

How to Cost-Justify
**Ergonomic
Improvements**



Many ergonomic improvements can be implemented with low capital expenditures. However, when an ergonomic improvement requires a larger capital expenditure, cost can become a barrier to implementation.

In these situations, it's important to make a compelling business case for the ergonomic improvement using cost justification to prove a return on investment (ROI).

To help quantify the value of ergonomics, the *Washington State Department of Labor & Industries* developed a very useful cost-benefit calculator based on epidemiological data. The calculator allows you to compare up to three ergonomic improvement options, and estimates the benefits and payback periods for each option.

Once you've clearly defined the business case for the best ergonomic improvement, you are more likely to get the resources you need to move the project forward.

Step-by-Step Directions

The ergonomics cost-benefit calculator is intended to be used under the following conditions:

- Your company directly pays the costs of workers' comp claims (i.e., self-insured).
- You have an active ergonomics program and you pretty much know what you're doing.
- You're considering implementing one or more ergonomics solutions to address specific problems (e.g., back and shoulder injuries from lifting).
- You'd like to evaluate a few different options.
- You're expecting a payback period of less than one year. (The payback period is the time that it takes for the benefits of a solution to pay for the costs of implementing it. Most ergonomics solutions have a payback period of less than one year.)

(Scroll to the bottom of this section for a more complete listing of the calculator's assumptions)

Step 1: Input Worker's Comp

The first step is to enter the number of employees affected by the ergonomic improvement, their average hourly salary and each injury associated with the job. The rest of the spreadsheet will be calculated for you.

An example is pictured below:

The screenshot shows the 'Ergonomics Cost Benefit Calculator' spreadsheet. It includes the following data and callouts:

- Number of employees in this job/dept./org.:** 9. Callout: "Only input the number of employees that will be affected by the solutions you are considering."
- Average hourly salary for these employees:** \$ 12.00 per hour. Callout: "These values will be calculated for you."
- Number of WMSD claims for this job/ dept./ org. per year:**
 - This past year:**
 - Type: Back strain, Number: 2, Typical costs: \$ 17,446
 - Type: Back strain, Number: [empty], Typical costs: \$ -
 - Type: Back strain, Number: [empty], Typical costs: \$ -
 - Type: Back strain, Number: [empty], Typical costs: \$ -
 - Type: Back strain, Number: [empty], Typical costs: \$ -
 - Total costs for year:** \$ 17,446
 - The year before:**
 - Type: Back injury w/ surgery, Number: 1, Typical costs: \$ 57,688
 - Type: Shoulder strain, Number: 1, Typical costs: \$ 11,565
 - Type: Back strain, Number: [empty], Typical costs: \$ -
 - Type: Back strain, Number: [empty], Typical costs: \$ -
 - Type: Back strain, Number: [empty], Typical costs: \$ -
 - Total costs for year:** \$ 69,253
 - 2 years before:**
 - Type: Back strain, Number: [empty], Typical costs: \$ -
 - Type: Back strain, Number: [empty], Typical costs: \$ -
 - Type: Back strain, Number: [empty], Typical costs: \$ -
 - Type: Back strain, Number: [empty], Typical costs: \$ -
 - Type: Back strain, Number: [empty], Typical costs: \$ -
 - Total costs for year:** \$ -
- Average annual WMSD claim costs:** \$ 28,900
- Estimated annual indirect costs:** \$ 31,790

Callouts also include: "Select only the types of injuries that are likely to be reduced by the solutions you are considering." and "Use the tabs to move from step to step." The spreadsheet tabs at the bottom are: Input Workers' Comp, Input Solutions, Benefits, Payback.

Step 2: Input Solutions

Step 2 is to input details of the solutions you are considering as well as the estimated effectiveness and productivity improvements of the proposed solutions. The calculator allows for up to three options.

An example is pictured below:

Option 1: <input type="text" value="Job Rotation"/>	Option 2: <input type="text" value="Pallet lift"/>	Type the name of the option here.
Purchase cost: <input type="text"/>	Purchase cost: \$ 5,500	Include costs to install, modify, etc.
Engineering cost: <input type="text"/>	Engineering cost: <input type="text"/>	Include employee time off work.
Training cost: \$ 400	Training cost: <input type="text"/>	The annual recurring costs for maintenance, supplies, etc.
Recurring costs: <input type="text"/>	Recurring costs: <input type="text"/>	
Other costs of change: <input type="text"/>	Other costs of change: <input type="text"/>	
Total cost of intervention: \$ 400	Total cost of intervention: \$ 5,500	
Effectiveness of solution: <ul style="list-style-type: none"> <input type="radio"/> Eliminates exposure to hazard <input type="radio"/> Reduces level of exposure <input checked="" type="radio"/> Reduces time of exposure <input type="radio"/> Relies on employee behavior <input type="radio"/> No reduction in injuries expected 		How effective will the solution be? For example, a mechanical device that lifts and moves the load will eliminate exposure to lifting hazards. A lift table that raises the load so that it can be lifted <u>without</u> bending will reduce the level of exposure. Job rotation reduces time of exposure. Safe lifting training and team lifting rely on employee behavior.
Productivity Improvements: <ul style="list-style-type: none"> <input type="radio"/> High - speeds up entire process <input type="radio"/> Medium - reduces wasted motion <input type="radio"/> Low - improves comfort/reduces fatigue <input checked="" type="radio"/> No productivity gains expected 		
		Estimate the effect the option will <u>have</u> on productivity. When in doubt, use the more conservative estimate.

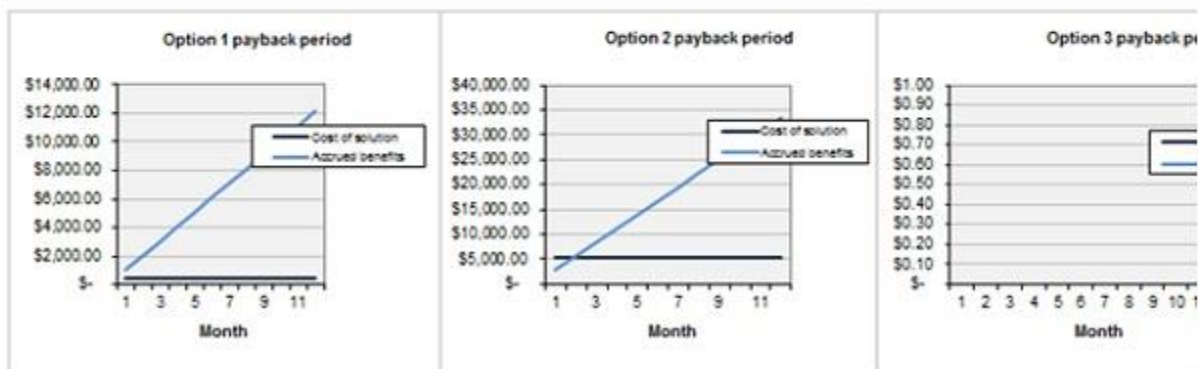
Step 3: Benefits

Estimated benefits from the solution options that you input are calculated automatically and presented in the 'Benefits' tab. Total estimated annual savings are the potential savings the first year after implementing that solution option. Estimated savings over three and five year periods are also calculated. The cost of implementing the solution is not subtracted out (i.e., these are *not* net savings). Estimated net savings are shown on the 'Payback' tab.

Step 4: Payback

Total costs, total benefits, and net benefits for the first year are shown on this tab. The payback period is calculated, and shown graphically for each option. Most ergonomic solutions have payback periods of less than one year. If you find a payback period that is significantly greater than one year, you should use a cost-benefit calculator that allows you to factor in depreciation and a discount rate.

Payback Period					
	Option 1	Job Rotation	Option 2	Pallet lift	Option 3
Total first-year cost of control:	\$	400	\$	5,500	\$ -
Annually recurring costs:	\$	-	\$	-	\$ -
Estimated annual benefits:	\$	12,138	\$	33,456	\$ -
Estimated payback period:		0.03 years		0.16 years	- years
Estimated net benefits after 1 year:	\$	11,738	\$	27,956	\$ -
Estimated net benefits after 3 years:	\$	36,014	\$	94,867	\$ -
Estimated net benefits after 5 years:	\$	60,289	\$	161,779	\$ -



Calculator Assumptions

Assumptions are based on [250 ergonomics case studies](#) reviewed by the Washington State Department of Labor and Industries.

INTENDED USE:

- Self-insured company.
- Implementing solution(s) in defined area (i.e., not a company-wide program).

- Company has active ergonomics program with all recommended elements and solutions will be effective.
- Can compare up to three options.
- Expecting payback in less than one year (i.e., not considering depreciation, discount rate).

INJURY COSTS:

- Average costs from 2004 SHARP report on WMSDs.
- Average costs used instead of actual company costs because recent injuries may not have incurred eventual total
- Cost of claim.
- Three years of experience used to be consistent with workers' comp.

INDIRECT COSTS:

- From OSHA e-tool: <http://www.osha.gov/SLTC/etools/safetyhealth/mod1.html>
- Less expensive claims have proportionally higher indirect costs.
- \$0 - \$2,999 = 4.5 x claim cost
- \$3,000 - \$4,999 = 1.6 x claim cost
- \$5,000 - \$9,999 = 1.2 x claim cost
- \$10,000+ = 1.1 x claim cost

EFFECTIVENESS OF SOLUTIONS:

- Based on Oxenburgh's (1991) assumptions & review of 250 case studies of ergonomics interventions.
- Effectiveness estimates were taken from the low end of the range to be conservative.
- Solutions that eliminate hazard (e.g., lift equipment, semi-automation) 70% effective.
- Solutions that reduce level of exposure (e.g., adjustable workstations, reduced weight of lift) 40% effective.
- Solutions that reduce time of exposure (e.g., job rotation) 15% effective.

- Solutions that rely on employee behavior (e.g., training only, team lifting) 10% effective.
- Percentage reduction in claims = percentage reduction in claims costs = percentage reduction in indirect costs.

PRODUCTIVITY BENEFITS:

- Employers pay for 2,000 hours per year per worker, at \$x.xx per hour.
- Workers are not 100% productive, and may be only 85% productive or less under non-optimal work conditions.
- Ergonomics solutions can help to regain some of the lost 15% productivity by improving work conditions and
- Increasing efficiency.
- Median increases in productivity for successful controls from the case studies in the 15% to 20% range, but how
- Productivity measured not known, probably varies widely.
- Conservative estimates were chosen.
- High productivity increase – 10%, medium = 5%, low = 2.5%.
- Value of productivity equal to annual cost of worker salaries multiplied by percentage increase in productivity.

(Source: Original calculator developed by Washington State Department of Labor and Industries)

Additional Ergonomics Tools and Resources

- [Step-by-Step Guides to Popular Ergonomic Assessment Tools](#)
- [MSD Prevention 101 – How to Prevent Musculoskeletal Disorders \(MSDs\)](#)
- [Employee Ergonomics Survey](#)