generate to pay for claims?
- How many of your Products/Services do you have to sell to make up this loss?
- What percent of your total business does that represent?
- How many customers do you have that buy that much of your product/service?




### Simple Net Present Value Calculator

	A	B
1	<i>Enter your data into the yellow highlighted cells:</i>	
2	Inflation Rate %	4.0
3	Annual Savings from reduced claims costs (direct & indirect) \$	\$10,000
4	Annual Estimate of Increased Revenue Equivalent due to Increased Productivity \$	\$4,000
5	Initial Cost of Controls \$	\$40,000
6	Ongoing Annual Cost of Controls \$	\$2,000
7	Life of Controls (years)	7.0
8		
9	Net Present Value of Controls \$	\$32,025
10	Internal Rate Of Return %	20%
11	Payback Period (years)	3.3
12	Cost Benefit Ratio 1 to	1.8
13		




### Simple Net Present Value Calculator

	A	B
1	<i>Enter your data into the yellow highlighted cells:</i>	
2	Annual Costs (Direct + Indirect) Due to Problem \$:	\$100,000
3	Company Profit Margin %:	8
4	Cost of your Product/Service:	\$756
5		
6	Annual Revenue needed to cover Problem Costs:	\$1,250,000
7	Number of Products/Services to sell to cover Problem Costs:	1,653
8		



### What if you don't function around "profit?"


- What is the cost justification process for expenditures in your organization?
- Where do you get the money to pay for claims?
- Who are your main contributors?
- How many patrons, widgets, citizens etc. would you need to have to pay for the estimated losses?
- The POINT is to translate the COSTS of injury/loss into salient metrics for your organization.



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### Approaching The Decision Maker

- Direct
- Indirect
  - With Your Advocate
  - Influence the Influencer
  - Project Team
  - Grassroots Team
- Key Question: When has Decision Maker taken action on something similar?


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### Insight on Decision Makers

Williams and Miller, Harvard Business Review, 2002


*In our experience, people can vastly improve their chances of having their proposals succeed by determining who the chief decision maker is among the executives they are trying to persuade and then tailoring their argument to that business leader's decision-making style.*

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### Charismatics (25%)


- Examples: Richard Branson, Lee Iacocca
- Characteristics: enthusiastic, captivating, talkative, dominant
- Buzzwords to use: results, proven, actions, show, watch, easy, clear, focus
- How to reach:
  - Resist joining his/her enthusiasm
  - Focus on results.
  - Simple arguments
  - Visual aid to stress features and benefits

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### Thinkers (11%)


- Examples: Bill Gates, Michael Dell
- Characteristics: cerebral, intelligent, logical, academic, slow to decide
- Buzzwords to use: quality, academic, think, numbers, intelligent, plan, expert, proof
- How to reach:
  - Lots of data
  - Data/Research to support your arguments
  - Multiple Sources (BLS, Articles, Case Studies...)
  - Multiple perspectives

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### Skeptics (19%)


- Examples: Steve Case, Larry Ellison
- Characteristics: demanding, disruptive, disagreeable, rebellious
- Buzzwords to use: feel, grasp, power, action, suspect, trust, demand, disrupt
- How to reach:
  - PERSONAL TRUST
  - Credibility
  - Often have to "borrow" from his/her confidant

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### Followers (36%)

- Examples: Peter Coors, Douglas Daft
- Characteristics: responsible, cautious, brand-driven, bargain-conscious
- Buzzwords to use: innovate, expedite, expertise, similar to, previous
- How to reach:
  - Use references and testimonials
  - Show that others have succeeded with the same approach
  - Show them how this decision is similar to one of their previous similar decisions


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### Controllers (9%)

- Examples: Martha Steward, Ross Perot
- Characteristics: logical, unemotional, sensible, detail-oriented, accurate, analytical
- Buzzwords to use: details, facts, reason, logic, power, handle, physical, grab, just do it
- How to reach:
  - Structured arguments
  - Best if you give data and they convince themselves
  - Focus on facts, not uncertainties
  - Avoid pushing your proposal too hard

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Again: How did they make their last big decision?  
Who influenced them?

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### The Power to Influence: Relationship Is More Powerful Than Reason

**Fair** reasons, in the context of a **great** relationship, are more powerful than **great** reasons in the context of a **fair** relationship.

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### Tips for Cost Justification

- Make sure all benefits are identified and fully measured
- Use the right Task Analysis Tools
- Determine present value of recurring injury costs
- Implement lower cost solutions that provide higher degree of control
- Look for best practice in other plants/locations
- Solicit and document quotes/"verbatims" – Costs and Benefits
- Use cost measurement and justification techniques
- Translate the direct and indirect costs of the problem into Meaningful Metrics
- Don't be afraid to guess
- Talk to someone in marketing
- Persistence with "grace"
- Pilot first – not full implementation
- Promote successes

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### Parlay Your Success Through Sharing

- Document Your Improvements
- Share "Learnings" through:
  - Flyers
  - Newsletters
  - Postings
  - Competitions
  - Conference Presentations
  - Association Meetings

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### Summary

- Know your decision maker
- Have your facts together
- Be open to options
- Use available tools
- Institutionalize your influence by publicizing your successes

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