Office Ergonomics

Source	Workplace	Interventions	Costs	Measurements	Savings
http://www.allscan.ca/ergo/ergoecon.htm	Office	(4,000 users) Participatory, furniture changes		Absenteeism 4% down to 1% (75%) Error rates 25% down to 11% (56%) Time on task 60% up to 86% (40% increase in active work time) Reduced discomfort	
http://www.allscan.ca/ergo/ergoecon.htm	Insurance (State Farm)	Furniture and seating		15% increase in productivity	
http://www.allscan.ca/ergo/ergoecon.htm	Lab keyboard (Dainoff)	Workstation set up		5% increase in keystroke rate	
Promoting Health and Productivity in the Computerized Office: Models of Successful Ergonomic Interventions. Editors: Steven L. Sauter, Marvin J. Dainoff, Michael J. Smith Ch. 3, Taylor and Francis, London, 1990	Lab workstations (Dainoff)	Optimal vs. suboptimal workstation set up Exp. 1 includes glare control		Exp. 1 - 23.3% increase in productivity (based on incentive pay), 17.6% increase in 2nd experiment	
http://www.allscan.ca/ergo/ergoecon.htm	Insurance (Blue Cross – Blue Shield)	Ergonomically enhanced environment		4.4% increase in productivity	
Ergonomic Success Stories, OSHA, November 1996. From Fryer, B. & Ignatius, E. (1994) The high cost of keyboard injuries: Blue Cross addresses repetitive strain injuries. *PC World*, 12(3), 45.	Blue Cross	Redesigned workstations: Fully adjustable chairs with 5-point bases. Desks with adjustable height, drawers, keyboard trays. Adjustable lights for desks.		26 workers' compensation claims costing the company $1.6 M., after 3 years. $1M insurance dividend	$1M

Source	Workplace	Interventions	Costs	Measurements	Savings
http://www.osha.gov/dcsp/success_stories/ergonomics/bluecross_kan.html	Blue Cross Blue Shield of Kansas	Program, training, workstation evaluation for all new employees, follow-up evaluation, chairs, glare screens, articulating and split keyboards, document holders, mouse rests, and different mouse varieties, workstations, indirect lighting, health and stretching programs, medical management.		CTD-related repetitive strain injury claims 103 and in 1991, to 52 in 2001	Claims costs $526,000 down to $137,000 in 10 years.
http://www.osha.gov/dcsp/success_stories/ergonomics/bluecross_ri.html	Blue Cross & Blue Shield of Rhode Island	Program, ergo teams, training, workstation changes, standardized ergo equipment.		Lost workdays 345 in 1999 down to 104 in 2000 (70 percent).	Workers' Comp costs $227,620 in 1999 down to $26,010 in 2000 (89 percent).
http://www.osha.gov/dcsp/success_stories/ergonomics/erie.html	Erie Insurance Group	Program, early reporting, medical management, stretching, training, workstation evaluations.		50 percent reduction in workers' compensation claims for work-related musculoskeletal disorders (MSDs).	
http://www.allscan.ca/ergo/ergoecon.htm	Norwegian State Institute	Workstations and seating	Not reported	50% reduction in absenteeism Turnover 40% down to 5% (88%) Disability – 40% returned to work	Not reported
http://www.allscan.ca/ergo/ergoecon.htm	Automotive mfg (mgr. VDT use)	Tables & chairs	Not reported	Avg. 3 hrs. per week of time savings	Not reported
http://www.allscan.ca/ergo/ergoecon.htm	High tech mfg (office workers)	Furniture & work layout	Not reported	5% increase in productivity	Not reported
http://www.allscan.ca/ergo/ergoecon.htm	Office	Furniture and layout	$1,578,000 ($315,000 per year)	20% increase in productivity (5% expected)	$5M over 10 years, 1.7 year payback, 40% ROI (all if 5% productivity increase)

Source	Workplace	Interventions	Costs	Measurements	Savings
http://www.hfes.org/Publications/ProductDetail.aspx?ProductID=26	Telephone directory assistance (VDT)	Screen display improvements	Not reported	Faster time per call	$2.94M per year
Ergonomic Success Stories, OSHA, November 1996.	Aetna insurance office	Redesigned workstations: Adjustable ergonomic chairs, task lights, acoustical panels, and increased space.	$522,600	Productivity increased 64% (10-15% due to physical changes, remainder due to organizational). Absenteeism decreased 14%. Turnover rate decreased 86%.	Based on salaries, productivity increases are worth $621,100 annually. Net benefit of $98,500
Ergonomic Success Stories, OSHA, November 1996.	Office, 12,000 employees	New workstations, best available furniture	Not reported	15% improvement in data entry (22 week payback), 10% for dialog (36 week payback).	Projected annual benefit $6.4M dialog, $5.6M data entry
General Accounting Office. Worker protection: Private sector ergonomics programs yield positive results. Report to Congressional Requesters. 1997(; GAO/HEHS-97-163).	American Express Financial Advisors, 8000 employees	Hired ergonomist, program, task force, medical management, training, employee access to services & involvement. Workstation changes, adjustable furniture, chairs, larger monitors, corner stations, head sets, arm supports		80% reduction in workers' comp costs ($484,000 down to $98,000 over 4 years), average cost per WMSD $9,123 down to $1,685 (81%) Reduced discomfort, improved productivity and quality of work.	$386,000 in workers' comp over 4 years.
Ergonomic Success Stories, OSHA, November 1996. From Gauf, M. (1995) 3M pilots ergonomic program to reduce OSHA recordables. In M. Gauf (Ed.), *Ergonomics That Work* (pp.41-44). Haverford, Penn.: CTD News.	3M office	Redesigned workstations: Adjustable chairs with armrests, articulating keyboards.		64% reduction in OSHA injury and illness rate fell from 4.5 to 1.61 incidents per 200,000 worker hrs in one yea	

Source	Workplace	Interventions	Costs	Measurements	Savings
http://www.osha.gov/dcsp/success_stories/ergonomics/spring_window3.html	Springs Window Fashions, office workstations	Ergonomics committee, workstation analysis and adjustments, follow-up evaluation.		10 to 15 compensable claims per year down to zero.	
http://www.osha.gov/dcsp/success_stories/ergonomics/siemensautomotive.html	Siemens VDO Automotive	Program, training, workstation evaluations, new chairs, back cushions, lumbar supports, keyboard/mouse rests, and document holders. Frequent short exercise breaks, proper vision correction.		Workplace strain injuries decreased from 43 percent to 0. Savings of 20,000 hours per year in time previously lost to pain, doctor visits, and time off.	
Ergonomic Success Stories, OSHA, November 1996. From Tadano, P. (1990). A safety/prevention program for VDT operators: One company's approach. *Journal of Hand Therapy*, 3(2) 64-71.	VDT workstations	Redesigned workstations: Monitor risers, adjustable chair.		49 reported cases of repetitive motion syndrome down to 28	$60,000 in medical costs.
Ergonomic Success Stories, OSHA, November 1996. From Bradley, W. Management and Prevention of on the Job Injuries, *AAOHN Journal*, Vol44, Number 8, Aug. 1996, pgs 402-405.	VDT workstations	Made adjustments to the existing workstation, raise/lower work surface, CRT risers, adj backrest		100% reduction in lost time.	Cost avoidance over $400,000 over two years.
Promoting Health and Productivity in the Computerized Office: Models of Successful Ergonomic Interventions. Editors: Steven L. Sauter, Marvin J. Dainoff, Michael J. Smith Ch. 1	Insurance co.	New furniture, new layout, task lighting, arranged according to task requirements.	$1,877 per workstation	5.5% increase in productivity; 23-month payback. Increased satisfaction.	$979 per worker per year
Promoting Health and Productivity in the Computerized Office: Models of Successful Ergonomic Interventions. Editors: Steven L. Sauter, Marvin J. Dainoff, Michael J. Smith Ch. 1	Army engineering office	Task requirement design of new furniture, more storage, organization, document access improved, task lighting, new chairs.	$54,509	20.6% increase in productivity 10.8 month payback	$3420 in space savings $4065 per worker in productivity ($56,914 total)

Source	Workplace	Interventions	Costs	Measurements	Savings
Promoting Health and Productivity in the Computerized Office: Models of Successful Ergonomic Interventions. Editors: Steven L. Sauter, Marvin J. Dainoff, Michael J. Smith Ch. 2	Data entry operators	Work desks, foot rests, document holders, lighting levels, color of walls, work breaks		Average keying speed 9480 keystrokes/hr up to 13,000 keystrokes/hr., long term 11,300 keystrokes/hr. Error rate 0.19-4.73% down to 0.10-0.13%, long-term 0.18-1.10%.	
Promoting Health and Productivity in the Computerized Office: Models of Successful Ergonomic Interventions. Editors: Steven L. Sauter, Marvin J. Dainoff, Michael J. Smith Ch. 2	Typesetters	Adjustable chairs, foot rests, lighting, work teams, rest breaks		Average keying speed 7,567 keystrokes/hr down to 7,420 keystrokes/hr 0.08 to 0.04% decrease in error rate, 7.8 errors per 10,000 characters down to 4.0	
Promoting Health and Productivity in the Computerized Office: Models of Successful Ergonomic Interventions. Editors: Steven L. Sauter, Marvin J. Dainoff, Michael J. Smith Ch. 7	Data entry	Exercise breaks		25% increase in productivity, short term	
Interior design of the electronic office: The comfort and productivity payoff. Kleeman, W.B., Duffy, F., Williams, K.P. & Williams, M.K. (1991).	Software designers, 39, at TRW	Private offices, participatory design, privacy, acoustics, chairs, advanced hardware		39% increase in productivity (10-200% range).	
Interior design of the electronic office: The comfort and productivity payoff. Kleeman, W.B., Duffy, F., Williams, K.P. & Williams, M.K. (1991).	Office workers, 700 in US, 74 overseas, Merck	Participatory design, major renovations, advanced technology		Turnaround time 4 days down to 6 hours, 25% ROI (US), 50% ROI (Int'l)	
Interior design of the electronic office: The comfort and productivity payoff. Kleeman, W.B., Duffy, F., Williams, K.P. & Williams, M.K. (1991).	London Life insurance	Systems furniture, participatory design		Productivity increased 10.6%	

Source	Workplace	Interventions	Costs	Measurements	Savings
Interior design of the electronic office: The comfort and productivity payoff. Kleeman, W.B., Duffy, F., Williams, K.P. & Williams, M.K. (1991).	Plantronics	Telephone Headsets		Overall efficiency improved 11%, 113.4 keystrokes/min (one-handed) up to 200 keystrokes/min (two-handed) (43%)	
Interior design of the electronic office: The comfort and productivity payoff. Kleeman, W.B., Duffy, F., Williams, K.P. & Williams, M.K. (1991).	Insurance company	Panel systems furniture		11.83% increase in productivity (5.8%, 12.6% & 17.1% by department)	
Interior design of the electronic office: The comfort and productivity payoff. Kleeman, W.B., Duffy, F., Williams, K.P. & Williams, M.K. (1991).	Wells Fargo bank	Systems furniture		28.4% over three months	
Interior design of the electronic office: The comfort and productivity payoff. Kleeman, W.B., Duffy, F., Williams, K.P. & Williams, M.K. (1991).	Control Data Corp.	Improved lighting		6% increase in productivity, 65% reduction in energy consumption, payback in 23 days	
Interior design of the electronic office: The comfort and productivity payoff. Kleeman, W.B., Duffy, F., Williams, K.P. & Williams, M.K. (1991).	Penn. Power & Lighting drafting room	Improved lighting, reduced glare		7.5% increase in productivity, 76% reduction in operating and maintenance costs, 73 day payback period	
Interior design of the electronic office: The comfort and productivity payoff. Kleeman, W.B., Duffy, F., Williams, K.P. & Williams, M.K. (1991).	Superior Die Set drafting area	Improved lighting		11% increase in productivity, reduced costs, 24 day payback	
Interior design of the electronic office: The comfort and productivity payoff. Kleeman, W.B., Duffy, F., Williams, K.P. & Williams, M.K. (1991).	Singapore Airlines computer center, 36 data entry operators, C.N. Ong, University of Singapore	Work area redesigned (participatory), adjustable chairs, work-rest regime revised, fewer visual and musculoskeletal complaints		37.15% increase in productivity, 92.8% reduction in errors over 12-month period.	

Source	Workplace	Interventions	Costs	Measurements	Savings
Interior design of the electronic office: The comfort and productivity payoff. Kleeman, W.B., Duffy, F., Williams, K.P. & Williams, M.K. (1991).	Computerized Offices	Adjustable office furniture Summary of studies		Average increase in productivity for adjustable office furniture = 16.75%	
Ohio BWC Grant Program Ergonomics Best Practices for Public Employers https://www.ohiobwc.com/downloads/brochureware/publications/PESafeGrant.pdf	VDT & office	Redesign of offices and computer workstations average risk factor score 26.3 down to 13.8, a 48-percent improvement.		CTD incidence rate 12.4 down to 4.4 CTDs per 200,000 hours worked, (64 percent); Payback 2.9 months; Days lost due to CTDs 45.6 down to 8.1 per 200,000 hours worked, (82 percent); Restricted days 16.6 down to 0 per 200,000 hours worked (100 percent);	
OSHA Final Ergonomics Standard, November 2000	Computer mfg.	Training, evaluations, sit-stand workstations, adjustable keyboard/mouse surface.		Upper limb disorders down 41%	
Tadano, P. A safety/prevention program for VDT operators: one company's approach. Journal of Hand Therapy. 1990; 3(2):64-71.	VDT workers, 500	Provided training, redesigned workstations, and incorporated additional breaks and exercises into the work schedule.		MSDs down 40% in 6 months. Cumulative trauma disorder cases reduced from 49 in the 6 months preceding the intervention to 24 in the 6 months following the intervention.	

Source	Workplace	Interventions	Costs	Measurements	Savings
Thompson D.A.; McEvers D.C., and Olsen C.H. Case study on data entry system design. Couch D. The Economics of Ergonomics. Occupational Health and Safety, Canada, 1990; 1986. "Case Study in Data Entry System Design", Human Factors Society 30th Annual Conference Proceedings, Dayton, OH, September 1986.	Data entry	System design		MSDs down 100%, lost workdays down 58% over 1 year.	
Ergonomic Success Stories, OSHA, November 1996. Cumulative Trauma in the Workplace: Case Studies (1991). The Fresno Bee, 143-148.	Newspaper publishing	Redesigned adjustable workstations: Keyboard at elbow height, wrist rests, padded edges and enlarged work surfaces. Adjustable chairs with option of arm supports.		Medical costs and temporary disability reduced 80%. Reduced reported repetitive motion disorders from 50 in 1989, to 19 in 1990. Morale has greatly improved.	
Amick, et al (2003) Spine 28(4), 2706-2711.	State Dept. of Revenue Services, 87 employees in chair with training group.	Highly adjustable task chair with ergonomics training and follow-up.		Productivity improvements of $354 per worker per day. Cost benefit ratio of 1:22.	
Nerhood, H.L. & Thompson, S. W., 1994. Adjustable sit-stand workstations in the office. *Proceedings of the Human Factors and Ergonomics Society 38th Annual Meeting*. Santa Monica, CA	Office workstations, United Parcel Service	Sit-stand workstations and training		MSDs down 50%, costs down 100% Body part discomfort decreased 62%.	

Source	Workplace	Interventions	Costs	Measurements	Savings
BSR/HFES100 Human Factors Engineering of Computer Workstations	Office workstations	Summary of studies		Based on multiple research studies, an ergonomically designed workstation improves productivity by 2% to 22%.	

Healthcare Ergonomics

Source	Workplace	Interventions	Costs	Measurements	Savings
http://www.doli.state.mn.us/fourthmeetingminutes.html Minnesota Dept. of Labor and Industry, testimony regarding proposed ergonomics rule	Ag-Gwah-Ching Nursing Home	Program, employee involvement, management responsibilities, lift equipment, chairs, workstations, training, safety teams		Lost workday injury rate 11.3 down to 4.5, 60% decrease in workers' compensation costs	
http://w3.rn.com/news_features.asp?articleID=10820 according to a 1996 report in *Community Nurse*	United Kingdom healthcare	They implemented a "no-lift" policy in 1993. Nurses in the United Kingdom use sling lifts, stand-assist lifts, lateral transfer equipment and other devices to lift patients.		84 percent reduction in lost work hours and a 98 percent drop in absenteeism due to lifting and handling	
http://www.doli.state.mn.us/fifthmeetingminutes.html Minnesota Dept. of Labor and Industry, testimony regarding proposed ergonomics rule	Care Providers, nursing homes	Low lift program, with mechanical lift assists (18)		14% reduction in time loss claims, 33% reduction in all claims over 3 years, 73% reduction in time loss costs, 51% reduction in all claims costs	

Source	Workplace	Interventions	Costs	Measurements	Savings
GAO report, 1997. *WORKER PROTECTION: Private Sector Ergonomics Programs Yield Positive Results.* GAO/HEHS-97-163 GAO, United States. General Accounting Office. Washington, D.C.	SOCHS Nursing homes 775 workers	Program, hired safety coordinator, staff and employee involvement, ergo task force, purchasing and design, carts, patient lifts, workstations, chairs, laundry bins, smaller laundry bags, mats, training, policies, medical management	$60,000 for 14 lifts	Average cost per WMSD $2,500 up to $3,000 (-20%) in 3 years (due to one time loss claim). Incidence rate 14.7 down to 12.3 (16%). Lost workdays down 35 per 100 FTEs, restricted workdays up 45 per 100 FTEs. Improved efficiency, morale, reduced turnover and absenteeism.	Workers' comp costs $111,000 down to $72,000 in 3 years (35%).
Ohio BWC grant program https://www.ohiobwc.com/downloads/blankpdf/ExtendedCare.pdf	27 Extended care facilities	Floor lifts Average risk factor score for patient lifting tasks 70 down to 30.5 (56%). (Over avg. 298 day follow up)		The CTD incidence rate 21.3 per 200,000 hours down to 11.9 per 200,000 hours (44%). ROI for the floor lifts is 2.5 months; Days lost 127.2 per 200,000 hours down to 79.0 per 200,000 hours (38%); Restricted days 96.6 per 200,000 hours down to 87.0 per 200,000 hours (10%); Turnover 98.5 per 200,000 hours down to 74.1 per 200,000 hours (25%);	
Ohio BWC grant program https://www.ohiobwc.com/downloads/blankpdf/ExtendedCare.pdf	11 Extended care facilities	Ceiling lifts Average risk factor score 36 down to 21 (42%). Over avg. 143 days follow up)		Incidence rate and lost days incidence rate increased. Restricted days 81.3 per 200,000 hours down to 77.2 per 200,000 hours (5%); turnover rate 159.7 per 200,000 hours down to 155.2 per 200,000 hours (3%);	

Source	Workplace	Interventions	Costs	Measurements	Savings
Ohio BWC grant program https://www.ohiobwc.com/downloads/blankpdf/ExtendedCare.pdf	1 extended care facility	Geri-chairs The average risk factor score for patient lifting tasks was 56 before using the geri-chairs and was seven after the chairs were in use — an 87-percent improvement.		Restricted days due to CTDs 7.2 per 200,000 hours down to 0 per 200,000 hours (100%); Payback 1.4 months; Days lost 14.4 per 200,000 hours worked to 0 (100%); Restricted days 35.5 per 200,000 hours down to 0 (100%); turnover 168 per 200,000 hours down to 68.9 (59%).	
Ohio BWC grant program https://www.ohiobwc.com/downloads/blankpdf/ExtendedCare.pdf	8 Extended care facilities	Hi-Lo beds The average risk factor score for patient lifting tasks was 31.6 before using the hi-lo beds and was 21.4 after the beds were in use — a 10-percent improvement.		CTD incidence rate 21.1 CTDs per 200,000 hours down to 15.0 (29%); Payback period 8.5 months; Days lost 72.7 per 200,000 hours down to 20.1(72%); Restricted days due to CTDs 53.1 per 200,000 hours down to 36.7 (31%); turnover 71.9 per 200,000 hours down to 65.2 (9%);	
Ohio BWC grant program https://www.ohiobwc.com/downloads/blankpdf/ExtendedCare.pdf	1 extended care facility	Bathing systems The average risk factor score for patient lifting tasks was 31.6 before using the hi-lo beds and was 21.4 after the beds were in use — a 10-percent improvement.		CTD incidence rate 39.3 CTDs per 200,000 hours down to 0 (100%); Payback 0.7 months; Days lost due to CTDs remained at zero; Restricted days due to CTDs 368 per 200,000 hours down to 0 (100%); turnover 185 per 200,000 hours down to 0 (100%);	

Source	Workplace	Interventions	Costs	Measurements	Savings
Ohio BWC grant program https://www.ohiobwc.com/downloads/blankpdf/ExtendedCare.pdf	69 healthcare facilities	Various equipment		Incidence rate 18.5 per 200,000 hours down to 11.6 per 200,000 hours (37%); days lost 95.8 per 200,000 hours down to 58.8 per 200,000 hours (39%); restricted days 79.5 per 200,000 hours down to 58.8 per 200,000 hours (26%); turnover 96.8 per 200,000 hours down to 80.9 per 200,000 hours (16%). 299 day period.	
Ohio BWC grant program https://www.ohiobwc.com/downloads/blankpdf/ExtendedCare.pdf	Champaign County Nursing Home	32 electric beds. Arjo patient lift	$59,000.	16 CTDs per 200,000 hours down to 0 CTDs at 7 months after the intervention. Lost days rate 289 per 200,000 hours down to 0 lost days at seven months after.	
Ohio BWC grant program https://www.ohiobwc.com/downloads/blankpdf/ExtendedCare.pdf	Calvary Manor nursing home	Zero lift system; by purchasing 20 Ultra Care electric beds, an Apollo Bath System and the two lift-n-weigh assists. Patient handling risk factor scores decreased from 35 to 28.	$13,053.	In 18 months, CTD incidence rates fell from 22 to 14 incidents per 200,000 hours worked. Restricted-days rate decreased from 121 to 44 days per 200,000 hours worked. Turnover rate went from 55 percent to 32 percent.	
Ohio BWC grant program https://www.ohiobwc.com/downloads/blankpdf/ExtendedCare.pdf	Wood County Nursing Home	Six lifts to assist in the transfer of residents.	$25,347.30.	CTD rate fell from 29.6 CTDs per 200,000 hours down to 15.5 CTDs per 200,000 hours one year after the intervention. Turnover decreased from 58 percent before the intervention to 35 percent after.	

Source	Workplace	Interventions	Costs	Measurements	Savings
http://www.osha.gov/dcsp/success_stories/ergonomics/citizens.html	Citizens Memorial Healthcare	All jobs evaluated, training, employee involvement, workstation adjustments, lift assist equipment		66 percent decrease in injuries	
Provider – American Health Care Association, February 2001, A Look At No-Manual-Lift Programs, Betty Z. Bogue; as reported on: http://www.doli.state.mn.us/secondtmeetingminutes.html Minnesota Dept. of Labor and Industry, testimony regarding proposed ergonomics rule and http://w3.rn.com/news_features.asp?articleID=10820 and http://www.getalift.com/about.htm	106 (103) nursing facilities	Zero-lift programs with mechanical lift assists		97% reduction in injuries Bogue reports that a study she conducted involving 103 nursing homes following her protocol showed the homes maintained a 90 percent reduction in lift-transfer injuries and had a 49 percent reduction in overall workers' compensation costs. Also, lift/transfer only: 93% reduction in costs, 95% reduction in injuries, 39% cost reduction, 19% injury reduction overall.	
Garg, A. and Owen, B. D. Reducing back stress to nursing personnel: an ergonomic intervention in a nursing home. Ergonomics. 1992; 35(11):1353-1375.	Nursing 57 employees	Implemented patient transferring devices.		LBP down 43% over 3.5 yrs IR of back injuries decreased from 83 to 43 per 200,000 work hours following the intervention; no lost or restricted work days during the 4 months following the intervention.	
Garg, 1997. Reducing safety and ergonomic hazards with a zero-lift program. Long Term Care. 1997; Nov./Dec.():26-27.	Hospital	Zero lift program		Lost workdays down 79%, back injuries down 78%, costs down 90%.	
Garg, A. Long-term effectiveness of "zero-lift program" in seven nursing homes and one hospital. Wisconsin; 1999 Aug 16; U60/CCU512089-02.	Hospital, 754 employees	Zero lift program		Lost workdays down 62%, back injuries down 32%, costs down 55%.	

Source	Workplace	Interventions	Costs	Measurements	Savings
Ergonomic Success Stories, OSHA, November 1996. From Hospital Employee health (1995). Back program cuts comp costs, injuries, lost days. July 1995, 92-93	Hospital	Redesigned work process: Mechanical lifting equipment, slide boards, and patient transfer belts.		149 back injuries down to 85 (43%); nearly 1,000 lost days down to 426 lost days (57%); lost-time injuries reduced to 49 (down 35%); more than 4,000 restricted-duty days down to 1,851 (54%).	The average workers' comp cost per case was $2,207, for a total of $328,843 in 1993, down to $187,595 (43%) in 1994.
Ergonomic Success Stories, OSHA, November 1996. From Garg, A. & Owen, B. (Univ. of Wisconsin), Reducing back stress to nursing personnel: An ergonomic intervention in a nursing home.	Nursing home	Redesigned work process: Selection of patient transferring devices designed to produce less physical stress. Devices include walking belts and hoists. Mean compressive force on the L5/S1 disc 4751N down to 1964N, mean hand force to make a transfer 321N down to 122N, strength requirements 41% female pop, capable up to 83%.		Incidence rate for back injuries was 83 per 200,000 work hours down to 47 per 200,000 work hours.	
Ergonomic Success Stories, OSHA, November 1996. From Brigham, C.J. (1994). Ergonomic intervention. The 4th National Symposium and Trade exhibition on Health Care Safety and the Environment. February 13-16, 1994, Florida.	Hospital, perioperative setting	Redesigned work process: At least 4 people to transfer patient. Longer roller boards.		25% reduction in back injuries during the 18 months after intervention.	

Source	Workplace	Interventions	Costs	Measurements	Savings
Ergonomic Success Stories, OSHA, November 1996. From Charney, W., Zimmerman, K., & Walara, E. (1991). The lifting team: A design method to reduce lost time injury in nursing. *AAOHN Journal*, 39(5)231-234.	Hospital	Redesigned work process: Lifting teams for 95% of all patient transfers. The lifting teams, incorporates the latest body mechanics; uses transfer belts; mechanical lifting devices; and incorporates work/lift coordination. A team of two per shift had no problem with the average of 30 lifts per day.		Back injuries $229,500 per year, average cost of $9,000 per injury. Baseline rate of injury prior was 32 cases per 420 nurses in a two-year period. Back injuries among health care workers reduced 94% first year; 100% second year.	$135,000 per year saved in compensation costs; $70,000 a year increase in nursing productivity.
Ergonomic Success Stories, OSHA, November 1996. From Gauf, M. (1995) Giving health-care workers a helping, mechanical hand. In M. Gauf (Ed.), *Ergonomics That Work* (pp.73-77). Haverford, Penn.: CTD News.	Healthcare – hospital nursing	Ergonomics program in nursing and laundry. Redesigned work process: Worker-assisting devices to move patients from bed to bed, and from sitting position.		94 injuries, 7,716 lost-time hrs on nursing units in 1988-1989. Incidence of back injuries in nursing wards 1988-1993 fell 39%; lost-time hrs dropped 83%.	$500,000 in workers' compensation in 1993, and $553,000 in 1994, total of $1.8 mil in 5 yrs.
Ergonomic Success Stories, OSHA, November 1996. From Gauf, M. (1995). Giving health-care workers a helping, mechanical hand. In M. Gauf (Ed.), *Ergonomics That Work* (pp73-77). Haverford, PA: CTD News	Healthcare laundry	Redesigned work process: Regularly scheduled maintenance program for equipment.		Injuries 1993-1994 decreased from 55 to 16 lost-time hrs reduced from 1481 to 284.	
Ergonomic Success Stories, OSHA, November 1996. From Brevillier Nursing Home Correspondence.	Nursing home	Redesigned work process: Lifting devices. Heavy lifting reduced by 80-85%.		Claims related to sprains and strains 12 down to 1 over three years. Total cost of claims $19,000 down to $118.00.	
Ergonomic Success Stories, OSHA, November 1996. From Don Estabrook, Safety Mgr, d'Youville Pavilion, Maine.	Nursing home	Medi-Man and Medi-Maid lifts		Workers' compensation reduced 50%; Improved morale, low turnover in CNA staff	

Source	Workplace	Interventions	Costs	Measurements	Savings
Ergonomic Success Stories, OSHA, November 1996. From Wyatt, R., C. Booth, R. Poirier, 1995, Reducing Employee Back Injuries in Skilled Nursing Facilities, Proceedings of the Institute of Industrial Engineers, 1995.	Nursing home	Suitable number of lifts, lifts that fit the patient		Incidence rates reduced approx 50%; greater job satisfaction	Benefit/cost were 3.04, 3.47, 3.25, 2.10 and 0.5
Ergonomic Success Stories, OSHA, November 1996. From Brigham, C.J. (1994). Ergonomic intervention. The 4th National Symposium and Trade exhibition on Health Care Safety and the Environment. February 13-16, 1994, Florida.	Hospital	Redesigned work process: AIR PAL (Patient Air Lift) devices.	Total cost of the AIR PAL devices was under $22,000.	Indemnity cases dropped from 5.7 to 2.5 in the two years. The indemnity case cost $273,380 down to $73,380.	$200,000 over 2 years
http://www.eorm.com/ezine/pp7/ergo_healthcare.asp	Healthcare North Carolina	"No lift" policy		One year 60 cases down to seven; costs of $350,000 down to $8,200.	
http://www.eorm.com/ezine/pp7/ergo_healthcare.asp	Long-term care facility	Prevention program using mechanical lifting devices.		Back injuries were reduced 74% over a three-year period	
http://www.eorm.com/ezine/pp7/ergo_healthcare.asp	Ledgewood Manor, a skilled/intermediate care facility in Windham, Maine	Installation of fixed ceiling lifts		Six months Workers' Compensation costs reduced by 60%. At 20 months, zero (0) back injuries related to patient transfers reported and Workers' Comp costs decreased 97%.	
OSHA Final Ergonomics Standard, November 2000	Nursing Home	No single person lift policy, mechanical lift equipment.		Lost workdays reduced 80%	
Nyran, P. I. Cost effectiveness of core-group training. Advances in Industrial Ergonomics and Safety III. 1991	Hospital	Train-the-trainer		MSDs down 66%, costs down 75%.	

Source	Workplace	Interventions	Costs	Measurements	Savings
Laflin, K. and Aja, D. Health care concerns related to lifting: an inside look at intervention strategies. The American Journal of Occupational Therapy. 1995; 49(1):63-72.	Hospital 1,050 employees				
Bernacki, E. J.; Guidera, J. A.; Schaefer, J. A.; Lavin, R. A., and Tsai, S. P. An ergonomics programs designed to reduce the incidence of upper extremity work related musculoskeletal disorders. Journal of Occupational and Environmental Medicine. 1999; 41(12):1032-1041.	Hospitals, 18,000 employees	Program aimed at the early diagnosis and treatment of potential upper extremity work related musculoskeletal disorders , ergonomic assessment and abatement of work areas where individuals with UEWMSDs are employed, identification and correction of areas throughout the hospital and university where UEWMSDs could possibly occur		UEWMSDs down 80% over 7 years. Initial increase in the number and cost for the treatment of UEWMSDs. Subsequently, there was a significant decrease in the number of UEWMSDs reported and virtual elimination of the need to use surgical procedures to correct these conditions.	
Evanoff, B. A.; Bohr, P. C., and Wolf, L. D. Effects of a participatory ergonomics team among hospital orderlies. American Journal of Industrial Medicine. 1999; 35():358- 365.	Hospital, 105 employees	Formation of a participatory ergonomics team with three orderlies, one supervisor, and technical advisors. This team designed and implemented changes in training and work practices.		MSDs down 50%, lost workdays down 83%, costs down 41% over two years.	

Source	Workplace	Interventions	Costs	Measurements	Savings
McGrail Jr., M. P.; Tsai, S. P., and Bernacki, E. J. A comprehensive initiative to manage the incidence and cost of occupational injury and illness. Report of a outcomes analysis . Journal of Occupational and Environmental Medicine. 1995; 37(11):1263-1268.	Hospital, 13,895 employees	A comprehensive initiative utilizing an in-house preferred provider organization, medical case management, and application of ergonomic techniques.		MSDs down 18% over 2 years. Significant decrease in injuries and illnesses (53/1000 vs 27/1000, P <.01) and average days lost per event (10.4 vs 6.6 days, P <.01). A significant increase in restricted-duty days (.2 vs 1.5 days, P <.01) and an 18% reduction in medical and indemnity costs of the institution's workers' compensation expenditures	
Rosald, et al, and Spiegel et al, (2002) AAOHN 50(3), pgs. 120-127 and 128…	Hospital	Implemented ceiling lifts in patient rooms, did not reach into bathrooms, not usable for repositioning. Estimated benefits over 12-year period.	$344,323	58% decline in lift/transfer injuries, cost benefit 1:6, internal rate of return 17.9%. Costs of injury reduced 69% ($65,997 down to $20,731 per 100,000 hours). Payback 1.3 years (all factoring in indirect costs of 2x direct costs).	$872,372 projected over 12 years.
Evanoff, B., Wolf, L., Aton, E., Canos, J. and Collins, J., (2003). Reduction in injury rates in nursing personnel through introduction of mechanical lifts in the workplace. *American Journal of Industrial Medicine, 44*, 451-457.	Acute Care and Long Term Care	Full-body and sit-to-stand lifts, 2-hour, hands-on instruction Data collected between 1997-8 to end of 2000.		Acute care: 13% reduction in injury rate (6.59 down to 5.70); 53% reduction in lost workday injury rate (32.0 down to 14.9); 33% reduction in lost day rate (3.00 down to 2.02) Long term care: 29% reduction in injury rate (6.90 down to 4.92); 72% reduction in lost workday injury rate (3.13 down to 0.89); 66% reduction in lost day rate (49.04 down to 16.82)	

Industry Ergonomics

Source	Workplace	Interventions	Costs	Measurements	Savings
http://www.apa.org/ppo/issues/sergofact.html http://www.hfes.org/Publications/ProductDetail.aspx?ProductID=26	John Deere	Redesign of work processes, employee involvement, ergo coordinators	Not reported	83% reduction in back injuries over 5 years, 32% reduction in workers' comp costs	Not reported
http://www.apa.org/ppo/issues/sergofact.html http://www.hfes.org/Publications/ProductDetail.aspx?ProductID=26	AT&T mfg. & office	Workstations and lift training. Lifting manipulator to pick up heavy components, allows employee to steer components into place for easier fastening into cabinet.	Not reported	75% reduction in workers' comp costs in one year, $400,000 down to $94,000 (down to $8,600 in three years)	Not reported
http://www.apa.org/ppo/issues/sergofact.html; http://www.hfes.org/Publications/ProductDetail.aspx?ProductID=26	AT&T again	Scissor lifts with lazy-susan raises cabinet off floor and allows easy access., sit/stand workstations, job enlargement		298 lost work days to 0 lost workdays over two year period, workers' comp down to $12,000	$1.48M in 5 years (workers' comp savings)
http://www.hfes.org/Publications/ProductDetail.aspx?ProductID=26	Poultry processing	Redesigned de-boning knife		Reduced injuries More efficient de-boning, line speed up 2% to 6%	$500,000 (workers' comp savings)
http://www.hfes.org/Publications/ProductDetail.aspx?ProductID=26	Logging	Truck cab redesign, improved visibility & posture	$300 per unit total $6,900	Reduce down time, increased loads per truck	$2,000 per unit per year in reduced accident damage, total $65,000 per year
http://www.hfes.org/Publications/ProductDetail.aspx?ProductID=26	Military aircraft mission kit design	Reduced aircraft weight	$500,000	Reduced fuel costs, labor, storage requirements	$2M in initial costs $5M total
http://www.hfes.org/Publications/ProductDetail.aspx?ProductID=26	Steel pipe mfg.	Redesign semi-automatic material handling system	Not reported	Production increased 10%, reject rate 2.5% down to 1%	18 mo. Payback
http://www.hfes.org/Publications/ProductDetail.aspx?ProductID=26	Tube mfg.	Redesigned storage and handling system	Not reported	Reduced lifting, eliminated product damage, zero accidents	15 mo. payback

Source	Workplace	Interventions	Costs	Measurements	Savings
http://www.hfes.org/Publications/ProductDetail.aspx?ProductID=26	Forge shop	Redesigned manipulator cabin	Not reported	Reduced WBV, sick leave down 8% to 2% (75%), productivity improved, maintenance costs down 80%	Not reported
http://www.hfes.org/Publications/ProductDetail.aspx?ProductID=26	Food service stands Dodger Stadium	Complete redesign, participatory method	$40,000 for 2 stands, $12,000 per stand later	Reduced customer transaction time by 8 sec., increased productivity $1,200 per stand	Payback in 33 games (40% of season), later payback 20 games
http://www.hfes.org/Publications/ProductDetail.aspx?ProductID=26	Fine assembly	Video monitor as magnifier	Not reported	15% increase in productivity, $2,250 to $3,000 per day per workstation, expect 20% decrease in injuries	
http://www.hfes.org/Publications/ProductDetail.aspx?ProductID=26	Shoe mfg. (Redwing)	Awareness, training, stretching, hiring ergo staff, chairs, mats, cross-training, job rotation, work groups, machine and workstation redesign, modified production process. Redesigned product: Pre-packaged laces eliminated hand-tying.		Workers' comp reduced 70% over 7 years, OSHA recordable time loss days 75 per 100 workers down to 19 per 100. 1/3 of workers suffered OSHA reportable injuries annually; 70% sprain/strain or repetitive motion down to 25-30%.	$3.1M in workers comp over 7 years (From $4.4mil in 1990 to $1.3mil in 1995.)
http://www.hfes.org/Publications/ProductDetail.aspx?ProductID=26	Manuf., 6 out of 7 companies	Training, participatory program, cross-disciplinary teams		Injuries down 131 in six months to 42 per six months, over 18 month period, injury costs $688,344 down to $72,600.	$1, 348,748 over 18 mos. for six companies
http://www.hfes.org/Publications/ProductDetail.aspx?ProductID=26	Railroad car repair	Job analysis, equipment and storage redesign, lifting training, weekly meetings	Not reported	Injuries 33 down to 12, back injuries 13 down to 0, lost days 579 down to 0, restricted days 194 down to 40, absenteeism 4% down to 1%, cars repaired 1,564 up to 2,900	$3.96M in increased productivity (67%) over 4 years, cost:benefit ratio 1:10
http://www.hfes.org/Publications/ProductDetail.aspx?ProductID=26	IBM mfg. Shipping dept.	Job aid to help in packing product	Not reported	Shipping error rate 35 per 100 down to <1 per 1,000	$2M over 2 years
http://www.hfes.org/Publications/ProductDetail.aspx?ProductID=26	Petroleum distribution	Macroergonomics, participatory approach, equipment modifications, training, tool and equipment selection		Injuries down 54% in 2 years, 69% in 4, MVAs down 51%, off the job injuries down 84%, lost work days down 94%	$60,000 per year

Source	Workplace	Interventions	Costs	Measurements	Savings
http://www.hfes.org/Publications/ProductDetail.aspx?ProductID=26 http://www.osha.gov/SLTC/ergonomics/ll_bean.html	LL Bean	Macroergonomics, participatory, equipment modifications, design stage, TQM		Lost time accidents down 70-79%	
http://www.danmacleod.com/Cost-Benefit%20Analysis%20of%20a%20Pallet%20Lift.doc	Distribution center	Pallet lift	$3,000	Time to unload pallet 6.5 min down to 5.2 min (20%)	$10,500 time savings, $5,000 workers' comp (est.)
http://www.occupationalhazards.com/Issue/Article/36853/Add_Value_with_a_Comprehensive_Approach_to_Ergonomics.aspx Kincaid, W. Occupational Hazards, February 18, 2004	Manufacturing, packaging workstation	Waist high carts to bring materials to wrapping machine, reducing walking and bending		Productivity improved 400%	
http://www.occupationalhazards.com/Issue/Article/36853/Add_Value_with_a_Comprehensive_Approach_to_Ergonomics.aspx Kincaid, W. Occupational Hazards, February 18, 2004	Automotive parts mfg.	Complete ergo program		Efficiency improved 80%	$200,000 per work cell per year
http://www.occupationalhazards.com/Issue/Article/35819/Ergonomics_and_Manufacturing_Excellence.aspx Smith, S. Occupational Hazards, September 11, 2002	DENSO, air conditioning parts mfg.	Training, employee involvement, Kaizen integration, changes to workstations and production lines, design standards.		Recordable injuries reduced 27%	
http://www.doli.state.mn.us/fourthmeetingminutes.html Minnesota Dept. of Labor and Industry, testimony regarding proposed ergonomics rule	Pepsi bottling	Purchased layer picker to reduce manual lifting	$85,000	Turnover reduced from 9 workers to 3	Not reported

Source	Workplace	Interventions	Costs	Measurements	Savings
http://www.doli.state.mn.us/fourthmeetingminutes.html Minnesota Dept. of Labor and Industry, testimony regarding proposed ergonomics rule	Jennie-O Turkey Store	Hired ergonomist, fix one problem task per area per year, training, medical management, job rotation	Not reported	Workers' comp costs $4.3M down to $900,000 in 14 years, turnover 50% of industry average	
http://www.doli.state.mn.us/thirdmeetingminutes.html Minnesota Dept. of Labor and Industry, testimony regarding proposed ergonomics rule	Meatpacking	Microbreaks, knife redesign, automation		Exp. Rating 1.37 down to 0.56, turnover 200% down to 28-40%	$300,000 in workers' comp costs over 10 years
http://www.doli.state.mn.us/fifthmeetingminutes.html Minnesota Dept. of Labor and Industry, testimony regarding proposed ergonomics rule	Seagate, small electronics mfg.	Workstation rearrangement, parts carrier redesign		Productivity gains	$250,000 & $1M, respectively
http://www.danmacleod.com/Articles/CostBenefits.htm	Paper mfg., Crane & Co.	Program, employee involvement, training, workstation, process and procedure improvement, medical management	$2.5M	80% reduction in UECTDs, 100% reduction in time loss over 7 year period, CTD recordables, sprain and strain rates reduced ~50%, discomfort reduced 40%, 25% avg productivity gain (0% to 200% range) 40% ROI	$3.5M ($2.8M due to workers' comp savings, remainder through productivity)
http://www.cirano.qc.ca/pdf/publication/95s-38.pdf	Packing warehouse, Société des Alcools du Québec	Participatory program, automatic pallet distributor, redesigned pallet trucks, work with suppliers on box glue, new truck seats, box handling gloves	$164,529.44 to 227,318.31	Prevented an estimated 15 back injuries, slight increases in productivity, reduced product damage	$72,893.67 to $193,247.42 in indirect costs, $83,653.12 to $221,771.70 in direct costs
http://chppm-www.apgea.army.mil/ergowg/conference/conf_agenda.asp Barbara Wright	Military, repair services	5% of WMSD costs invested in equipment – vacuum lift, AV gloves, keyboard trays, anti-fatigue mats	$35,212	Strain injuries 83 down to 64 (23%) in one year.	$87,400, benefit:cost of 2.5:1

Source	Workplace	Interventions	Costs	Measurements	Savings
http://chppm-www.apgea.army.mil/ergowg/conference/conf_agenda.asp Barbara Wright	Military, repair services	Two work positioners (adjustable creepers) for canopy shop	$2,160	No new injuries ($75,000 prior cost), time to complete 5 days down to 2	$155,240, benefit:cost ratio of 72:1
http://chppm-www.apgea.army.mil/ergowg/conference/conf_agenda.asp Barbara Wright	Military, repair services	Lift/rotate fixture built in house to position part	$700	Time per unit 24 hours down to 10 hours (58%) Potential injury avoided $50,000 (est.)	$73,520 benefit:cost ratio of 140:1
http://www.ergoworkinggroup.org/ewgweb/SubPages/AboutUs/Conference2003.htm FHP_ROI_Stack.ppt (same presentation, 20-22% reduction in back injuries due to awareness, body mechanics training, stretching programs)	Military, repair	A fixture that holds the door in place and allows partial rotation during repairs. Reduced vibration hand tools.	$10,700 (over 10 years) $5,500 for fixture $1,000 for maint. $4,500 for tooling	Time to complete 15 days down to 11 days, labor cost $72,000 down to $52,800	$19,200 annual savings, $181,300 total over 10 years, 203-day payback period.
http://www.ergoworkinggroup.org/ewgweb/SubPages/AboutUs/Conference2003.htm Best Practices and ROI-Navy Perspective - Ms. Cathy Rothwell	Military, hazardous waste	Forklift mounted rake to replace manual process	$750 to fabricate rake	Cost of process $10,000 down to $1,500 Payback in 27 days	Annual $8,500, $84,000 over 10 years
http://chppm-www.apgea.army.mil/ergowg/conference/conf_agenda.asp Smith & Stack	Military, transportation	Dump trunk auto tarping	$3,000 per vehicle, total cost $22,000	Time per stop 25 minutes down to 10.	$75,000 per year, $728,000 over life of equipment. 107 day payback period
http://chppm-www.apgea.army.mil/ergowg/conference/conf_agenda.asp Smith & Stack	Shipboard maintenance	Automated cable cleaner and lubricator	$8,200 (5 units)	Reduced cost of consumables and waste disposal. Labor 16 hrs. per crane down to 3.	$286,214.28/ year. $2.85M over 10 year life of equipment 10.5 day payback period
http://www.ergoworkinggroup.org/ewgweb/SubPages/ProgramTools/Publications/PDFnewsletters/2003NewsPDF/issue11.pdf	Army tank disassembly, vehicle repair	Low vibration impact wrenches with ergonomic features, workstation set-up	Not reported	Time to remove hub nuts decreased by almost 50%, vibration reduced	Not reported

Source	Workplace	Interventions	Costs	Measurements	Savings
http://www.af.mil/stories/story.asp?storyID=123005843	Air force aircraft mfg. & maintenance, inserting foam into fuel tanks	Vacuum bag compresses the foam; Delrin Separators allow the foam sheets to be inserted easier; and bladder-fitting tools. Reduced push forces 60%, duration of exertion 25% to 50%, 40% reduction in risk of injury	Not reported	Time savings 7 man hours per aircraft	$44,000, 7-month payback period
http://www.tifaq.com/information/archive/osha-effective_practices-ergonomics-jun98.txt	Luggage mfg. Samsonite	Program with employee involvement, medical management, training	1991-1997, $2,662,000 ($726,000 was not necessarily ergonomics, but redirection), $800,000 for actual fixes	73% reduction in number of MSDs, 85% reduction in incident rate, 36.5% reduction in workers' compensation costs	Not reported
General Accounting Office. Worker protection: Private sector ergonomics programs yield positive results. Report to Congressional Requesters. (GAO/HEHS-97-163, 1997)	AMP Electronic connectors and components mfg. 300 employees	Ergo teams, training, medical management, engineering, purchasing and employee involvement, changes to tools, equipment, workstations, low tech engineering controls built in house, job rotation		Average cost per WMSD $6,601 down to $2,512 (62%). Incidence rate 12.8 down to 7.1 (45%). Lost days down 78 per 100 employees. Restricted days up 21 per 100 FTEs. Improved productivity, reduced scrap, improved quality, improved morale.	Workers' comp costs $73,000 down to $28,000 over four years (62%)
General Accounting Office. Worker protection: Private sector ergonomics programs yield positive results. Report to Congressional Requesters. 1997(; GAO/HEHS-97-163).	Navistar truck and bus mfg. 4000 employees	Full program, hired ergonomist, training, employee involvement, ergo committees, engineering involvement, medical management, low tech, in-house engineering controls, hoists, articulating arms, lift tables, hydraulic jacks, chairs, keyboard trays, design guidelines, supports, gloves.		Average cost per WMSD $9,500 down to $4,900 in 4 years (50%). Incidence rate 20.3 down to 14.2. Lost and restricted days 122 down to 35 per 100 FTEs (30%). Improvements in productivity, quality, morale.	Workers' comp costs $1.4M down to $544,000 in 4 years (60%). ($250,000 over 3 years related to CTS, repetitive trauma & back injuries)

Source	Workplace	Interventions	Costs	Measurements	Savings
General Accounting Office. Worker protection: Private sector ergonomics programs yield positive results. Report to Congressional Requesters. 1997(; GAO/HEHS-97-163).	Texas Instruments high tech mfg. 2800 employees	Program, hired ergonomist, awareness education, ergo teams, training, medical management, purchasing and design, in-house design of controls, workstation set up, job rotation, task redesign, automation, new microscopes, foam padding, hoists, laser welder, microblaster, stretch breaks.		Average cost per WMSD $21,946 down to $5,322 in 5 years (76%). Incidence rate 5.5 down to 1.5 (73%). Lost and restricted days 66 per 100 down to 15 per 100 FTEs.	Workers' comp costs $2.6M down to $224,000 in 5 years (91%).
Ohio BWC grant program https://www.ohiobwc.com/downloads/brochureware/publications/ConstSafeGrant.pdf	Construction companies, 7	Lift assists, aids and/or transport devices The average risk factor score for 10 affected tasks in the four companies was 41.8 before the devices were put into place, and was 28.3 afterwards — a 32-percent improvement.		CTD incident rate (incidents per 200,000 hours) 2.1 down to 0 (100%); Payback 2.4 years; Days lost 329 days per 200,000 hours down to 0 (100%); Restricted days 32.7 days per 200,000 hours down to 0 (100%); Turnover rate (per 200,000 hours worked) 21.6 down to 11.7 (46%). 231 days	
Ohio BWC grant program https://www.ohiobwc.com/downloads/brochureware/publications/ConstSafeGrant.pdf	Construction companies, 3	Powered dollies to move HVAC units, appliances, plumbing The average risk factor score for four affected tasks in the three companies was 30.2 before the devices were put into place, and was 29.7 afterward — a 2-percent improvement.		CTD incident rate (incidents per 200,000 hours) 14.9 down to 0 (100%); Payback 0.18 years, or 2.2 months; Days lost due to CTDs 29.8 days per 200,000 hours down to 0 (100%); Restricted days due to CTDs 19.8 days per 200,000 hours down to 0 (100%); Turnover rate (per 200,000 hours worked) 79.3 down to 31.6 (60%). 398 days.	

Source	Workplace	Interventions	Costs	Measurements	Savings
Ohio BWC grant program https://www.ohiobwc.com/downloads/brochureware/publications/ConstSafeGrant.pdf	Construction company	Continuous height adjustment scaffolding for masons. The average risk factor score for three affected tasks in the company was 31.3 before the scaffolding was put into place, and was 30.3 afterward – a 3-percent improvement..		The turnover rate (per 200,000 hours worked) changed from 47.5 to 27.9 (41%). 399 days.	
Ohio BWC grant program https://www.ohiobwc.com/downloads/brochureware/publications/ConstSafeGrant.pdf	Construction companies, 3	Skid steers and attachments for tasks such as grading, digging holes and ditches, hauling dirt, and transferring pallets of materials. The average risk factor score for 12 affected tasks in the three companies was 32.5 before and 20.1 afterward — a 38-percent improvement.		CTD incident rate 17.4 CTDs per 200,000 hours down to 12.2 CTDs (30%); Payback 4.4 years; Restricted days 17.4 days per 200,000 hours down to 16.2 (7%); 298 days. One company reports productivity has increased by an estimated 65%.	
Ohio BWC grant program https://www.ohiobwc.com/downloads/brochureware/publications/ConstSafeGrant.pdf	Construction company	Ride-on, laser guided screeding equipment for concrete finishing. The risk factor score for the affected task was 45 before the laser screed was used, and was 1 afterward — a 98-percent improvement; could use the laser screed on 63 percent of the square footage it poured.		Turnover rate (per 200,000 hours worked) changed from 202 to 138 (32%). Productivity, measured in square footage per man-hour, increased 40 to 45%. 225 days.	
Ohio BWC grant program https://www.ohiobwc.com/downloads/brochureware/publications/ConstSafeGrant.pdf	Construction companies, 30	The average risk factor score (a relative measure of the risk of cumulative trauma disorder) for 58 tasks in the 30 areas changed from 35.9 (before the ergonomic intervention) to 22.3 (after the intervention) — a 38-percent improvement.		CTD incidence rate 4.1 CTDs per 200,000 hours down to 2.8 (32%); Lost days 169 per 200,000 hours down to 30.8 (82%);	

Source	Workplace	Interventions	Costs	Measurements	Savings
Ohio BWC grant program https://www.ohiobwc.com/downloads/brochureware/publications/ConstSafeGrant.pdf	K.E. Dittmar, a family-owned construction company	Skid steerer with backhoe, buckets, forks, trencher and auger attachments for digging and leveling footers, digging post holes, and moving stone and fill for grading, lifting and carrying lumber, grading and trenching. Average risk factor scores for the affected tasks dropped from 34.2 to 21.0 (39%).	$33,501.50	CTD incidence rates 29 down to 5.9 CTDs per 200,000 hours (80%). Restricted days due to CTDs 29.1 down to 23.6 days per 200,000 hours (22%). 10 months.	
Ohio BWC grant program https://www.ohiobwc.com/downloads/brochureware/publications/ConstSafeGrant.pdf	Hawley Landscape	Four hydraulic lift gates for dump trucks. The lift gates eliminate the loading and unloading of other equipment, as well as plant materials. Average risk factor scores for the affected tasks changed from 35 to 28 (20%)	$20,270	CTD incidence rate 15.5 CTDs per 200,000 hours down to 0 (100%). CTD lost day rate 124 days per 200,000 hours down to 0 (100%). Productivity went from loading one wheelbarrow at a time to three. 7 months.	
Ohio BWC grant program https://www.ohiobwc.com/downloads/brochureware/publications/ConstSafeGrant.pdf	Martin Masonry	Skytrack 6036 telescope material lift to lift pallets of bricks or block up onto the scaffolding without manual handling; and walk-through scaffolding that allows employees to move materials from one end of the scaffolding to another without having to climb over cross bars or support bars. Average risk factor scores for the affected tasks changed from 35.3 to 19.0 (46%).	$64,735.80	Turnover rate 317 down to 129 per 200,000 hours (59%). Average number of bricks per mason 575 up to 625 (8.7% productivity gain). 13 months.	

Source	Workplace	Interventions	Costs	Measurements	Savings
Ohio BWC grant program https://www.ohiobwc.com/downloads/brochureware/publications/ManufSafeGrant.pdf	65 manufacturing companies	Lift assists including hoists, cranes, manipulators and vacuum lifters. Lifting aids such as powered and spring-loaded lift tables. Transport devices including carts, conveyors, tugs, powered dollies and forklifts. The average risk factor score for 120 affected tasks in the 65 companies was 33 before the devices were put into place and was 19 afterward – a 42% improvement.		CTD incident rate (incidents per 200,000 hours) 9.8 down to 4.9 (50%); Payback 0.83 years or 10 months; Days lost due to CTDs 110 days per 200,000 hours down to 36.2 (70%); Restricted days due to CTDs 102 days per 200,000 hours down to 39.5 (61%); Turnover rate (per 200,000 hours worked) 53.2 down to 44.5 (16%); 214 days.	
Ohio BWC grant program https://www.ohiobwc.com/downloads/brochureware/publications/ManufSafeGrant.pdf	3 manufacturing companies	Stretch wrapping machines		CTD incident rate (incidents per 200,000 hours) 9.2 down to 7.9 (14%); Payback 2.5 years; Days lost due to CTDs 369 days per 200,000 hours down to 0 (100%); Restricted days due to CTDs 125 days per 200,000 hours down to 39.3 (69%); Turnover rate (per 200,000 hours worked) 94.6 to 35.3 (63%).	
Ohio BWC grant program https://www.ohiobwc.com/downloads/brochureware/publications/ManufSafeGrant.pdf	2 manufacturing companies	Ergonomically designed powered hand tools. The average risk factor score for six affected tasks in the two companies was 23.5 before the hand tools were put into place and was 20.7 afterward – a 12% improvement.		restricted days due to CTDs 57.1 days per 200,000 hours down to 44.8 (22%); Turnover rate (per 200,000 hours worked) 28.4 down to 17.3 (39%); 298 days.	

Source	Workplace	Interventions	Costs	Measurements	Savings
Ohio BWC grant program https://www.ohiobwc.com/downloads/brochureware/publications/ManufSafeGrant.pdf	9 manufacturing locations	Ergonomic workstation design. The average risk factor score for 29 affected tasks in the nine locations was 29.7 before the design changes were put into place and was 17.5 afterward – a 43-percent improvement.		CTD incident rate (incidents per 200,000 hours) 10.0 down to 1.6 (84%); Payback 0.37 years or four months; Days lost due to CTDs 24.9 days per 200,000 hours down to 16.0 (36%); Restricted days due to CTDs 58.5 days per 200,000 hours down to 6.4 (61%); 247 days:	
Ohio BWC grant program https://www.ohiobwc.com/downloads/brochureware/publications/ManufSafeGrant.pdf	24 manufacturing locations	Automation, including CNC machines, automatic case packers and palletizers. The average risk factor score for 46 affected tasks in the 24 locations was 28.5 before the devices were put into place and was 15.4 afterward – a 46-percent improvement.		CTD incident rate (incidents per 200,000 hours) 10.4 down to 7.2 (31%); Payback 5.8 years; Days lost due to CTDs 123 days per 200,000 hours down to 23.1 (81%); Restricted days due to CTDs 239 days per 200,000 hours down to 57.4 (76%); Turnover rate (per 200,000 hours worked) 103 down to 43.1 (58%). 214 days.	
Ohio BWC grant program https://www.ohiobwc.com/downloads/brochureware/publications/ManufSafeGrant.pdf	16 manufacturing locations	Semi-automation including controlled lathes, saws, grinders and presses. The average risk factor score for 17 affected tasks in the 16 locations was 21.4 before the semi-automation was implemented and was 10.4 afterward – a 51-percent improvement.		CTD incident rate (incidents per 200,000 hours) 32.4 down to 9.7(70%); Payback 1.7 years; Days lost due to CTDs 215 days per 200,000 hours down to 63.0 (71%); Restricted days due to CTDs 197 days per 200,000 hours down to 0 (100%); Turnover rate (per 200,000 hours worked) 94.6 down to 64.6 (32%). 229 days.	

Source	Workplace	Interventions	Costs	Measurements	Savings
Ohio BWC grant program https://www.ohiobwc.com/downloads/brochureware/publications/ManufSafeGrant.pdf	208 manufacturing facilities	Ergonomic interventions. The average risk factor score (a relative measure of the risk of CTD for 397 tasks in the 208 manufacturing areas declined from 31.7 (before the ergonomic intervention) to 18.5 (after the intervention) — a 42-percent improvement.		CTD incidence rate 9.4 CTDs per 200,000 hours down to 6.4 (32%); Lost days due to CTDs 87 days per 200,000 hours down to 42 days (52%); Restricted days 111 per 200,000 hours down to 74.7 (33%); Turnover rate 82.4 per 200,000 hours down to 26.4 (68%); 219 days.	
Ohio BWC grant program https://www.ohiobwc.com/downloads/brochureware/publications/ManufSafeGrant.pdf	Oxford Automotive parts mfg.	20-tilt stands for parts baskets and 100 anti-fatigue mats. The risk factor assessment scores changed from an average of 52 to 36.5 – a 30-percent reduction.	$22,986	CTD rate 95.2 CTDs per 200,000 hours down to 11.2 (88%). Lost days rate (due to CTDs) 71.4 days lost per 200,000 hours down to 0 (100%). Restricted days rate (due to CTDs) 190.4 restricted days per 200,000 hours down to 44.9 days (76%). Seven months	
Ohio BWC grant program https://www.ohiobwc.com/downloads/brochureware/publications/ManufSafeGrant.pdf	Liberty Steel Products a welding/fabrication job shop	New shear, less bending, stacker to keep parts off floor, cleaner cuts so less deburring/grinding, ball conveyor to position metal plates, built in automatic plate clamp. Risk factor scores went from an average of 36 to 5.	$57,500	Before installing the shear, the average time to complete a piece was 16.35 seconds. Six weeks after the intervention, the average time to complete a piece was 10.95 seconds; six months - 8.33 seconds; 12 months - 7.60 seconds. (54% faster).	

Source	Workplace	Interventions	Costs	Measurements	Savings
Ohio BWC grant program https://www.ohiobwc.com/downloads/brochureware/publications/ManufSafeGrant.pdf	Screens Technology manufactures preassembled roll formed and extruded window/patio screens.	Semi-automated wiring tables reduced awkward postures and high forces. Also improve quality, increase productivity, reduce operator fatigue and boost employee morale. Risk factor scores went from 29 before the intervention to 19 after the intervention.	$40,000	CTD incidence rate 69 CTDs per 200,000 hours down to 0 (100%). CTD lost-days rate decreased from 2342 CTDs per 200,000 hours down to 0 (100%). CTD restricted-days rate 275 CTDs per 200,000 hours down to 0 (100%). 18 months.	
Ohio BWC grant program https://www.ohiobwc.com/downloads/brochureware/publications/PESafeGrant.pdf	School districts, 3	Retrofit buses with automated, pneumatic door openers. The average risk factor score was 38.5 before using the automated door openers and 25.5 afterward, a 34-percent improvement.		CTD incidence rate 2.8 down to 0.9 CTDs per 200,000 hours (68%); Payback 0.4 months; Days lost due to CTDs 17.6 down to 2.3 per 200,000 hours (87%); Restricted days due to CTDs 17 to 2.8 per 200,000 hours (84%);	
Ohio BWC grant program https://www.ohiobwc.com/downloads/brochureware/publications/PESafeGrant.pdf	School district	Desk moving equipment		Days lost due to CTDs 27.5 down to 20.3 per 200,000 hours (26%); Restricted days due to CTDs 23 down to 12.7 per 200,000 hours (45%).	
Ohio BWC grant program https://www.ohiobwc.com/downloads/brochureware/publications/PESafeGrant.pdf	Public employers, 20	Lifting aids, such as hoists, attached to trucks to help with moving heavy equipment in and out of trucks in the field. The average risk factor score for lifting tasks was 37.6 before using the lifting aids and was 23.5 after the openers were in use, a 37-percent improvement.		CTD incidence rate 4 down to 1.3 CTDs per 200,000 hours (67%); Payback 2.6 years; Days lost due to CTDs 13.5 down to 5.3 per 200,000 hours (61%); Restricted days due to CTDs 15.6 down to 14 per 200,000 hours (10%).	

Source	Workplace	Interventions	Costs	Measurements	Savings
Ohio BWC grant program https://www.ohiobwc.com/downloads/brochureware/publications/PESafeGrant.pdf	Public employers, 2	Lift gates added to trucks. The average risk factor score for lifting tasks was 35 before using the lift gates and 28 after the lift gates were in use, 20-percent improvement.		CTD incidence rate 20 down to 0 CTDs per 200,000 hours (100%); Payback five months; Days lost due to CTDs 80.3 down to 0 per 200,000 hours (100%); Turnover rate due to CTDs 622 down to 73.4 per 200,000 hours (88%). 290 days.	
Ohio BWC grant program https://www.ohiobwc.com/downloads/brochureware/publications/PESafeGrant.pdf	35 public employers	Incorporating ergonomic design into their workplaces		CTD lost-days rate 36 to 29 days lost per 200,000 (19%) after just 200 days.	
Ohio BWC grant program https://www.ohiobwc.com/downloads/brochureware/publications/PESafeGrant.pdf	City of Mansfield's public works division	Purchased equipment to reduce CTD risk factors, such as cranes to move sewer grates, lighter weight, low-vibration jackhammers, lift gates for trucks and winches.	$58,024	Repair: CTD injury rate 49.8 CTDs per 200,000 hours down to 0 (100%). Maintenance: CTD injury rate 461.9 CTDs per 200,000 hours down to 0 (100%). Six months.	
Ohio BWC grant program https://www.ohiobwc.com/downloads/brochureware/publications/ManufSafeGrant.pdf	Window manufacturer	Automatic screw-feeding systems, inline screw guns and pistol-grip screw guns, two parallel arm workstations to reduce torque and hold weight of tool. The risk factor scores for this task declined from 25 to 17 (32-percent improvement).		Productivity: The change resulted in a 25-percent reduction in cycle time. Quality: The scrap rate decreased from 10 percent to less than 1 percent.	

Source	Workplace	Interventions	Costs	Measurements	Savings
Ohio BWC grant program https://www.ohiobwc.com/downloads/brochureware/publications/PlasticsSafeGrant.pdf	Plastics mfg.	Implement bulk handling systems, which eliminate the handling of materials during mixing. The average risk factor score for office tasks was 32 before redesigning the workstations, and 23 after the change (28-percent improvement).		CTD incidence rate 78.3 down to 20.3 CTDs per 200,000 hours (74%); Payback 1.5 years; Days lost due to CTDs 392 down to 198 per 200,000 hours (49%); turnover rate 141 down to 81 per 200,000 hours (42%).	
Ohio BWC grant program https://www.ohiobwc.com/downloads/brochureware/publications/PlasticsSafeGrant.pdf	Plastics mfg, 4 facilities	Lift assist devices to lift, tilt and/or turn the boxes or bins. The average risk factor scores changed from 44.3 to 20.9 — a 53-percent improvement.		Lost-day rate 87.6 down to 33.0 days lost per 200,000 hours (62%).	
Ohio BWC grant program https://www.ohiobwc.com/downloads/brochureware/publications/PlasticsSafeGrant.pdf	Plastics mfg, 5 facilities	Workstation redesign. For eight tasks in those plastics facilities, the average risk factor assessment score changed from 33.2 to 24.4, a reduction of 27 percent.		Restricted days due to CTDs 127.9 down to 87.6 per 200,000 hours (32%).	
Ohio BWC grant program https://www.ohiobwc.com/downloads/brochureware/publications/PlasticsSafeGrant.pdf	Plastics mfg,	Barrel-handling hoist system. The average risk factor score was 323 before redesigning and was 21 after the change (67-percent improvement).		CTD incidence rate 15.2 down to 0 CTDs per 200,000 hours (100%); Payback 1.8 months; Days lost due to CTDs 37.9 down to 0 per 200,000 hours (100%); Turnover rate 137 per 200,000 hours down to 50.3 (63%).	
Ohio BWC grant program https://www.ohiobwc.com/downloads/brochureware/publications/PlasticsSafeGrant.pdf	17 plastics facilities	Ergonomic interventions The average risk factor score (a relative measure of the risk of CTD) for 30 tasks in the 17 facilities changed from 29 (before the ergonomic intervention) to 17.5 (after the intervention), a 41.5-percent improvement.		CTD incidence rate 10.88 down to 9.96 CTDs per 200,000 hours (8.5%); Restricted days due to CTDs 152.2 down to 95.3 per 200,000 hours (37.4%). 160 days.	

Source	Workplace	Interventions	Costs	Measurements	Savings
Ohio BWC grant program https://www.ohiobwc.com/downloads/brochureware/publications/PlasticsSafeGrant.pdf	Magnetic Specialties produces flexible magnetic stock from raw materials.	Internal mixer that extrudes and cuts the finished material into logs that are collected in a large plastic storage bin and transported to the granulators by a tow motor, eliminating many of the manual tasks.		Incidence of CTDs 78.3 down to 20.3 incidents per 200,000 hours (73%). Days lost due to CTDs 391.6 down to 197.7 (50%). turnover 141 down to 59.9 per 200,000 hours (58%) One year Productivity (measured in average percent billable pounds) 82.2% to 87.8% within six months, a 6.8% increase. Scrap rate 18.2 percent to 11.8 percent within six months (35%).	
Ohio BWC grant program https://www.ohiobwc.com/downloads/brochureware/publications/PlasticsSafeGrant.pdf	BC Composites a fiberglass pultrusion manufacturing facility.	Two steel safety platforms with handrails to allow workers to move creels from high shelves. A crane/hoist system to mechanically move the die tooling and to aid in transferring barrels of resin at the pan area. The average risk factor scores decreased from 28.5 to 14 as a result of the ergonomic interventions, more than a 50-percent reduction.	The two ladders cost $214.32. The hoist cost $8,189.	CTD incidence rate 15.2 down to 0 incidents per 200,000 hours (100%) (at six weeks). Lost days rate due to CTDs 37.9 down to 0 days lost per 200,000 hours (100%) Turnover rate 136.3 down to 50.3 employees per 200,000 hours (63%)	
Ohio BWC grant program https://www.ohiobwc.com/downloads/brochureware/publications/PlasticsSafeGrant.pdf	Partners in Plastics, a manufacturer of blow-molded products	Two deflashing fixtures, dies and four adjustable height tables. The average risk factor scores declined from 31.6 to 22.6 as a result of the ergonomic interventions, a 28-percent reduction.		CTD incidence rate 19 down to 9.4 incidents per 200,000 hours (50%) (at 11 months). Lost-days rate due to CTDs 38 down to 12.7 days lost per 200,000 hours (66%). Restricted-days rate due to CTDs 326 down to 87.6 days lost per 200,000 hours (73%). Turnover rate 140.3 down to 82.3 per 200,000 hours (41%).	

Source	Workplace	Interventions	Costs	Measurements	Savings
Rodrigues, C.C. (2001). Ergonomics to the Rescue: A Cost Justification Case Study. Professional Safety, ppg. 32-34.	Mfg.	Automatic palletizer to replace hand palletizing	$300,000	ROI over 10 year period = 23.6% per year	Labor savings $60,000, throughput increase $5,000, injury prevention $20,000 (est.)
http://www.osha.gov/dcsp/success_stories/ergonomics/goldkist.html	Goldkist poultry processing, 12,000 employees	Hired ergonomist, program, ergo committees, knife sharpening, planning ergo in design stage, medical management, annual evaluation.		After 5 years: Workers' compensation claims for repetitive motion injuries dropped by 46%; claims for back injuries from lifting dropped 50%; costs for new workers' compensation cases declined 20% for repetitive motion injuries and 36% for back injuries related to lifting. After 10 years: Musculoskeletal claims per 100 employees dropped almost 80% (7.7 down to 1.52).	
Stuart-Buttle '94 Ergonomic Success Stories, OSHA, November 1996. Stuart-Buttle, C. (1994). Summary of effectiveness of an ergonomics program. Correspondence dated 4/4/94.	Poultry processing, 1000 employees	Redesigned workstations: Reducing reaches. Altering heights of product. Providing work stands. Focusing on smoother transitions of product including reducing the lifting and handling. Tank tilters introduced to lift the product up.		$3M in total workers' compensation costs in 1989. A 10% reduction in workers' compensation costs in 1991. Subsequent 70% drop in 1992. Injury rate down 36%. Reduction of lost workdays due to back injury from 85.2 in 1991, to 7.1 in 1992. (83%)	
http://www.osha.gov/dcsp/success_stories/ergonomics/taylor.html	Taylor Beef Processing	Comprehensive program, hired ergonomics coordinator, training, hazard reduction, medical management.		Over a 50 percent decrease in the overall incident rate	
http://www.osha.gov/dcsp/success_stories/ergonomics/georgia.html	Georgia-Pacific Wood beam manufacturing	Employee involvement. Worktables were lowered or raised, matting was added, and workstations were automated and redesigned to reduce material handling and repetitive movements.		Injury rate dropped from 4.2 to 2.1, improved morale	

Source	Workplace	Interventions	Costs	Measurements	Savings
http://www.osha.gov/dcsp/success_stories/ergonomics/furniture.html	HON Office furniture manufacturing	Program, training, employee involvement, new equipment and tools, powered scissor lifts to keep work at appropriate heights. Workstations were redesigned to eliminate the need to twist and bend to reach for parts.		Incidence rate for back injuries reduced 50 percent	
http://www.osha.gov/dcsp/success_stories/ergonomics/spring_window4.html	Springs Window Fashions mfg.	Assembly tables were redesigned, making it easier to reach parts and allowing workers to raise or lower the table to suit their height. Fatigue mats and footrests.		Incidence of 20 compensable claims per year (80 workers) down to 2 claims over 5 years.	
http://www.osha.gov/dcsp/success_stories/ergonomics/spring_window.html	Springs Window Fashions mfg.	Bulk rack system with miniature rollers and guided slots for each carton, allowing 75 to 150-pound boxes to be slid into position		25 compensable shoulder, arm, neck, and back injuries per year down to zero.	
http://www.osha.gov/dcsp/success_stories/ergonomics/quadgraphics.html	Quad Graphics, Commercial Printing and Lithography	Comprehensive, proactive program, training, employee involvement, teams including engineers		Lost workdays down 60 percent. Workers' compensation costs down 10 percent. Lost time days decreased 25 percent Restricted days decreased 116 percent work-related injuries reported decreased 25 percent. Back injuries due to material handling decreased 39 percent and the cost of those injuries have decreased by 25 percent.	
http://www.osha.gov/dcsp/success_stories/ergonomics/intel.html	Intel, Computers and computer chips	Program guidelines, hired coordinators, training, employee involvement, web based workstation advisor, tool and process improvement, medical management.		OSHA recordables for MSDs 2.0 down to 0.1 in 10 years. Lost day case rate 0.5 down to 0.03 (95%).	

Source	Workplace	Interventions	Costs	Measurements	Savings
http://www.osha.gov/dcsp/success_stories/ergonomics/sun.html	Sun Microsystems, Computer equipment/systems	Workstation assessments, training, chairs, furniture, equipment.		300 MSDs per year down to 50 per 9 months over 10-year period. $1.5 million in 1992 down to less than $100,000 in the first nine months of 2002. The average cost to close WMSD disability claim dropped from more than $12,000 in 1992 to $2,500 in 2002.	MSD claims $1.5 million in 1992 down to less than $100,000 in the first nine months of 2002.
http://www.osha.gov/dcsp/success_stories/ergonomics/duracell.html	Duracell, Alkaline Battery Manufacturing	Program, ergo committee and task force, records review, proactive survey, early reporting, medical management, automation of unloading and loading stations, work height adjustments (including “pallet pal” type systems), redesign of work stations, elimination of portable sanders, automatic box makers, anti-fatigue floor mats, rotation of jobs, and ergonomically designed chairs.		Incident rates were reduced by 90 percent, and the total accident rate was reduced by 81 percent	
http://www.osha.gov/dcsp/success_stories/ergonomics/transit.html	San Mateo County Transit District	Contracted ergonomist, analysis, employee involvement, training, shock absorbing and adjustable bus seats, and evaluation.		Work-related upper limb musculoskeletal disorders (MSDs) among bus operators decreased by nearly 30 percent.	
http://www.osha.gov/dcsp/success_stories/ergonomics/colby.html	Colby College	Ergo team, records review, employee involvement, job redesigns, equipment changes, training, and warm-up exercise programs.		Lost workday injury rate and total lost workdays reduced by over 95 percent over three-year period.	Workers’ compensation costs decreased by over $100,000 per year

Source	Workplace	Interventions	Costs	Measurements	Savings
Parenmark, G.; Malmkvist, A.-K., and Ortengren, R. Ergonomic moves in an engineering industry: effects on sick leave frequency, labor turnover and productivity. International Journal of Industrial Ergonomics. 1993; 11():291-300.	Mfg.: 30 Workers Engineering Ind.: 279 employees	Factory designed to meet high ergonomic standards, workers trained and motivated to take advantage of the provided facilities. Work organized to allow for a certain percentage of the work force being on sick-leave without putting undue stress on the remaining workers. Job enrichment, other tasks added to the regular assembly work. New pay system that promotes quality and takes age into account.		Mfg.: UECTDs down 50% in 1 yr Lost workdays down 15%, turnover down 25%. Sick-leave absence decreased by 5 percentage points, to less than 3/4 the rate of the old factory, and personnel turnover dropped by 25 percentage points, falling below one third compared to the old factory. Production planning liberated from disturbances, both production costs and warranty expenses diminished. Engineering Ind.: Lost workdays down 15%, turnover down 25%.	
Shi, L. A cost-benefit analysis of a California county's back injury prevention program. Public Health Reports. 1993; 108(2):204-211.	County 205 employees	Introduced education, back safety training, and physical fitness activities and provided equipment and facility improvements (e.g., additional material handling equipment).		Back injuries down 38%, lost work days down 38%, claims costs down 33%, cost per case down 13% over 1 yr Back pain prevalence declined modestly; significant improvement in satisfaction, and a reduction in risky lifting behaviors were reported;	ROI= 1.8 a savings of $161,108 was realized, giving a 179% return in the investment.

Source	Workplace	Interventions	Costs	Measurements	Savings
Helander, M. G. and Burri, G. J. Cost effectiveness of ergonomics and quality improvements in electronics manufacturing. International Journal of Industrial Ergonomics. 1995; 15():137-151.	Electronics mfg.	Ergonomics training, systematic approach to ergonomics improvement of manufacturing facilities, analysis of the production environment including equipment, processes, ambient factors and job procedures, interviews of management, operators, and first-line supervisions, field measurements of ergonomic parameters. Processes modified, tasks reallocated between automated devices and human operators and workstation design optimized.		MSD down 19% over 12 yrs. Improved productivity, quality, and reduction of injuries. All four studies proved to be good investments.	Since its implementation around 1978, it is estimated that ergonomics improvements have resulted in cost savings of approximately $130 million.
Narayan, M. and Rudolph, L. Ergonomic improvements in a medical device assembly plant: a field study. Proceedings of the Human Factors and Ergonomics Society 37th Annual Meeting-1993. 1993; 812-816.	Assembly 156 workers	Redesigned workstation to reduce reach distances, provided adjustable chairs and footrests, and provided fixtures and pneumatic gripper to eliminate pinch grips. Not all jobs in plant affected by changes.		For workers impacted by intervention, MSDs down 80%, Lost workdays down 99% over 1 yr Plant-wide CTD incidence rate reduced from 13.7 to 11.3 per 200,000 worker hours after intervention, plant-wide severity rate reduced from 154.9 lost-time days to 67.8 lost time days per 200,000 worker hours	
MW Riley, DJ Cochran, TL Stentz, DR May, CE, Case Study #1: Participatory Ergonomic Interventions in Meatpacking Plants, 1994	Meatpacking 815 workers	Ergonomics task forces, training, participatory problem-solving, mechanical assists, workstation and conveyor redesign, work practices		CTD down 20%, Turnover down 3% over 2 yrs	

Source	Workplace	Interventions	Costs	Measurements	Savings
Smith, M. J. A case study of a participatory ergonomics and safety program in a meat processing plant. Proceedings of the 12th Triennial Congress of the International Ergonomics Association; Toronto, Canada. Toronto: Human Factors Association of Canada; 1994: 114-116. v. Part 1).	Food prod 200 workers	Participatory, education, work methods improvements, reduced storage stack heights, automated saws, automated loading of packages, layout and work flow redesign, reduced reach heights, rotation, job enlargement, team work		MSD down 50% over 1 yr	
Village et al, 1994. As cited in R.H. Westgaard and J. Winkel. 1997. Ergonomic Intervention Research for Improved Musculoskeletal Health: A Critical Review. *International Journal of Industrial Ergonomics*, v. 20, no. 6, pp. 463-500.	Wood Ind. Workers	Ergonomics team, education, systematic problem identification and solution		MSD down 20% over 3 years	
Oxenburgh, 1990 Ergonomic Success Stories, OSHA, November 1996. Oxenburgh, M. "Increasing Productivity and Profit through Health & Safety." Musculoskeletal injuries in a packaging/warehouse operation, 131-135.	Packaging (#10) 330 workers	Redesigned work process: Gravity feed roller system set at waist height reduced lifting. Twisting decreased 30%.		There was almost a five-fold decrease, based on days lost, in musculoskeletal injuries with a concomitant reduction in sickness and workers comp costs. 100% reduction in lost workdays. 25% increase in productivity.	
Oxenburgh, M. Increasing productivity and profit through health and safety. Australia: CCH International; 1991.	Restaurant (#17) 43 workers	Redesigned work process: changing the manner of food service to reduce the frequent and repetitive movements. Redesigned plates: reduced the weight the workers had to carry 57%.		Absenteeism rate reduced from 13% to 10%. Lost workdays down 3%. Reduction of nearly 40% in the number of reported injuries. Productivity increased 10% when measured as meals served per restaurant staff member per day.	

Source	Workplace	Interventions	Costs	Measurements	Savings
Oxenburgh, 1990 Ergonomic Success Stories, OSHA, November 1996. Oxenburgh, M. "Increasing Productivity and Profit through Health and Safety." Reduction of hand stresses in the use of two-handed machine controls, 231-233.	Elect. Manu (#42)	Redesigned workstation: Switch that eliminated all hand contact, or a switch that only involved contact with the backs of the fingers.		The musculoskeletal injury incidence rate (new cases) was reduced 29%. There was a 25% increase in productivity. The payback period was less than one month.	
Oxenburgh, M. Increasing productivity and profit through health and safety. Australia: CCH International; 1991.	Meat Process			MSD down 80%	
Holland, T. H. Injury rates plummet with behavior-management program. Safety & Health. 1991; (November):50-53.	Light Manu., 700 employees			MSDs down 62%, costs down 89% over 6 years.	
Ridyard, D. T. and Hathaway, J. The three dimensions of an ergonomics program. Occupational Hazards. 2000; February():41-44.	Beverage Packaging, 140 employees	Program, participatory, education, medical management, restricted duty, administrative changes only		MSDs down 11%, lost workdays down 74%.	
Ergonomic Success Stories, OSHA, November 1996. Spilling, S., Eitrheim, J & Aaras, A. (1990). Cost-benefit analysis of work environment investment at STK's telephone plant at Kongsvinger. In J. R. Wilson (Ed.) Evaluation of Human Work: A Practical Ergonomics Methodology. Also: *Promoting Health and Productivity in the Computerized Office: Models of Successful Ergonomic Interventions.* Editors: Steven L. Sauter, Marvin J. Dainoff, Michael J. Smith Ch. 5	Electronics assembly	Redesigned workstations: Adjustable work-stands that allowed work to be carried out in a seated or standing position.	$57,000	Long-term sick leave rate 9.9% down to 9.4%. Musculoskeletal sick leave rate 5.3% down to 3.1%. Sick leave duration 22.9 days down to 1.8 days Turnover rate 30.1% down to 7.6%. 2nd workstation sick leave 4.7% down to 1.6%, 30.6% down to 14.3%. Lost workdays down 57% over 12 years.	$490,000

Source	Workplace	Interventions	Costs	Measurements	Savings
Ergonomic Success Stories, OSHA, November 1996. Murphy, D. (1992). House of high tech. The National Provisioner, October, 1992, 32-39.	Red meat packing, deboning	Redesigned work process: Mechanical deboner.		Injury rate reduced from 30% to less than 2% of total work hrs. Cumulative trauma disorders reduced from 84 to 9 cases; absenteeism from 12% to 3%. There was a significant gain in productivity.	
Ergonomic Success Stories, OSHA, November 1996. Nickasch, S. (1994). An ergonomic success story. Applied Occupational and Environmental Hygiene Journal, June, 1994.	Gun case & holster mfg.	Redesigned workstations: Adjustable height tables and chairs, tilting the table surfaces. Work area was increased.		Injury rate for cumulative trauma 15% in 1989 down to 6.8% in 1991	
Ergonomic Success Stories, OSHA, November 1996. Occupational Safety and Health Reporter. (1991). Back injury prevention program yielded reduction in injuries, eliminated lost time. Bureau of National Affairs, Inc., 5/29/91, 1752-1753.	Mfg.	Redesign product: Reduce weight of bags to 50 lbs. Redesign work process: Automated material handling for all powders and liquids, hydraulic turntables.		62% drop in overexertion back problems Elimination of lost-work days due to back ailments between 1982-1990	
Ergonomic Success Stories, OSHA, November 1996. Oxenburgh, M. “Increasing productivity and Profit through Health & Safety.” Redesign of an inspection station, 152-155.	Wood flooring mfg. Inspection station	Redesigned workstation: Conveyor belt that automatically turns the blocks and automatically stacks the blocks.		About 30% of injured employees, who had all been out for over a year, returned to full employment. The work rate at the inspection and sorting station has increased 15% per worker.	
Ergonomic Success Stories, OSHA, November 1996. Akzo Coatings, Inc. P.O. Box 37230, Louisville, KY. 40233-7230 correspondence with OSHA	Paint mfg.	Redesign work process: Include more material handling equipment.		From 1990 to 1993, lost time rate decreased by approximately 63%. Workers’ compensation costs reduced by 50%. Total OSHA recordable reduced by 40%.	

Source	Workplace	Interventions	Costs	Measurements	Savings
Success Stories, OSHA, November 1996. Gauf, M. (1995). Problem-solving by committee at General Seating, In M. Gauf (Ed.), Ergonomics That Work (pp.89-91). Haverford, Penn.: CTD news.	Seating mfg.	Committees. Redesigned product: Number of fasteners reduced by 50%. Compression tool to clamp padding to the seat allowed 2 hands to be used to perform the fastening.		1993, lost-time days: 690 for tendonitis, 188 carpal tunnel syndromes, 256 for sprains and strains. In 1994 carpal tunnel reduced 96%, tendonitis 93%.	
Ergonomic Success Stories, OSHA, November 1996. Elie, J. (?). All the right moves. OH&S CANADA, 4(2) 46-53.		Redesigned workstations: Adjustable platforms eliminating the need for highly repetitive motions.		Workers' comp claims 4 down to 0; Absenteeism 10% down to 4%; Productivity increased by as much as 55%.	
Ergonomic Success Stories, OSHA, November 1996. Hazzard, L., Mautz, J., & Wrightsman, D. (1992). Job rotation cuts cumulative trauma cases. Personnel Journal, Feb., 29-32.		Redesigned work station: Meet needs of employee, job rotation		From job rotation: 46% reduction in CTDs in 1990 compared to 1989	
Ergonomic Success Stories, OSHA, November 1996. Murphy, D. (1992). Putting it on the table. The National Provisioner, October, 1992, 23-31.		Redesigned process: Automated hog skinner, automatic deboner, and a pneumatic-powered device to remove the sausage casings. Machine to hang stick loads of sausage on racks, worker only guides machine.		Injury incidence rate has dropped 17% from 1991 to 1992. Medical costs have declined 15%.	
Ergonomic Success Stories, OSHA, November 1996. Piegorsch, K. (1994). ErgoWorks! Ergonomic consulting and seminars correspondence 4/18/94.	Upholstery	Redesigned work process: Upholstery is done by a modular production process (without a change in the size of the workforce). Reduced forces during handling, easy access resulting in less postural strain, eliminated pinching and pulling.		20%-30% reduction in the cost to make the furniture.	

Source	Workplace	Interventions	Costs	Measurements	Savings
Ergonomic Success Stories, OSHA, November 1996. Amey, D. (1992). Ergonomic safety: Cargill's experience. Broiler Industry, February, 1992.	Poultry processing	Redesign work process: Automate kill lines		Reduced injury and illness rates Increased efficiency and quality. Health care costs decreased by 280%. Employee turnover rate has been reduced by 50%.	
Ergonomic Success Stories, OSHA, November 1996. Brown, S. (1993). Golden opportunities. The National Provisioner, December 1993, 34-39.	Poultry processing	Redesigned workstations: Processing lines and shackles can be adjusted for individual heights. Stands have hydraulic gauges. Butt rests are utilized on deboning lines. The need to work above the head or to bend over to hang the birds was eliminated.		Turnover 30% down to 20%. Morale improved.	
Ergonomic Success Stories, OSHA, November 1996. Wheal, C. (1992). An easier way to raise output. The Engineer, 12 November 1992, 34-35.	Car parts	Redesigned work process: Smaller boxes, forklifts, and assister arms for manipulating car parts.		Absenteeism 8.5% down to 4%..	
Ergonomic Success Stories, OSHA, November 1996. From Oxenburgh, M. "Increasing Productivity and Profit through Health & Safety." Reduction of strenuous physical activity in domestic refuse collection, 140-143.	Refuse collection	Redesigned work process: Garbage pick-up is completely automated.		Injury rate of 11% down to 4%.	
Ergonomic Success Stories, OSHA, November 1996. La Bar, G., (1992). Succeeding with ergonomics. Occupational Hazards, April, 1992. 29-33.	Welding and assembly work	Redesigned work process: Articulating arms installed in assembly areas to move and lift large parts.		50% drop in the number of ergonomic-related injuries after the first year (1987). This was followed by further 35% decreases in each of the next two years.	

Source	Workplace	Interventions	Costs	Measurements	Savings
Ergonomic Success Stories, OSHA, November 1996. From Bureau of National Affairs. (1990) Diverse work force posing new challenges in designing ergonomic workplaces, group told. *Occupational Safety and Health Reporter*, 11/7/90, 995-997.		Redesigned workstation. Padded, swivel chairs with adjustable backs.		12% incidence rate of cumulative trauma disorder down to less than 1% in some plants.	
Ergonomic Success Stories, OSHA, November 1996. Burdorf, A. & Van Duuren, L. (1993). An evaluation of ergonomic improvements in the woodworking industry. Annuals of Occupational hygiene, 37(6) 615-622.	Woodworking	Redesigned workstations: Raised platforms, roller paths, and tables to reduce lifting and awkward postures of the back.		Reduced the average time involved in lifting and carrying wooden boards and planks about 10%.	
Ergonomic Success Stories, OSHA, November 1996. From Cook, R.E. & Marcotte, A.J. (1990). Ergonomic improvement in games manufacturing: A case study. Human Factors Society 34th Annual Meeting. October 8-12, 1990. Orlando, FL.	Games mfg.	Redesigned workstation: "Packing table" installed on the end of the delivery conveyor allowing "automatic" stacking of the boxes and the conveyor belt raised for better positioning of the lower back.		100% reduction in injury cases. 90% reduction in damage to the packaging and related returns	
Ergonomic Success Stories, OSHA, November 1996. Oxenburgh, M. "Increasing Productivity and Profit through Health & Safety." A de-burring operation is de-bugged, 234-236.	Parts deburring and finishing	Redesigned work process: Parts are finished on a potter's wheel instead of held by hand on bench.		Reduced injuries and increased productivity. Workers' compensation premium reduced by 60% first year and, subsequently, by an additional 25%.	

Source	Workplace	Interventions	Costs	Measurements	Savings
Ergonomic Success Stories, OSHA, November 1996. Oxenburgh, M. "Increasing Productivity and profit through health & Safety". Reduction in heavy manual handling and machine pacing, 136-139.	Wood products	Redesigned work process: Automatically feeding the boards to the finishing machine, separating and stacking them. Use of forklift to transfer loads.		reduction in all injuries, no lost-time musculoskeletal injuries in two yrs (100% reduction in lost workday injury rate). Productivity increase of 10%-20% (tons of board manufactured per employee per day.)	
Ergonomic Success Stories, OSHA, November 1996. Bone, J. (1993). Refineries pump up ergonomics. Safety & Health, January, 1993, 60-64.	Refinery	Redesigned work processes: Chain hoists, platforms, and adjustable-height carts to move equipment eliminating bending, stooping, and lifting. Valve stems altered to eliminate bending when turning the valves. Training.		Workers' compensation rates have dropped 83% and injury rates 90% over three years.	
Ergonomic Success Stories, OSHA, November 1996. Rhone-Poulenc Rorer correspondence dated November 10, 1994.	Pharmaceuticals	Redesigned work process: Power straddle lifts (80% reduction in lifting from floor to work station height.). Power flex conveyor systems. Metal filter press plates weighing >60 lbs were replaced with plastic frames weighing 15 lbs.		Lost time accidents, 66 down to 3. Recordable injuries, 156 down to 55. There was a ten-fold reduction in workers' compensation losses.	
Ergonomic Success Stories, OSHA, November 1996. Oxenburgh, M. "Increasing Productivity and Profit through Health & Safety." Musculoskeletal hand injuries in a packaging operation, 229-230.	Sugar packaging operation	Redesigned product: Sugar cubes were packaged loosely, rather than in neat layers in boxes.		Productivity up 15% Considerable savings in absenteeism and workers' compensation.	

Source	Workplace	Interventions	Costs	Measurements	Savings
Ergonomic Success Stories, OSHA, November 1996. From Wick, J.L., Morency, R., Waite, J., & Schwanda, V. (1990). Ergonomic improvement in a barr-tack sewing job: A case study. *Advances in Industrial Ergonomics and Safety II*, Biman Das, Ed., Taylor & Francis, 1990, 285-288.	Sewing	Redesigned workstations: Tilt stands for the tote boxes. Reduction in the size of the bench. Arm rests, and the machine tilted toward the operator.		Labor savings of 36%	
Ergonomic Success Stories, OSHA, November 1996. Oxenburgh, M. "Increasing Productivity and Profit through Health & Safety." Maximizing gains from mechanized handling, 214.	Paper cutting	Redesigned work process: manual lifting was eliminated by putting a power-operated scissor lift with roller bearings between the trolley and the guillotine table. The paper laden plywood supports are slid onto the table.		18 back injuries among operators in one yr, accounting for more than 200 days of lost time. Down to zero in three years (100% injuries, 100% lost workdays). 20% increase in productivity.	
Ergonomic Success Stories, OSHA, November 1996. Wick. J. L. (1985). Bagging dry chemicals: A case study. Industrial Ergonomics – A Practitioners Guide. Georgia: Industrial Engineering and Management Press, 55-60.	Chemical packaging	Redesigned workstations: Platform and installation of conveyor belts, eliminating carrying bags with the associated high compressive forces on spine.		Increased production 33.3%.	
Ergonomic Success Stories, OSHA, November 1996. Fischer, J. F. & Wick, J. L., (1991). Ergonomic improvements to a microscope workstation: A case study. Advances in Industrial Ergonomics and Safety III. W. Karwowski and J. W. Yates, Ed., Taylor & Francis, 1991, 543-547.	Microscopes & wafers	Redesigned workstations: Reducing arm supinations, shoulder abductions. Improved lateral movement and greater range of motion were provided. Reduced worker travel time between stations. Reduced wafer handling.		25% increase in productivity due to elimination of several material handling tasks.	

Source	Workplace	Interventions	Costs	Measurements	Savings
Ergonomic Success Stories, OSHA, November 1996. Gengel, S., Washburn, J. M., III, & Wick, J. (1991). Carpal tunnel syndrome prevention: A case study. Advances in industrial Ergonomics and Safety III, W. Karwowski and J.W. Yates, Ed., Taylor & Francis, 1991, 117-120.		Redesigned workstation: Fixture to hold the part and a change in height of the bench and work rest.		Production level increased 11%.	
Ergonomic Success Stories, OSHA, November 1996. M&M Protection Consultants correspondence.	Red meat packing, hide dept.	Redesigned work process: Truck to move the carts of bologna?		32 musculoskeletal disorders, reduced workers' compensation claims in both frequency and severity by over 50%. Cost for musculoskeletal disorders $300,000 down to $100,000; cost per employee $1,166 down to less than $480, over 1 year period. Employee morale, efficiency, and quality improved.	
Ergonomic Success Stories, OSHA, November 1996. Caterpillar Inc. (1992). Welding Journal, September, 1992, 36-38.	Construction equipment mfg.	Redesigned work process: Altered height of stacked materials, adjusting fixturing heights, robots for long welds. Work station redesign: Adjusting height of tables and chairs. Tool redesign: Extended handles to add leverage when turning metal plates.		Over two-year period, the back injury rate went down 27%. Workers less tired, higher morale.	

Source	Workplace	Interventions	Costs	Measurements	Savings
Ergonomic Success Stories, OSHA, November 1996. Correspondence with OSHA from Perdue Farms.	Poultry processing	Program, Identify high risk jobs and implement engineering controls		OSHA recordable incidents, 1989 (72), 1990 (86) (Started ergonomics program in 1990), 1991 (123), 1992 (45), 1993 (19); Incidence rate 1991 (31.9), 1992 (27.5), 1993 (13.2), 1994 (10.8). Workers' comp decreased by 68% over 4 years.	
Ergonomic Success Stories, OSHA, November 1996. From Gauf, M. (1995). Food retailer rewrites user, safety manuals for safer workplace. In M. Gauf (Ed.), *Ergonomics That Work* (pp.85-87). Haverford, Penn.: CTD News.	Grocery stores	Redesigned workstation. Heights raised, scales moved, keyboards raised and made adjustable, grocery bag wells made adjustable.		Experience rating down 43%.	
Ergonomic Success Stories, OSHA, November 1996. Oxenburgh, M. "Increasing Productivity and Profit through Health and Safety." Reduction of musculoskeletal hand injuries in meat processing, 239-242.	Meat processing	Redesigned workstation: Hook for meat, downward slope, permits wrist to remain in neutral position (straight) while cutting the meat. Redesigned tool: Knife with a pistol grip handle to keep the wrist neutral.		80% reduction in wrist injuries in the first year; increase in productivity. Marketing of the redesigned tool became a successful commercial venture.	
Ergonomic Success Stories, OSHA, November 1996. Oxenburgh, M. "Increasing Productivity and Profit through Health & Safety." Straighten up. Reducing bending and lifting, 222-223.	Instrument panel mfg., lifting	Redesigned work process: Panels were removed from the conveyor belt with a hoist and "walked" to the shipping area where they were slid into place.		Pay-back period was less than two months	

Source	Workplace	Interventions	Costs	Measurements	Savings
Ergonomic Success Stories, OSHA, November 1996. Steele, S., Hamel, R., & Muller, J. (1990). Wrist injury prevention in firearms manufacture: A case Study. Advances in Industrial Ergonomics and Safety II, Biman Das, Ed., Taylor & Francis, 1990, 273-276.	Gun mfg.	Redesigned workstation: Gauges anchored to the benches, and a manual, lever ejection mechanism.		Cycle time was reduced 32%.	
Ergonomic Success Stories, OSHA, November 1996. Material Handling Engineering. Cost cutting ideas: Pallet positioner cuts back injuries of packaging workers. January, 1994, page #66.	Palletizing	Redesigned work process: E-Z Loader pallet positioner that keeps the containers at waist level.		Productivity has increased 40%.	
Ergonomic Success Stories, OSHA, November 1996. Material Handling Engineering, (1988). Put ergonomics to practical use. July 1988, 53-56.	Lifting and carrying of tote boxes.	Redesign work process: Lift table/transporter (Southworth Model L-250 Dandy Lift).		Injuries have been reduced 90%. The cost of back injury claims reduced from $88,400 to $8,700. Productivity has been substantially increased.	
Ergonomic Success Stories, OSHA, November 1996. CTD News, January 1996 pp 3-5.	Deburring	Enclosed shot blaster to clean burrs from shelves.		Productivity is up about 25%.	
Ergonomic Success Stories, OSHA, November 1996. Ridyard, D.T. (1990). A successful applied ergonomics program for preventing occupational back injuries. Advances in Industrial Ergonomics and Safety II, Biman Das, Ed., Taylor & Francis. 125-132.	Chemical production, materials handling, 90 employees	Redesigned work process: Hydraulic pallet turntables, drum dumpers, and electric hand-trucks. Redesigned product: Reducing the weight of the bags.		7.8 overexertion-related back injuries associated with materials handling activities per 100 employees. Lost workdays were eliminated (100%). 62% average reduction in the incidence of total overexertion back injuries over three year period.	

Source	Workplace	Interventions	Costs	Measurements	Savings
Ergonomic Success Stories, OSHA, November 1996. Mandleker, J. (1993). Cumulative trauma increases workers' compensation claims. Business & health, April, 1993, 28-38.		Redesigned workstations: Increase height, add lifting devices.		105 Cumulative trauma disorder cases down to 54 over two years. 301 workers' compensation claims down to 193. 1,402 lost workdays down to 476. 80 lost time injuries down to 28.	
Ergonomic Success Stories, OSHA, November 1996. From Longmate, A.R., & Hayes, T. J., (1990). Making a difference at Johnson & Johnson: Some ergonomic intervention case studies. Industrial Engineers – A Practitioners Guide, Georgia: Industrial Engineering & management Press.		Redesigned workstations: Adjustable V-stands to tilt the tote pans to a more accessible angle, provide recessed trays in front of the worker, and footrests.		10-12% increase in productivity	
Ergonomic Success Stories, OSHA, November 1996. McCasland, L. J. (1992). Development of an ergonomic program for the meatpacking industry. AAOHN Journal, 40(3) 138-142.	Meat packing	Redesigned work process: Truck to move the carts of bologna.		Injuries and cumulative trauma disorders involving new employees have been reduced 50%.	The trucks will save an estimated $10,000 in medical costs.
Ergonomic Success Stories, OSHA, November 1996. OSHA. Case 7. Appendix A, Preliminary Regulatory Impact Analysis for OSHA's Proposed Ergonomic Protection Standard.	Clothing mfg.	Redesigned workstation: New adjustments on machines that allow for more control and less handling of the cuffs and waistbands.		Annualized lost time illnesses incident rate down 56%, 1/92-6/92.	

Source	Workplace	Interventions	Costs	Measurements	Savings
Ergonomic Success Stories, OSHA, November 1996. Ferris, F. (1992). Uplifting experience. American Printer, November 1992, 40-43.	Printing	Redesigned work process: Spring-loaded table for loading and unloading.		Back injury medical costs reduced from $67,738 to $6,033 in 1 year. Indemnity costs reduced from $35,102 to $5,117. Lost workdays reduced from 413 to 112. Production volume increased from 338 million to 384 million books.	
Ergonomic Success Stories, OSHA, November 1996. Riley, M., Cochran, D., & Stentz, T. Case study #1. In Gjessing, C., Schoenborn, T., & Cohen, A. Ed.), Participatory Ergonomic Interventions in Meatpacking Plants (51-91). Cincinnati: NIOSH, pub#94-124.	Meatpacking	Redesigned work process: Duration of twisted wrist posture reduced by having knuckle-trimmers remove and trim lean shank, leaving only bone removal to do.		Decreased employee turnover.	$14,000 in increased meat yield.
Ergonomic Success Stories, OSHA, November 1996. From Garry, M., (1993). Getting a grip. *Progressive Grocer*, June 1993, 78-82.	Grocery meat dept.	Redesigned work process: Semiautomatic meat-wrappers. Redesigned tool: Knife which keeps the wrist in alignment when cutting meat.		Cumulative trauma disorder claims from 47 down to 26 in 1 year.	
Ergonomic Success Stories, OSHA, November 1996. Fefer, M D., (1994). Taking control of your workers' comp costs. Fortune, October 3, 1994, 131-136.	Sewing machine operators	Redesigned workstation: "Feed dogs" installed which use metal teeth to dig into the fabric and pull it through the sewing machine. Adjustable height chairs and equipment.		Workers' comp costs decreased 33%.	$2.7M
Ergonomic Success Stories, OSHA, November 1996. Case 12. Appendix A, Preliminary Regulatory Impact Analysis for OSHA's Proposed Ergonomic Protection Standard.	Auto glass window encapsulation	Redesigned workstations: Modified to provide height and tilt adjustability.		Increased productivity.	$650,000 decrease in workers' comp. costs.
OSHA Final Ergonomics Standard, November 2000	Bakery	Modified tools, committee, improved work practices, redesigned workstations.		Lost workdays due to CTS 731 down to 8.	
OSHA Final Ergonomics Standard, November 2000	Mattress mfg.	Hand trucks and lift systems, employee involvement.		Workers' comp claims down 53.5% in one year.	

Source	Workplace	Interventions	Costs	Measurements	Savings
OSHA Final Ergonomics Standard, November 2000	Copying machine control assembly	Replaced workbenches with adjustable stand to hold weight of part.		MSD rate down 50%	
Getty, R. L. Ergonomics improvement are cost effective [http://www.ergobuyer.com/**Getty**/gettya.html]: Ergo Buyer. Accessed 1999 May 4.	Aircraft manu.	Program integrated with continuous improvement and TQM; employee ownership of program, training, medical management, "quick fixes" followed by changes to tooling and processes; low-vibration tools, lift tables, matting; working with designers to eliminate hazards upstream.		Lost workdays down 25%, costs down 55%. Improvements in productivity in several areas.	Over $3 million incurred and $11 million projected workers' comp costs
Narayan, M. and Rudolph, L. Ergonomic improvements in a medical device assembly plant: a field study. Proceedings of the Human Factors and Ergonomics Society 37th Annual Meeting-1993. 1993; 812-816.	Mfg. Electronics 316 employees	Awareness training, employee involvement prototyping, workstation modification, adjustable chairs, part-holding fixtures, microscope repositioning, padded areas of contact stress.		Initial increase in injury reporting, but lost time down. MSDs down 83%, lost workdays down 97%, payback in 2.3 months.	
NIOSH, 1997 *Elements of Ergonomics Programs*, Exhibit 16: Engineering Controls—Motorcycle Manufacturing	Motorcycle Manu., 48 workers	Upgrading forging and milling machine processes and improving product flow to reduce flywheel handling from 28,000 to 17,500 lb per 8-hour shift Installing a customized 40-ton press to eliminate the use of brass hammers for truing flywheels Using an overhead lift to eliminate manual handling of the 35-lb assembled flywheel unit		MSDs down 55% over 3.66 years. During a 5-year period from 1989 through 1993, a reduction of WMSDs involving lost or restricted workdays from 27.6 per 100 workers in 1989 to 12.5 per 100 workers in 1993. The severity of musculoskeletal disorders decreased from 610 lost or restricted-activity workdays per 100 workers in 1989 to 190 workdays in 1993	

Source	Workplace	Interventions	Costs	Measurements	Savings
Worrell, G. A. and Wirtz, S. Complete ergonomics benefits case study: Flesher machine operation. Norcross, GA: Shock Design, Inc.; 1999; pp. 77-79.	Beef packing plant			MSDs down 71%, lost workdays down 100%, costs down 100% in one year.	
L&I, Seattle City Light	Public Utility, 1,804 employees			MSDs down 63%, costs down 66%, cost per claim down 10% over 3 to 4 years.	
L&I, Xerox report	Document equipment, 50,000 employees.			MSDs down 24%, costs down 55% over 8 years.	
Oxenburgh, M. S. Cost-benefit analysis of ergonomics programs. American Industrial Hygiene Association Journal. 1997; 58():150-156.	Manufacturing (sm.)			Upper limb lost workdays down 68% over 2 years.	
Oxenburgh, M. S. Cost-benefit analysis of ergonomics programs. American Industrial Hygiene Association Journal. 1997; 58():150-156.	Engine Maintenance (Lg)			MSD lost workdays down 60% over 2 years.	
Lanoie, P. and Trottier, L. Costs and benefits of preventing workplace accidents: going from a mechanical to a manual handling system. Journal of Safety Research. 1998; 29(2):65-75.	Packers,274 employees	"Demechanization" of packing process, warehouse layout, shelving arrangements, automatic pallet dispenser, forklifts, pallet jacks, computer system for orders, training, timely feedback to packers.	CA$1,650,779 .31	Back injuries down 36%, lost workdays down 53% over 6 years. Reduced product damage, 50 % reduction in shipping errors, eliminated shipping delays	CA$2,587,778.28 Net present value = CA$936 998.97
Hochanadel, C. D. and Conrad, D. E. Evolution of an on-site industrial physical therapy program. Journal of Occupational Medicine. 1993; 35(10):1011-1016.	Industrial, 2,900 employees Martin Marietta Energy Systems	On-site physical therapy		80% reduction in lost workdays due to low back pain over 10 years. A significant reduction occupational absence rate	Savings of $8.3 million, a benefit-to-cost ratio of greater than 9 to 1.

Source	Workplace	Interventions	Costs	Measurements	Savings
Melhorn, J. M. A prospective study for upper-extremity cumulative trauma disorders of workers in aircraft manufacturing. Journal of Occupational and Environmental Medicine. 1996; 38(12):1264-1271.	Aircraft Manufacturing	Early identification, medical care, job task modification, workplace accommodation, and training. Posture training, exercise training, and vibration-damped rivet-guns.		Positive benefit from ergonomic posture training and exercise training for the following groups: the dominant hand, time spent in an awkward position, number of standard rivets bucked, number of parts routed, number of parts ground, number of vibration-dampening rivets bucked, and newly hired individuals. A negative effect (increase in individual risk level) for vibration-dampening rivet guns was demonstrated.	
Moore, J. S. and Garg, A. Participatory ergonomics in a red meat packing plant, part I: Evidence of long-term effectiveness. American Industrial Hygiene Association Journal. 1997; 58():127-131.	Red Meat packing, 830 employees	Employee involvement, training, prioritizing jobs for evaluation, brainstorming solutions, mechanical assists, conveyor redesign, control redesign, workstation redesign, work process redesign, flooring changes, adjustable platforms, knife redesign, knife sharpening, additional staffing		MSDs down 8%, costs down 77% over 7 years.	

Source	Workplace	Interventions	Costs	Measurements	Savings
Mansfield, J. A. and Armstrong, T. J. Library of congress workplace ergonomics program. American Industrial Hygiene Association Journal. 1997; 58(2):138-144.	Library	Program, training, employee involvement. Interventions included materials-handling devices, furniture, floor mats, lamps, glare screens, seating, copy holders, CPU stands, monitor pedestals, and shelving.	1994 - 1995 $108,000 on training and consulting services, $510,000 on ergonomics interventions, $1,970,000 on workers' compensation claims.		

Source	Workplace	Interventions	Costs	Measurements	Savings
Wiesel, S. W.; Boden, S. D., and Feffer, H. L. A quality-based protocol for management of musculoskeletal injuries. Clinical Orthopaedics and Related Research. 1994; April(301):164-176.	Public Utility more than 5300 employees	Quality-based standardized diagnostic and treatment protocols as part of an unbiased injury surveillance system. Early functional return, efficient use of diagnostic studies, and avoidance of surgery whenever possible.		Days lost from work reduced 55%, injuries reduced 51%, average time lost per injury down 40%, number of surgeries performed decreased by 67%, and the operative success rate increased dramatically. 60% reduction in expenditures for lost time and replacement wages, resulting in a Also reduced unjustified lost time and compensation costs through.	Cumulative ten-year savings of more than 4.1 million dollars
Henderson, C. Back injuries: let's talk turkey. Safety + Health. 1998;():74-75.	Turkey production, 2,500 employees			Costs of MSDs down 40% over 5 years. ROI = 3.0	
Wickstrom, G.; Hyytiainen, K.; Laine, M.; Pentti, J., and Selonen, R. A five-year intervention study to reduce low back disorders in the metal industry. International Journal of Industrial Ergonomics. 1993; 12():25-33.	Metal Industry 88 planners and 125 sheet metal workers	Improved working conditions, education on body mechanics and fitness of the back tissues, participatory approach, lifting equipment		Comparing the period 1985-89 to 1990-91 the occurrence of sick-leaves of up to six months due to low back disorders fell from 3.1 to 1.9 days/person-year Workers considered the load on the back smaller than before; this was verified by biomechanical evaluation of the work tasks.	

Source	Workplace	Interventions	Costs	Measurements	Savings
Mckenzie, F.; Storement, J.; Van Hook, P., and Armstrong, T. J. A program for control of repetitive trauma disorders associated with hand tool operations in a telecommunications manufacturing facility. Industrial Hygiene Association Journal. 1985; 46(11):674-678.	Telecomm manu., 6,600 employees	Redesigned handles on power screwdrivers and wire wrapping guns and instituted plant-wide ergonomics program.		MSDs down 55%, lost workdays down 84% over 2 years. Incidence rate of repetitive trauma disorders decreased from 2.2 to .53 cases/200,000 work hours; lost days reduced from 1001 to 129 in 3 years.	
Aaras, A. The impact of ergonomic intervention on individual health and corporate prosperity in a telecommunications environment. Ergonomics. 1994; 37(10):1679-1696.	Assembly workers, 331	Provided adjustable workstations and additional work space; chairs with arm support; tools were suspended and counterbalanced.		Lost workdays down 60%	
Chatterjee, D. S. Workplace upper limb disorders: a prospective study with intervention. Occupational Medicine. 1992; 42:129-136.	Automotive workers, 695	Clinical and epidemiological studies, power tool vibration measurement, assessment time and motion studies, multidisciplinary interventions, workplace design, education		UECTDs down 95% in one year.	
Echard, M.; Smolenski, S., and Zamiska, M. Ergonomic considerations: engineering controls at Volkswagen of America. Ergonomic Intervention; pp. 117-131.	Automotive workers	Ergonomics team, training, problem solving system, redesigned tools, fixtures, and work organization in assembly operations.		CTS down >50% over 2 years.	
Geras et al, 1989 As cited in R.H. Westgaard and J. Winkel. 1997. Ergonomic Intervention Research for Improved Musculoskeletal Health: A Critical Review. *International Journal of Industrial Ergonomics*, v. 20, no. 6, pp. 463-500.	Automotive workers	Ergonomics training and intervention program introduced; added material handling equipment and workstation modifications to eliminate postural stresses.		Lost workdays down 70% over 5 years. Lost time prevalence rates at two plants reduced from 4.9 and 9.7/200,000 hours to 0.9 and 2.6, respectively, within 1 year and maintained over a 4-year period.	

Source	Workplace	Interventions	Costs	Measurements	Savings
Lifshitz et al, 1991 As cited in R.H. Westgaard and J. Winkel. 1997. Ergonomic Intervention Research for Improved Musculoskeletal Health: A Critical Review. *International Journal of Industrial Ergonomics*, v. 20, no. 6, pp. 463-500.	Automotive workers	Ergonomic teams, quality circles		CTDs down 50% over 2 years.	
Lockhart, 1986 As cited in R.H. Westgaard and J. Winkel. 1997. Ergonomic Intervention Research for Improved Musculoskeletal Health: A Critical Review. *International Journal of Industrial Ergonomics*, v. 20, no. 6, pp. 463-500.	Electric utility workers, 4,000	Team approach to problem identification and solution		MSDs down 58% over 3 years.	
Fitzler et al, 1983 As cited in R.H. Westgaard and J. Winkel. 1997. Ergonomic Intervention Research for Improved Musculoskeletal Health: A Critical Review. *International Journal of Industrial Ergonomics*, v. 20, no. 6, pp. 463-500.	Manuf. Workers, 400	Medical management, early reporting, conservative treatment, modified work duty, education		Back injuries down 50%, costs down 90% over 3 years.	
Townes, M. and Imrhan, S. N. Use of ergonomic line balancing and a "pull" system to reduce CTDs in electronics assembly: a case study. Karwowski, W. and Yates, J. Proceedings of the Annual International Industrial Ergonomics and Safety Conference; Lake Tahoe, Nevada. New York: Taylor & Francis; 1991: 163-168. Advances in Industrial Ergonomics and Safety III.	Electronics manu., 6 workers	Product flow, line balancing, job rotation		Productivity increased 10.24%	

Source	Workplace	Interventions	Costs	Measurements	Savings
ErgoSolutions, June 30, 2004. Ergonomics ROI. Michael Wynn, CPE	Honeywell, large electronics mfg.	Program, lean mfg., training, engineering involvement, prioritization, employee involvement, purchasing, layout, workstations, design, elimination of high-risk tasks, e.g., heavy lifting. 3-year period.	$355,000 additional costs	Productivity increased 37%. ROI 1,675%	$100,000 per year in reduced labor costs. $2.1 M per year overall savings.
Drury, et al (1999) Ergonomics 42 (1) 208-228.	VF Apparel mfg., 45,000 employees	Program, mgmt support, ergo teams, training, engineering, workplace redesign, chairs, lifting aids, work methods redesign, workstation adjustment, automation, breaks, rotation, packaging changes.		Over 5-year period, lost time rate down 42%, injury rate down 60%, costs down 68%.	