Appendix VI-B. Summary of Case Studies of Ergonomic Programs/Interventions

#	Job Title or Activity	SIC Code	Ergonomic Program/Interventions	Reported Reduction in Injury Rates		Sources
				Lost Workday MSDs	Total MSDs	
240	Soft Drink Bottling	2086	For the last two years this small soft drink bottler has participated in OSHA's Consultation Program. This has given the company a background in occupational injury prevention through training. They began two years ago to track their occupational injuries by both type and department to help them identify their workplace risks.	Since 1996, they have reduced the number of lost work-days associated with them by 60%.	As a result of implementing some parts of an ergonomics program, since 1996 they have cut their rate of ergonomics related injuries by 40%.	OSHA case file (Ex: 502-22)
190	Catfish Processing	2092	To reduce MSD injuries, this company purchased ergonomic tools/knives, mechanical conveyors and lifts and automated stressor processes. The company also began rotating and enlarging jobs.	The work-related musculoskeletal disorder lost workday injury incident rate was reduced from 136.9 in 1990 to 4.3 in 1994.		Delta Pride corporate settlement agreement report to OSHA. (Ex: 502-22)
144	Snack Chip Manufacturing	2096	The company implemented a comprehensive ergonomics approach which included the elements of a good program.	From 1996 to 1997 the ergonomics program implemented by this employer reduced the lost work-days associated with back injuries by two thirds, and the rate of upper extremity musculoskeletal disorders and the number of lost work-days associated with them by more than 50%. In 1998 these rates are continuing to decline.	This resulted in a dramatic reduction in musculoskeletal injuries and illnesses.	OSHA case files (Ex: 502-22)

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148	Tortilla Production	2099	Ergonomists from their insurer and from OSHA helped the company set up an ergonomics program and evaluate their workplace. Engineering changes were made. Foot rests were used. Table heights were altered. Stools were provided. Employees were rotated to different work stations. Light duty tasks were made available to get injured workers back to work. Communication between management and employees was improved. An ergonomic training program was provided and a medical management program established.	Within two years the company's total losses plunged over 200 percent. Their loss ratio went from 217% to 9.2%.	Not Reported	Idaho State Insurance Fund Newsletter (Ex: 502-22)
221	Textile Manufacturing	22	The company replaced wooden chairs with adjustable padded swivel chairs. The company also adopted a medical program focused on prevention, early intervention, treatment and rehabilitation of MSDs.	Not Reported	The ergonomics program led to a drop in the MSD incidence rate from 12% in 1984 to less than 1%. Workplace changes also resulted in significant reductions in tendinitis.	Diverse Work Force Posing New Challenges in Designing Ergonomic Workplaces, Group Told," *Occupational Safety & Health Reporter* - Special Report, (November 7, 1990). (Ex: 502-22)

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330	Textiles	22	Hired an ergonomics professional and a physician practice. Ongoing training, workplace surveys and employee interviews to identify problem jobs, all complaints investigated, problem jobs are targeted for ergonomic improvement and redesign.	The lost workday injury rate was reduced from 14.6 in 1990 to 11 in 1992 (25% reduction).	Employee complaints concerning hand pain decreased from 34 in 1991 to 14 in 1992 (59% reduction).	(Ex: 32-339-1-1)
140	Textile Manufacturing	22	The company formed joint management-labor safety and health committees that identified and eliminated safety and health hazards. The joint committees developed solutions such as springs for the material-handling boxes so yarn remained at a comfortable level, eliminating the need for workers to bend down and lift up material. Workers designed and management implemented a new improved bagging system. The company also purchased adjustable chairs.	Not Reported	There were 121 work-related musculoskeletal disorders and 19 back injuries in 1993. After three years of the ergonomics program, there were only 21 work-related musculoskeletal disorders and one back injury.	Workshop on corporate-wide settlement agreements, (March 24, 1999), Washington, D.C. (Ex: 502-22)

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222	Knitwear Manufacturing	225	The company launched its ergonomics program in 1991 by focusing on educating all employees on ergonomics risks. In some plants, The company installed new equipment, such as vacuum waste-removal attachments and fully adjustable chairs. The company spent $2 million to automate one assembly process by developing an automated chain-stitch machine. Less costly changes included repositioning label holders by 15 degrees to match an operator's hand movements.	The company's ergonomic changes have resulted in a 40% reduction of injury claims costs since 1991.	Not Reported	John W. DeWitt, "Ergonomics: Bigger is Better," Apparel Industry Magazine, (5/1/1995). (Ex: 502-22)
142	Weaving of Carpet Backing	2273	The company used OSHA's draft ergonomics program guide as the basis to improve the ergonomics program they had established in 1994. They have a yearly ergonomic training program and strongly emphasize early reporting. Ergonomic job analyses are triggered by workplace incidents and pro-active reviews.	Not Reported	They have achieved more than a 50% decrease in ergonomic-related injuries and illnesses.	James Pair, plant manager, Amoco Fabrics and Fibers Phone call: (912) 375-6520; (7/14/99) (Ex: 502-22)

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336	Manufacturing	23	They use a quick-response team charged with performing: *correct work station adjustments, * follow up to assure actions are effective, * obtain medical care to treat objective or subjective symptoms, * make improvements in current tools and equipment, * instruct in proper work techniques for affected individuals.	For the time period of 1998 to 1999, the total number of illness cases increased by 15% while the number of lost-time-days dropped by 47%, and the number of restricted days dropped by 23%.	Not Reported	(Ex. 32-198-4-28)
143	T-Shirt Mfg.	23	Analysis by professional ergonomists and safety and health engineers identified that strain injuries (mostly cumulative trauma disorders of the hand, wrist, arm and back) accounted for 68% of the claim injuries and 88% of the claim dollars. They identified their three primary issues as: ergonomics, injury management, and safety training. They trained their supervisors and employees to observe people as they were working and to observe their posture. They showed their employees how to adjust the height of their chairs, the height of their work tables, and the height of their sewing machine motors. They trained them on the importance of maintaining proper ergonomic body postures.	The company achieved an 85% reduction in workers' compensation costs seven months after establishing a comprehensive safety and health program that stressed ergonomics.	Not Reported	*Occupational Safety and Health,(* October, 1995) (Ex: 502-22)

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141	Manufacturing Baby Products	23	The company's ergonomics program includes a committee that tries to assess the "operator-friendliness" of each process in assembly, and then implements the most ergonomic way of doing each task. The committee also trains operators to perform lifts and other risky operations. Workstations are continuously evaluated, and new types of adjustable, tilt-forward chairs have been purchased.	Not Reported	From 1993-1995, injury rates dropped from 11% to 7%, along with significant improvements in productivity and quality.	John W. DeWitt, "Ergonomics: Bigger is Better," *Apparel Industry Magazine,* 5/1/95 (Ex: 502-22)
347	Athletic Apparel Manufacturer	23	Implemented measures such as a 75% reduction in piecework compensation to reduce potential for MSDs through over-use, cross-training to reduce repetitive motions, ergonomic chairs to fit the workstation, and a contractual agreement with health care provider.	In the last 6 months, production has slowed considerably as a direct result of cross-training and almost eliminating piece-rate practice. Went from 54 pieces per day to 45 (17% reduction). Had to hire more staff to meet demand, resulting in increased costs.	Not Reported	(Ex. 30-1861)
388	Sewing Machine Operators	23	Incorporated adjustable table and chairs, increased size of work tables and lowered sewing machines.	Increased sick leave.	Did not see any reduction in MSD's.	Westgaurd et. al. (1986) (Ex: 38-68)

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				Lost Workday MSDs	Total MSDs	
164	Apparel Mfg.	23	The company hired outside consultants and developed an in-house database to isolate problems and devise specific solutions, including new equipment. The company also implemented formal ergonomics committees, typically comprised of the plant engineer and five to ten associates. Committee membership rotates periodically to get more staff involved.	In 1995, the company's lost time days dropped by 53%, and workers' compensation costs dropped 55%.	Not Reported	John W. DeWitt, "Ergonomics: Bigger is Better," *Apparel Industry Magazine,* (5/1/95). (Ex: 502-22)
174	Apparel Mfg.	23	The company used OSHA 200 logs, workers' compensation data and videotapes of jobs to analyze ergonomic problems. Once the issues were identified, the company used an ergonomics design team, consisting of an ergonomics specialist, a standards analyst/engineer, an occupational health nurse and a member of the maintenance department to create solutions. The team redesigned several aspects of the company's workstations, concentrating on excess force, angle problems, repetitions, and awkward unsupported postures.	The company reduced lost-time incidents due to MSDs by 79%.	Not Reported	Rooney, E.F. & Morency, R.R., A Practical Evaluation Method for Quantifying Ergonomic Changes at L.L. Bean, Advances in Industrial Ergonomics and Safety, IV, S. Kumar, Taylor and Francis, (1992). (Ex: 502-22)

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#	Job Title or Activity	SIC Code	Ergonomic Program/Interventions	Reported Reduction in Injury Rates		Sources
				Lost Workday MSDs	Total MSDs	
231	Clothing Manufacturer	23	This company created a task force to identify and address the ergonomics problems. As a result, the company invested in new equipment including padded and adjustable chairs. The safety team was authorized to purchase new chairs for each person on the production line. The company engineers developed air-driven tools to eliminate forceful exertions. The company installed mechanical feeds at some workstations to reduce the amount of force required to push material through the machine. The company trained its staff in ergonomics and encouraged employees to report injuries. The task force established job rotations that allowed employees to vary their work throughout the day.	In 1993, workers' compensation costs declined to $2.7 million, a 33% reduction.	Not Reported	Taking Control of Your Workers' Comp Costs," *Fortune,* (October 1994). (Ex: 502-22)
264	Window Manufacturer	2431	The company's program consisted of job-site assessments to identify hazards, training, modifying work areas or tasks to reduce repetitive body motions using ergonomic aids such as wrist supports, and early intervention by reacting aggressively to the first symptoms of repetitive strain injuries or carpal tunnel syndrome.	The employer received a $250,000 rebate on their workers' compensation premium, and saved as much as 75% in medical costs by intervening early using physical therapy rather than surgery.	The company was having an average of 22 carpal tunnel syndrome surgery cases every year. Following implementation of the program, carpal tunnel syndrome surgeries averaged one case per year.	Appendix C "Summaries of Studies on Effective Ergonomics Programs and Interventions" (Strakal, 1994). (Ex:32-339-1)

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				Lost Workday MSDs	Total MSDs	
192	Bath Vanity Furniture Maker	2511	The company adopted ergonomic changes to decrease injuries. These included dropping the conveyor belt so workers had easier access to the tops of cabinets, installing conveyors to minimize manual lifting, purchasing angled tables to reduce bending and reaching and rotating jobs every two to four hours. The company also included training videos and safety training in its ergonomics program.	Ergonomic changes resulted in a decrease of almost 40% in workers' compensation costs, with workers' compensation costs declining from $103,824 to $61,000.	In 1996, there were only four recordable injuries.	Ergonomics: Effective Workplace and Best Practices Conference, Chicago (1997), NIOSH Proceedings (Ex: 502-22)
15	Mattress Manufacturer, Warehousing	2515	Added conveyor, increased fork truck use, reduced stacking heights, and revised handling procedures. Production process changed to eliminate material handling and loading onto truck.	Not Reported	Decreased injuries from 9 to 1 in one year.	Marcotte (undated) (Ex. 26-1048)
13	Mattress Manufacturer, Material Handling	2515	Introduction of hand trucks and lift systems to aid in manual handling. Job hazard analysis involving the employees in identification of problem areas and solutions to problems. Job hazard analysis of all job functions to resolve ergonomic problems. Modified workstations, tools, and manufacturing procedures.	53.5% reduction in workers' compensation reports in one year (1991).Lost time reduced 1/4 to 1/3 in 3 years.	Not Reported	Bedtimes (1992) (Ex. 26-1047)
17	Office Furniture Manufacturing, Various Jobs	252	Installed scissor lifts to aid in packaging file cabinets of different sizes. Small-assembly workstations were altered to eliminate twisting and bending during lifting.	Not Reported	Back injuries have been cut by 50 percent.	LaBar (1991) (Ex. 26-1078)

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				Lost Workday MSDs	Total MSDs	
16	Office Furniture Manufacturing, Various Jobs	252	Introduction of a plant ergonomics program employing engineering controls, work practice controls, administrative controls, medical management, and education and training.	Restricted workdays decreased from 301/100 employees to 221/100 employees.	Decreased rate of MSDs from 21/100 employees (1989) to 19/100 employees (1991-1992).	Robinson (1993) (Ex. 26-1102)
182	Office Furniture Manufacturing	2522	The focus of this company's ergonomics program has been on fixing jobs so work does not have to result in pain. They target avoiding stretching and reaching stresses by arranging assembly areas so parts are readily accessible. Their medical management program includes having a mini-hospital at the company for immediate medical attention.	The company's Grand Rapids plant has achieved a very low lost-time injury rate of 0.8 per 100 workers because of their focused ergonomics program.	Not Reported	Safety and Health, (November, 1990). (Ex: 502-22)
168	Pulp and Paper Manufacturing	26	This employer chose to focus their ergonomics program on training and the physical aspects of their workplace and work processes.	Three years after being invited to join the Maine 200 Pilot program this mid-sized pulp and paper mill's ergonomics program had cut their lost work-day injury incidence rate by over 50%.	Not Reported	OSHA case files (Ex: 502-22)

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				Lost Workday MSDs	Total MSDs	
18	Pulp and Paper Mill Workers	2621	Conducted training sessions covering CTD issues and hazardous postures at the workplace. Job analysis included interviews of employees. Program included strengthening exercises and fitness initiatives. The following engineering controls were implemented: • reduced the number of wires per bale to reduce weight, • use of padded bolt cutter handles, • provided better lifting devices.	Not Reported	In a six-month follow-up to the interventions, the CTD rate had been diminished to zero and there were no wrist and elbow problems.	"Avenor's fitness a warm-up to ergonomics." CTD News (1996) (Ex. 26-1050)
356	Paper Mill	2621	In 1990, the company established a comprehensive ergonomics program. In particular, they installed mechanical handling and lift equipment; added ergonomic tools, chairs and inspection stations; automated and redesigned production process; and instituted job-sharing and mandatory breaks.	Not Reported	Within three years of starting their ergonomics program, their musculoskeletal disorder injury incidence rate was cut almost in half, going from 9.12 in 1990 to 5.15 in 1993.	(Ex. 502-404)
312	Manufacturing	2670	Most successful elements of their program: * Management participation in identifying and prioritizing issues, * Procedures were developed to identify hazards and make an assessment, * Team of managers, employees, technicians, etc.. who understand MSDs, * Appropriate medical information and treatment made available.	From 1993 thru 1997, they experienced a 70% reduction in ergonomic - related lost time OSHA recordables.	They realized that approximately 50% of all their OSHA recordables were WMSDs. From 1993 thru 1997, they experienced a 50% reduction in ergonomic-related OSHA recordable's.	(Ex. 30-3185)

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133	Personal Hygiene Products	2676	The company implemented a medical management program using a medical management team. The team handled worker training and education, hazard prevention and control and worksite analysis.	Early reporting led to an initial increase of 5% in MSD cases at one plant from 1992-1994. However, early identification, treatment, and control for problem jobs reduced workers' compensation costs by 35%. Average costs per case also fell to $1,400 from $8,000.	Not Reported	"Employers Report Reduced Cost Due to Workers' Compensation Initiatives," *Employee Benefit Plan Review,* (March 1998). (Ex: 502-22)
20	Printing, Glue Machine Operators	27	Installed partial mechanical aid for off loading of cartons.	Not Reported	No injuries reported in 2 yrs since changes.	Shinnick (1985) (Ex. 26-1049)
367	Newspaper	2711	Implemented an ergonomics program that included work site and work process evaluations, workplace redesign and renovation, training, on-site medical management, ergonomic equipment, a computerized tracking system and an in-house telephone hot line.	Over a four-year period (1992-1996), the company's efforts resulted in an 84% drop in the number of MSD workers' compensation cases, a 75% drop in lost-time cases and a 91% decrease in total days lost.	Not Reported	(Ex. 502-404)
120	Newspaper Publishing	2711	Company purchased adjustable workstations for their staff. They trained their employees on how to prevent injuries, encouraged early reporting of injuries and discomfort, and required keyboarders to take mini breaks. They also formed a labor-management task force to recommend changes in workstation design. They appointed a VDT safety coordinator to address concerns they may have about repetitive motion injuries and write an ergonomics column for their monthly in-house newsletter.	Of the 24 carpal tunnel cases in the year before program implementation, 12 involved lost workdays, and workers' compensation costs exceeded $250,000. Three years later there were no lost workdays, and workers' compensation costs were only $6,000.	The year before they started their office ergonomics program, they recorded 24 carpal tunnel cases - five required surgery. Three years later they had 13 cases, none involving surgery.	*Business and Health,* (May 1995). (Ex: 502-22)

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326	Newspaper Industry (Three-establishments)	2711	Program developed over 3 phases. Phase 1, the detection phase consisted of determining the prevalence and extent of work related MSDs. Phase 2, the intervention phase consisted of implementation and evaluation of participatory ergonomics program. Phase 3 the information dissemination phase involved the development of training materials.	Not Reported	The incidence rate of cases on the OSHA 200-log associated with MSDs of the upper extremity, neck, and low back decreased approximately 40% in the first two years of implementation.	Testimony of Rosecrance (Ex: 37-26)
232	Book Assembly	2732	The company installed 33 automatic, air-operated pallet positioners with rotating tops, activated by a simple charge.	Not Reported	After installation of the pallet positions, recorded back injuries dropped from 37 to 12.	Tom Feare, "Better Ergonomics: It's the Law," Modern Materials Handling, (6/1/94). (Ex: 502-22)
233	Commercial Printing and Lithography	2752	The company decided to implement a comprehensive ergonomics program. They started with ergonomics training focusing on how musculoskeletal injuries occur in the workplace, how to identify the risk factors, how to recognize the early signs and symptoms, workplace biochemechanics and the importance of early reporting. They formed employee management teams in their high risk areas and charged them with identifying ergonomic stressors and potential controls.	Four years after this commercial printer had initiated a comprehensive ergonomics program, their lost workdays were reduced by 60 percent and their associated workers' compensation costs by 10 percent.	Not Reported	Correspondence with OSHA. (October 16, 1998). (Ex: 502-22)

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21	Book Binding Operator	278	Introduced industrial load leveler (a spring loaded table) for loading/unloading pockets, binders, stitchers, and off-line mailers.	Lost workdays fell from 413 to 112.	Not Reported	Ferris (1992) (Ex. 26-1051)
132	Petroleum, Chemicals, and Pharmaceuticals	28	The company decided to strengthen their comprehensive ergonomics program and begin compiling separate injury and illness statistics for their ergonomics-related cases. Their program uses ergonomics teams to encourage employee participation. They focus on incremental workplace improvements as well as major process changes. Early reporting of symptoms or pain is an important part of their medical management program. Employee involvement on teams analyzing ergonomically stressful jobs is utilized.	Since 1993 when they began tracking injury and illness statistics for ergonomics-related injuries separately, their ergonomics program has produced significant declines in both ergonomics-related injuries and lost work time.	Not Reported	Safety and Health, (February, 1996). (Ex: 502-22)
252	Chemical Manufacturing	28	Targeted several divisions with the highest rates and conducted ergonomic evaluations for jobs in those divisions. In the acetate fiber division, several solutions were developed to reduce forceful exertions and repetitive motions. Those solutions were successful and enabled the ergonomic program to expand to other areas.	Over 5-year period, reduced the number of MSD-related workers' compensation cases by 58%.	Over 5-year period, reduced the number of OSHA recordable MSD's by 82%.	CTD News, Volume 7, No. 1, 1998. (Ex: 502-22)

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22	Organic Chemical Manufacture, Manual Handling	283	Analysis of injury data, observation of material handling tasks. Installed materials handling equipment, automated container-packaging and inspection equipment. Reduced weight of bags and drums. Worker training program.	Severe back injuries resulting in lost workdays were eliminated (1979-1989).	62% reduction in the incidence of total overexertion back injuries.	Ridyard (1990) (Ex. 26-1052)
368	Pharmaceutical/ medical Plastics Manufacturing	283	Installed an overhead crane system with two bridges and an air-powered balancing hoist suspended from each bridge. The crane now lifts the rolls of web film.	Not Reported	No workers have experienced back injuries on this operation in the two years since the crane has been in use. Lifting injuries still occur, but the numbers are down dramatically and none are attributable to loading rolls of film into the packaging machinery. Productivity has increased and morale has improved.	(Ex. 502-404)

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155	Pharmaceutical Manufacturer	283	In 1993,the company worked with its office furniture vendors to develop a two-week training program to educate 1,000 of its office workers about the safest way to do their jobs. Approximately 30 employees received 8 additional hours of training to become ergonomics coordinators. In addition, nonadjustable steel seats with steel back rests were replaced with cushioned, adjustable chairs, and a conveyor belt was redesigned to automatically feed bags into a heat sealer.	By 1995, two cases of repetitive motion illness resulted in only 34 lost workdays.	Cases of back disorders had dropped by 87%.	Meg Fletcher, "At Baxter, Furniture Helped Sell Workers on Ergonomics," *Business Insurance*, (4/22/96, p. 141); Sarah Wortham, "Let Your Workers Lead the Way," *Safety and Health*, (7/98, p.66); Sally Turner, "Ergonomics Teams: Help Workers Help Themselves," *Safety and Health*, (2/96, p. 54). (Ex: 502-22)
153	Pharmaceutical Preparation	2834	Using information from employee surveys and computer analyses, the company redesigned the work process to reduce lifting from floor level by 80%. The company installed power straddle lifts and power-flex conveyor systems. It replaced metal filter press plates weighing over 60 pounds with plastic frames that weigh15 pounds.	With the change in work processes, by 1994, lost time accidents had decreased from 66 to 4 and workers' compensation losses decreased ten-fold.	Total recordable injuries decreased from 156 to 60.	Company's correspondence to OSHA (November 10, 1994). (Ex: 502-22)

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219	Pharmaceutical Preparations	2834	Created the Ergonomics Task Force in the fall of 1994, consisting of nine members--an ergonomist, engineers, and specialists in logistics and occupational nursing. The Task Force's goal was to establish trained ergonomics teams in each of the firm's 132 U.S. facilities; to conduct training courses for a core group of designers, project engineers and principal engineers; and to address the ergonomic needs of workers using VDTs, plant maintenance workers and employees in the custodial and kitchen staffs. On site, teams analyze jobs, identify hazards, suggest corrective actions, and define ergonomic characteristics of individual jobs to appropriately place workers with medical restrictions. Teams are provided with basic skills for evaluating and setting hazard priorities, and making job site assignments.	Not Reported	Divisions have eliminated cumulative trauma disorders or reduced them by as much as 75%. Savings in the six digits due to productivity improvements, labor savings, and reductions in workers' compensation costs are also commonly reported outcomes.	Ergonomics News, (October, 1995). (Ex: 502-22)

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23	Paint Manufacturing	2851	Top management actively supported safety and health programs and communicated this commitment to all employees. The company considered ergonomics issues when it investigated accidents and redesigned work processes to eliminate hazards. Safety and health programs became an integral part of the engineering and manufacturing departments. The company relied on medical management to identify ailments before they became serious and to pinpoint job tasks with ergonomic risks.	From 1990 to 1993 Akzo Coatings lost work time rate decreased approximately 63%; its workers' compensation costs declined by 50%.	OSHA recordable injury/illness dropped by 40%.	(Ex. 502-22) (Ex. 26-1054)
25	Oil Refinery, Handling Hoses and Valves, Manual Handling	2911	Added platforms that make valve access easier, added extensions to valve stems to eliminate bending to turn valves, installed hoists over work tables to eliminate lifting and bending, purchased adjustable height carts, upgraded lighting, and conducted back injury training.	Not Reported	Injury rates dropped by 90%.	Bone (1993) (Ex. 26-1055)
272	Rubber and Plastics Part Manufacturer	30	Ergonomics training and intervention program introduced. Added material handling equipment, workstation modifications to eliminate postural stresses.	Total lost time at two plants reduced from 4.9 and 9.7/200,000 hours to 0.9 and 2.6 over a four year period.	Not Reported	"Summary of Studies on the Effectiveness of Ergonomic Interventions" (June 1995). (Ex. 38-65)

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352	Hardware Manufacturing	30	The company decided to completely eliminate manual lifting at its worksite. Each worker was provided a lift-table/transporter to lift and move materials.	The company was paying $88,400 in back injury claims. Injury costs have declined to $8,700, about 10 percent of the previous cost. The lifts increased productivity, because they enabled employees to work more quickly and efficiently.	Injuries have been reduced by 90%.	(Ex. 502-404)
362	Tire Manufacturer	3011	Developed an ergonomics program which includes the following elements: a written program, collection and evaluation of illness and injury data; job hazard analyses; engineering and work practice controls; new equipment review; employee training; and medical monitoring.	After implementing an ergonomics program in 1997, this mid-sized manufacturer saw their total lost-time injury rate fall by 40% in 1998. Their lost-time back injury rate and upper-extremity musculoskeletal disorders declined by 66% in the same period, and the work days lost associated with each by 80%.	Not Reported	(Ex. 502-404)
26	Rubber Hose Manufacturing	3052	A new hand tool was designed (an air gun) that is counterbalanced to reduce the amount of weight supported. This tool also has better handles.	No lost time incidents from repetitive trauma since the new tool was introduced.	Not Reported	Oxenburgh (1994) (Ex. 26-1041), Case 7

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147	Plastic Parts Manufacturing	308	In order to address the shoulder, arm and wrist injuries that were occurring due to hammering on molds containing plastic parts, MA purchased new molds that have made part removal easier. They also instituted a rotation policy for those departments with high levels of repetitive motion stresses.	In 1997, by adopting some straightforward ergonomic controls this mid-sized manufacturer reduced their work related lost time injury rate by 40%, compared to 1996 levels. The number of associated lost work-days was also cut from 259 to 61. As of October 1998, the department with the worst ergonomics related injury experience in the previous year had yet to record a single incident.	Not Reported	OSHA case files (Ex: 502-22)
263	Foam Products Manufacturer	3086	In response to the cumulative trauma injuries, the employer instituted an ergonomics program that included management commitment, medical management, training, creation of an ergonomics committee, identification of hazards, job analysis, and implementation of control measures.	Lost workday cases fell from 35 to 1; and cumulative trauma cases decreased from 34 to 6 from 1990 to 1993.	During the four-year period following the initiation of the ergonomics program, covering 1990 to 1993, all recordable injuries dropped from 128 to 18.	Appendix C "Summaries of Studies on Effective Ergonomics Programs and Interventions" (Whaley). (Ex:32-339-1)

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#	Job Title or Activity	SIC Code	Ergonomic Program/Interventions	Reported Reduction in Injury Rates		Sources
				Lost Workday MSDs	Total MSDs	
27	Shoe/luggage Manufacturing, Various Jobs	31	Instituted a comprehensive ergonomics program as part of a total quality management initiative. Program included elements of worker participation, medical management, job analysis and control of exposures to risk factors, and employee education and training. Exposure controls included installation of adjustable workstations; new jig fixtures to hold work pieces at proper angles; partial automation of processes; and use of anti-skid surfaces on tools, fixtures, and handles.	Reduced lost time upper extremity and back disorders by 79%.	Not Reported	Rooney and Morency (1992) (Ex. 26-1056)

Appendix VI-B. Summary of Case Studies of Ergonomic Programs/Interventions

#	Job Title or Activity	SIC Code	Ergonomic Program/Interventions	Reported Reduction in Injury Rates		Sources
				Lost Workday MSDs	Total MSDs	
29	Shoe Manufacturer, Various Jobs	314	Several programs implemented that included exercise and conditioning, stretching, and ergonomics awareness training. Conducted special training on ergonomics for industrial engineers and maintenance workers. Continuous flow manufacturing, including group working, cross training, and job rotation, was instituted. Engineering controls implemented included: • Purchase of new adjustable chairs; • Use of anti-fatigue mats for all employees whose jobs involved prolonged standing; • The cast iron base on heavy equipment was cut off and refitted with an adjustable base; • Electric or pneumatic foot pedals were used instead of non-adjustable mechanical ones; • Prepackaged shoe laces were purchased to eliminate hand-tying repetition; and • Sewing machines were tilted toward the worker to eliminate awkward posture.	Not Reported	Repetitive motion injuries in two problem areas were reduced from 70 percent to between 25 and 30 percent of the total OSHA recordable incidents in three years.	"Red Wing Shoes' early warning system." CTD News (1995) (Ex. 26-1057)

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#	Job Title or Activity	SIC Code	Ergonomic Program/Interventions	Reported Reduction in Injury Rates		Sources
				Lost Workday MSDs	Total MSDs	
30	Shoe Manufacture, Pneumatic Press Operator	314	Workstation design improvements included use of adjustable chairs and footrests, providing armrests, changing angle of the presses, providing parts bins to reduce extreme wrist flexion, and redesigning shoe ornaments so prongs were angled for easier insertion and pressing.	Not Reported	No injuries reported for 2 years since changes were implemented.	Wick (1987) (Ex. 26-1058)
31	Footwear Assembly and Fabrication	3149	Extensive ergonomic training program.	Lost-time injuries dropped 67% in 2 years.	Total number of CTDs dropped by 62% in 2 years.	Holland (1991) (Ex. 26-1059)
323	Luggage Manufacturer	3161	Ergonomics program consisted of: management leadership, employee participation, medical management, training, job-hazard analysis, problem-solving and intervention, cost-benefit analysis, solutions, specific interventions, and program/process evaluation.	A 73% reduction in combined total of lost and restricted work days due to MSDs from 1994 thru 1996. Went from a rate of 5.5 per 100 workers to 1.5 per 100 workers	In four years there was a 87% reduction in incident rates of MSDs reported on the OSHA 200 log from 40 in 1993 to 5 in 1997.	Testimony of Rosecrance (Ex. 37-26)

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#	Job Title or Activity	SIC Code	Ergonomic Program/Interventions	Reported Reduction in Injury Rates		Sources
				Lost Workday MSDs	Total MSDs	
127	Luggage Manufacturer	3161	The company has a total of 2,500 operations. The company prioritized problem jobs based upon lost time and the citation associated with the fine. Samsonite identified 450 jobs to fix. The company began analyzing jobs and working with its medical staff to treat workers earlier and get injured workers back to work more quickly. Many controls proved to be inexpensive fixtures costing less than $45.	Not Reported	When OSHA cited the company, its injury rate for work-related musculoskeletal disorders was about 40 injuries per 100 workers. By 1997, the rate had dropped to 6.5 injuries per 100 workers.	Presentation at the Ergonomics Symposium: Effective Workplace and Best Practices Conference, Chicago (1997), NIOSH proceedings. (Ex: 502-22)
32	Sewing and Cutting Operations	3199	Introduction of ergonomics program, including medical program to detect and treat CTDs early. Workplace modifications included use of adjustable workstations, footrests, and anti-fatigue mats; installing larger handles on hot irons to improve grip; installing proximity switches on presses; adjusting glue stations to prevent awkward upper-extremity postures; and automating some processes.	Not Reported	CTD incidence fell from 14.6% in 1990 to 11% in 1992	Nickasch (1994) (Ex. 26-1060)

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#	Job Title or Activity	SIC Code	Ergonomic Program/Interventions	Reported Reduction in Injury Rates		Sources
				Lost Workday MSDs	Total MSDs	
33	Encapsulating Automotive Glass Windows	3229	Ergonomics program and control measures, including installation of adjustable workstations, job rotation, and anti-fatigue matting; medical management program and an employee training program.	Incidence of lost-work-day injuries declined from 8.6% to 0.2% in 2 years. Rate of lost workdays declined from 1,615/100 workers (1990) to 0.9/100 workers (1992).	Not Reported	OSHA Site Visit Case Study No. 12 (Ex. 26-1182)
34	Packager	3231	Workplace improvements included: Reduced all material handling to less than 50 pounds; Purchased different sizes of gloves, cuffs, and sleeves to reduce additional stress and energy expenditure; Designed a device that allows employees to roll the glass onto the line instead of lifting it; Raised the racks to knuckle height to avoid bending while lifting the windshields; and Altered the racks to allow workers to step into them and load them from back to front in order to eliminate stressful forward reaches.	Not Reported	Injury incidence rate dropped from 14 per 100 workers in 1987 to 3.3 in 1996. Reduced severity and frequency of injuries.	"PPG learned to overcome ergo innocence." CTD News (1996) (Ex. 26-1061)
35	Ceramic Tile Manufacturing, Various Jobs	3253	Implementation of an ergonomics program including engineering controls (workstation redesign), job rotation, changes in work practices, and an ergonomic training program for employees.	Lost-time injury rate for repetitive motion injuries decreased from 1.6 in 1988/1989 to 0 in 1993.	Not Reported	Stuart-Buttle (1994) (Ex. 26-1045)

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#	Job Title or Activity	SIC Code	Ergonomic Program/Interventions	Reported Reduction in Injury Rates		Sources
				Lost Workday MSDs	Total MSDs	
241	Ceramic Fixture Manufacturing	326	This company has implemented the following controls: The work heights of some processes have been redesigned to reduce stresses associated with vertical lifts. Mechanical lift assists have been added to the casting department and training on safe lifting techniques has been provided by their workers' compensation insurance carrier.	This small manufacturer has reduced the number of lost/restricted work-days associated with ergonomics related injuries in their workplace by 60% for 1997/1998 (combined).	Not Reported	OSHA case files (Ex: 502-22)
36	Fiber-cement Board Manufacture, Manual Handling	3272	Installed on-loader at front of conveyor to permit workers to load boards at their own pace. Automate process for separating boards and transferring them to the on-loader. Automate stacking of final product.	Eliminated lost-time MSDs in 2 years after improvements were made.	Not Reported	Oxenburgh (1994) (Ex. 26-1041), Case 11
37	Metal Castings, Unpacking Operation	33	Frequent, excessive reach was required to unpack 15- to 18-pound castings from crates. Crates were modified by adding drop gates at each end of the crates and installing a scissors lift to lift crates. In addition, changes were made in the way the castings were stacked in the crates to permit the workers' arms to remain close to the body while unpacking.	Not Reported	Eliminated back injuries associated with this operation.	Oxenburgh (1994) (Ex. 26-1041), Case 34
38	Palletizing Operation	33	Scissors lift tables with turntable tops were installed alongside each packing station.	Not Reported	Five out of six back injuries were eliminated.	Benson (1987) (Ex. 26-1062)

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#	Job Title or Activity	SIC Code	Ergonomic Program/Interventions	Reported Reduction in Injury Rates		Sources
				Lost Workday MSDs	Total MSDs	
306	Metal Manufacturer	33	Started by implementing a shor-t term ergonomics plan. Implemented a adjustable lift-table and mechanical handling equipment as well as improvements to a punch press.	Over a 2-year period, they had 2 serious back injuries with direct costs of $30,000. New equipment cost $5,000, and since installed there here been no injuries.	Not Reported	(Ex. 500-114)
112	Gray and Ductile Iron Foundry	3321	In 1997, the company performed a survey to identify problem areas. They instituted an ergonomic awareness program and conducted safe back training. The company also purchased anti-vibration gloves.	The severity rate of injuries, as reflected in the associated lost work-day experience, was also dramatically reduced.	From 1996 to 1998 this employer cut their overall work related injury and illness incidence rate by 60% and their ergonomic related injuries even more.	OSHA case files (Ex: 502-22)
348	Aluminum Smelter	3341	Reduced the exposure time for carbonsetters by half for a number of risk factors such as handling heavy loads, pinching, and awkward postures of the wrist, forearm and shoulder. There was a 1/3 reduction in the duration that workers were exposed to awkward trunk postures.	Not Reported	They achieved a 50% reduction in prevalence of shoulder, elbow, and back disorders for carbonsetters. Hand and wrist disorders were reduced by 1/3.	(Ex. 500-41-3)
39	Aluminum Manufacturer, Materials Handling	3350	Establishment of an ergonomics program, including introduction of lift tables, cranes, and mechanical assists in overhead lifting, rearrangement of work to allow use of cranes in lifting.	Not Reported	Reduced overexertion injuries of the back by 40 to 60%.	Mandelker (1993) (Ex. 26-1063)

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#	Job Title or Activity	SIC Code	Ergonomic Program/Interventions	Reported Reduction in Injury Rates		Sources
				Lost Workday MSDs	Total MSDs	
261	Cable Manufacturer	3357	Ergonomics interventions were initiated in 1975.	A statistically significant decrease in average musculoskeletal sick leave, expressed as a percentage of total production time, dropped from 5.3% in the period of 1967 to 1974 to 3.1% in the years from 1975 to 1982. A statistically significant reduction in labor turnover also occurred in the period 1967 to 1974 compared to 1975 to 1982, attributable to the impact that ergonomic interventions had on improved health and job satisfaction among employees.	Not Reported	Appendix C "Summaries of Studies on Effective Ergonomics Programs and Interventions" (Westgaard. 1985). (Ex:32-339-1)
40	De-burring and Finishing Cast Metal Parts	34	Parts were held still by hand during finishing operations. Work bench was replaced by a potter's wheel to hold the part and rotate it as necessary. Finishing tools were redesigned.	Not Reported	Upper-extremity disorders were eliminated.	Oxenburgh (1994) (Ex. 26-1041), Case 43
41	Welding	34	Manual welding of a 5-meter weld required welder to work in a prolonged static posture. This process was replaced by a semi-automatic powder welding process, permitting welder to work from a standing position.	Not Reported	All knee, neck, and shoulder injuries from this operation have been eliminated.	Oxenburgh (1994) (Ex. 26-1041), Case 33

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#	Job Title or Activity	SIC Code	Ergonomic Program/Interventions	Reported Reduction in Injury Rates		Sources
				Lost Workday MSDs	Total MSDs	
42	Materials Handling, Hardware Manufacture	3411	Use of adjustable lift tables/ transporters completely eliminated manual lifting from the job.	Not Reported	Back injuries reduced by 90%.	"Put ergonomics to practical use." Material Handling Engineering (1988) (Ex. 26-1064)
205	Manufacturing-steel Fabrication	344	The company's approach included conditioning for employees returning to work following an injury, job sharing, and transitional job assignments. With the help of elected team leaders, everyone leaving and returning to work after injury or illness receives support and encouragement. Job modifications included ergonomic redesign to accommodate individuals with limitations.	Workers' compensation costs dropped from $200,000 in 1985 to just $9,000 in 1990. During the same five-year period, sick-day usage fell by half.	Not Reported	*Automation*, Volume 36, Number 4 (Ex: 502-22)
43	Packager	3452	Packaging area was redesigned; raised the level at which boxes are lifted, installed semi-automatic sealing machines and adjustable chairs, and eliminated loading of pallets; training introduced.	Nearly a five-fold decrease in musculoskeletal injuries based on days lost (equivalent to 5% of the department's total wage costs).	Not Reported	Oxenburgh (1994) (Ex. 26-1041), Case 10
44	Manufacturing Automotive Cables	3496	Introduction of ergonomics program utilizing engineering controls, work practice training, and medical management.	Lost workday cases decreased from 48 (1991) to 27 (1993). Number of lost workdays decreased from 1,287 days (1991) to 275 days (1993).	Decreased illnesses from 47 (1991) to 17 (1993)	OSHA Site Visit Case Study No. 11 (Ex. 26-1181)

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#	Job Title or Activity	SIC Code	Ergonomic Program/Interventions	Reported Reduction in Injury Rates		Sources
				Lost Workday MSDs	Total MSDs	
45	Steel Furniture Manufacturing, Various Jobs	3499	Employee involvement in identifying hazards and developing interventions. Engineering approaches included the following: • An enclosed shotblaster machine to automate polishing of the steel. • An automatic washing system. • Lighting placement and brightness improved to reduce the awkward posture required to inspect and brush the products. • Many of the jigs were improved to be adjustable.	Lost days from carpal tunnel syndrome, back strain and other CTDs dropped to zero in 1996, down from 176 lost workdays in 1991.	Not Reported	"Charleston Forge welds homemade approach." CTD News (1996) (Ex. 26-1065) Appendix C "Summaries of Studies on Effective Ergonomics Programs and Interventions" Ex:32-339-1 Success with Ergonomics (Ex. 26-1065)

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#	Job Title or Activity	SIC Code	Ergonomic Program/Interventions	Reported Reduction in Injury Rates		Sources
				Lost Workday MSDs	Total MSDs	
151	Equipment Manufacturing	35	The company decided it was time to hire an experienced health and safety manager who set up a comprehensive program emphasizing ergonomics. Ergonomic hazard assessments were performed of high risk departments. As a result many changes were made. Workers were provided larger knives and more adjustable work stations. Hourly job rotation was initiated. A medical management program was implemented to assure proper job fit for employees as well as to emphasize appropriate medical treatment and prompt return to work.	Workers' compensation insurance costs, which had exceeded $100,000 in 1993, fell to below $4,000 in 1997. In 1997, the company's lost-work day injury incidence rate fell to zero.	Not Reported	Business Insurance, June 22, 1998 (Ex: 502-22)

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#	Job Title or Activity	SIC Code	Ergonomic Program/Interventions	Reported Reduction in Injury Rates		Sources
				Lost Workday MSDs	Total MSDs	
152	Machinery Equipment Manufacturer	35	The company introduced a major back injury prevention training program for employees and implemented many improvements suggested during the training. Minor changes to equipment and work stations reduced physical stress for employees and resulted in improved morale. Adjusting the heights of work tables, chairs and fixtures eliminated excessive employee bending and twisting. Workers developed new tool designs and introduced material handling equipment to reduce other lifting and repetitive motion hazards.	Not Reported	In 1990 the back injuries decreased by 27 percent.	*Welding Journal*, (September 1992). (Ex: 502-22)
171	Turbine Generator Manufacturer	3511	Both of these facilities chose to implement their ergonomics programs as part of comprehensive safety and health programs. Their programs stressed worker involvement. They added power lifting equipment and changed workstation designs to reduce strains to the arms that their employees were experiencing.	By implementing comprehensive safety and health programs strongly emphasizing ergonomic concerns, both of these facilities cut their rate of lost time injuries by more than 70% between 1992 and 1996.	Not Reported	OSHA case files (Ex: 502-22)

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#	Job Title or Activity	SIC Code	Ergonomic Program/Interventions	Reported Reduction in Injury Rates		Sources
				Lost Workday MSDs	Total MSDs	
47	Farm Equipment Manufacture, Assembly and Materials Handling	3523	Initiated an eight-hour engineer ergonomics training program. Appointed ergonomics coordinators in all U.S. and Canadian factories, foundries and distribution centers chosen from the industrial engineering and safety departments. Conducted training through attending professional courses and conferences, memberships in professional organizations, subscriptions to ergonomics publications and tracking the latest ergonomics research. Conducted ergonomic review of new office furniture purchases. Conducted VDT ergonomics awareness training for video display operators. Engineering controls included: • Limiting manual lifting to 40 pounds or less; • Redesigning the assembling operations so that assemblers worked in an upright position; • Altering hand tools for better fit; and • Installing hoists and lift tables.	83 percent reduction of back injuries that resulted in lost time.	Not Reported	"An ergo process that runs like a Deere." CTD News (1995) (Ex. 26-1101)

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#	Job Title or Activity	SIC Code	Ergonomic Program/Interventions	Reported Reduction in Injury Rates		Sources
				Lost Workday MSDs	Total MSDs	
48	Welding, Vehicle Manufacture	3531	Ergonomic training program implemented, seat height adjustments installed, and work station height adjusted.	Not Reported	Back injury rate went down by 27%.	"Caterpilar, Inc." Welding Journal (1992) (Ex. 26-1066)
49	Chain Saw Assembly	3546	Introduction of new tools and modified production methods, and employee training.	Total sick leave rate dropped from 17 to 13.7 days annually, labor turnover dropped from 35 to 10%, assembly errors reduced by 3 to 6%, total production costs reduced by 10%, and productivity not impacted.	Not Reported	Parenmark et al. (1993) (Ex. 26-1067)
245	Electronics	357	This company determined that much of its injury experience was related to repetitive motion stressors and decided to implement a comprehensive ergonomics program. Their program relied heavily on employee involvement in both analyzing their workstations as well as recommending improvements.	The ergonomics program established by This company in early 1990, not only significantly improved their related injury experience but reduced their workers' compensation costs from $2.6 million in 1991 to $224,000 in 1996.	Not Reported	Business Journal, (September, 1997). (Ex: 502-22)

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#	Job Title or Activity	SIC Code	Ergonomic Program/Interventions	Reported Reduction in Injury Rates		Sources
				Lost Workday MSDs	Total MSDs	
124	Computers and Computer Chips	357	A cross-functional team was assembled to benchmark other ergonomic programs both within and outside the semiconductor manufacturing industry. A cross-site team was then assembled to develop a program guideline to provide minimum requirements for the company's site specific ergonomic programs across the country. At each Intel site, local ergonomists have developed written programs that meet these requirements but are tailored to fit their site needs. Implementation is accomplished through the involvement of site safety and ergonomics teams. Standardized training packages have been developed for both office and manufacturing environments and are taught corporate-wide. Internal ergonomic design guidelines have been developed to provide guidance for engineering, facilities and design personnel when designing, installing or evaluating workstations, tools and equipment.	Days away from work for lost workday cases have decreased 72%. Proliferation of the safety culture, which includes the ergonomics program, has resulted in the avoidance of about 20,000 days away from work due to injury during the past four years, and more than $10 million in cost avoidance.	OSHA recordable sprain/strain and cumulative trauma disorder (CTD) rates have decreased an average of 37% for each of the last four years, and are now among the best in the semiconductor industry.	Employee Benefit News, (9/1/99). (Ex: 502-22)
370	Electronic Card Assembly	357	Added new-employee training on lifting postures and changed work practices to require two workers to move a box over 25 pounds. Now every box must have two handles. IBM also redesigned workstations to reduce awkward hand and back movements.	Not Reported	MSDs declined from 32 a year to 17 in 1995. With an average cost of thousands of dollars per MSD case, eliminating 15 per year represents a significant cost saving for IBM.	(Ex. 502-404)

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#	Job Title or Activity	SIC Code	Ergonomic Program/Interventions	Reported Reduction in Injury Rates		Sources
				Lost Workday MSDs	Total MSDs	
52	Computer Mainframe Assembly	3571	Training had been provided in proper lifting techniques, general safety and use of special tools. Extensive office workstation ergonomics training was provided. Engineering controls included: • Providing new workbenches to accommodate workers' shorter reaches; • Adding roller-ball conveyor belts and lifting devices to raise the units onto the conveyor belt; • Replacing pneumatic drivers with lighter electric units which had much less vibration and weighed about one pound; • Installing lift platforms that would raise the cabinets 3 feet off the floor; • Providing seated and standing workstations so one employee could build the entire cabinet instead of working on an assembly line in order to reduce the static fatigue; and • Modifying scissor lifts to rise up to 4 feet off the floor.	There are no lost days due to CTDs in the office workplace.	CTD related injuries were eliminated in production.	"AT&T uses cost-conscious program to fight CTDs." CTD News (1995) (Ex. 26-1069)

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#	Job Title or Activity	SIC Code	Ergonomic Program/Interventions	Reported Reduction in Injury Rates		Sources
				Lost Workday MSDs	Total MSDs	
50	Computer Manufacturer	3571	The company engaged in several training and education initiatives, including: • Mandated ergonomics training classes for high risk groups; • Created and distributed a 16-page ergonomics brochure; and • Created an "ERGO Hotline" to schedule ergonomics evaluations, report problems, and seek information. Exposure control approaches included: • Limiting manual lifting to 40 pounds or less; educating the employees via a brief program on the basic ergonomics fundamentals; • Purchasing new office sit-stand workstations; • Adjusting the workstation surface height to accommodate each worker; and • Attaching a wider, adjustable keyboard and mouse platform to the standard desk.	Not Reported	• 41 percent drop in reportable upper limb disorders from 1994 to 1995 which addressed about 70 percent of the company's upper-limb reportable injuries. • Further 50 percent decrease in reportable CTD cases from 1995 to 1996. • Reportable cases of CTDs decreased to 25 through November of 1996 compared to 70 cases in 1994.	"Silicon Graphics melds high- and low-tech." CTD News (1997) (Ex. 26-1068)

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#	Job Title or Activity	SIC Code	Ergonomic Program/Interventions	Reported Reduction in Injury Rates		Sources
				Lost Workday MSDs	Total MSDs	
123	Computer Manufacturing	3575	An ergonomics program for both the 800 desks and computer-bound office staff and 200 main frame assemblies was introduced. Employees were trained in proper lifting techniques, and special tools like nut drivers were introduced. Pneumatic drivers were replaced by lighter electric units that vibrated less. An awkward conveyor system was replaced by individual scissors-lift platforms. Lifting manipulators were purchased. Office ergonomics training was instituted and ergonomic adjustable office workstations employed. Early reporting to allow improved medical management was encouraged.	Workers' compensation costs, which had been $400,000 in 1990, fell to $8,600 in 1994.	Not Reported	*CTD News* (Ex: 502-22)
53	Copying Machine Control System Assembly	3579	Assembly of the systems was performed on a workbench and required frequent lifting and turning of the part. The bench was replaced by an adjustable stand designed to take the weight of the part being assembled.	Not Reported	MSD rate declined by 50% in the first year. In the second year, the MSD rate declined to one-third.	Oxenburgh (1994) (Ex. 26-1041), Case 37

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#	Job Title or Activity	SIC Code	Ergonomic Program/Interventions	Reported Reduction in Injury Rates		Sources
				Lost Workday MSDs	Total MSDs	
234	Air-conditioning Equipment Manufacturing	3585	The company decided to implement a focused loss-prevention program with a strong emphasis on workplace ergonomics. They analyzed their records to determine where there important risks were. They trained extensively on their new company safety policies and management, safe work practices, accident and injury reporting and unsafe conditions. Since they found that one of the most frequent and expensive shop floor injuries were those caused by highly repetitive motion, they performed a thorough inspection of every aspect of production including each workstation. This revealed that inadequately designed equipment could cause a multitude of cumulative stress injuries. Extensive workstation redesign followed. They also hired a full-time ergonomics professional and provided training on ergonomics to their employees and management.	Two years after starting a focused loss prevention/ergonomics program, this company had reduced their lost workdays by 40 percent and their workers' compensation costs by 43 percent.	Not Reported	Best' Review/Property-Casualty Insurance Edition, (June 1, 1996, p. 70). (Ex: 502-22)

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#	Job Title or Activity	SIC Code	Ergonomic Program/Interventions	Reported Reduction in Injury Rates		Sources
				Lost Workday MSDs	Total MSDs	
361	Air Compressor Manufacturer	3585	Established teams to address potential ergonomic concerns. Concerns are investigated. Unassisted lifting was limited to a maximum of 20 pounds.	In the 18 months following program inception in June of 1995, lost days by 85%, restricted cases by 50% and first-aid cases by 45%. Union safety grievances which had averaged one every three weeks were completely eliminated.	In the 18 months following program inception in June of 1995, ergonomic-related injuries were reduced by 90%.	(Ex. 502-404)
55	Electronics Manufacture	36	Controls: workstation redesign and job rotation.	Not Reported	CTDs reduced by 46% in one year.	Robinson (1993) (Ex. 26-1102)
157	Electronic Mfg.	36	The ergonomics committee searched for a chair that not only provided comfort but reduced the repetitive motion injuries occurring in manufacturing assembly operations. They purchased seating that provided chair height adjustments, swivel, padding, and waterfall seat design to improve leg circulation.	Not Reported	Recordable injuries declined 28% in the year following purchase of the new chairs.	*Assembly,* (7/1/95). (Ex: 502-22)
54	Hand Tool Operation, Tele-communications Manufacturing	36	Safety and health committee implemented program that included creation of task force, worker training, improvements in workstation design and tooling, and medical management of workers on restricted duty.	Not Reported	Plant-wide incidence of repetitive trauma disorders was 2.2 cases per 200,000 work hours, reduced to 0.53 cases per 200,000 work hours in 1 year after program implementation.	McKenzie et al. (1985) (Ex. 26-1070)

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#	Job Title or Activity	SIC Code	Ergonomic Program/Interventions	Reported Reduction in Injury Rates		Sources
				Lost Workday MSDs	Total MSDs	
56	Electrical Equipment Manufacture, Press Operator	36	Automated handling and grinding of resistance elements. Eliminated possibility for hazardous exposures.	Not Reported	Eliminated MSDs	Oxenburgh (1994) (Ex. 26-1041), Case 16
57	Press Operator, Small Electronic Parts Manufacture	36	Press operation caused excessive wrist flexion and palm compression. The press was modified by adding switches that either eliminated hand contact or only involved contact with parts of the hand that do not have nerves close to the skin surface.	Not Reported	29% reduction in musculoskeletal injury incidence.	Oxenburgh (1994) (Ex. 26-1041), Case 42
183	Electronics Design	36	The decision was made to initiate an office ergonomics program. Ergonomically designed chairs were provided to their staff and ergonomic evaluations performed on every workstation of those workers with symptoms. Back cushions, lumbar supports, keyboard/mouse rests and document holders were provided. Frequent short exercise breaks were encouraged. Proper vision correction was investigated. A new-hire office ergonomics training program was brought on line. And regular training in correct posture, exercises, workstation adjustment and back safety is provided.	Not Reported	In 1991, 43% of the company's 250 home office workforce were complaining of pain in their shoulders, back, elbows and fingers. In the past two years they have not had any CTD related complaints. They estimate they are saving 20,000 hours per year in time previously lost to pain, doctors visits and time off. They consider ergonomics to be "proven science."	CTD News, January, 1997 (Ex: 502-22)

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#	Job Title or Activity	SIC Code	Ergonomic Program/Interventions	Reported Reduction in Injury Rates		Sources
				Lost Workday MSDs	Total MSDs	
58	Lamp Manufacturing, Materials Handling	3641	Added a vacuum hoist, reduced equipment height, reduced box size and weight, and introduced a back awareness program for employees.	Not Reported	Eliminated back and upper extremity disorders in the last four years.	Carreau and Bessett (1991) (Ex. 26-1071)
289	Telecommunication Equipment Manufacturer	366	Workstations were redesigned to reduce postural stress on workers.	Time loss was reduced over 40% and employee turnover reduced by 75%. A cost benefit analysis showed a return of 9 to 1.	Not Reported	Testimony of Bradley Evanoff, MD, MPH. (Ex. 37-1)
61	Telecommunications Equipment Assembly	3661	Workstation redesign (adjustable tables, illumination), ergonomically designed chairs, and tool redesign.	Musculoskeletal injury sick leave in 1978=5.0, in 1982=2.9.	Not Reported	Westgaard and Aaras (1984) (Ex. 26-1026)
60	Telecommunications Equipment Assembly	3661	Introduced a training program, job hazard analysis, and an engineering program to abate ergonomic hazards. Medical management of injured employees on restricted jobs.	Not Reported	Rate of repetitive trauma disorders dropped from 1.1 per 100,000 hours to 0.26 per 100,000 hours in 1 year.	Pope (1987) (Ex. 26-1073)
59	Telephone Systems Assembly	3661	Implemented an ergonomics program for the assembly line. Elements included an employee awareness program, disorder treatment protocols, job task analyses, job redesign, and cost savings analysis.	Lost-time repetitive strain injuries dropped from 20 to 4 over 1.5 years.	Not Reported	Darcangelo (1989) (Ex. 26-1072)

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#	Job Title or Activity	SIC Code	Ergonomic Program/Interventions	Reported Reduction in Injury Rates		Sources
				Lost Workday MSDs	Total MSDs	
118	Electronics Manufacturing	367	Developed a comprehensive ergonomics strategy. Each business unit has a safety committee. The committee conducts hazard assessments by reviewing employee repetitive stress injuries from the past 5 years. The committee then determines which departments have the highest injuries and risks, and are in need of corrective action. Corrective action consists of an initial one hour training session discussing injury types, risk factors, and means of prevention. The training session is followed by the "intervention" process, which identifies alternative means of performing the tasks with the highest injuries. A second method of intervention involves developing an ergonomics specialist team. The team receives additional training including anatomy and pathophysiology. The most frequent interventions/changes have involved keyboard and mouse placement, forearm support and chair use. Exercise may also play a role.	Not Reported	Although increased awareness initially contributed to a rise in reports of repetitive stress injuries, the company's ergonomics program eventually resulted in a significant reduction in the severity of injuries, from the 90th percentile to the 50th percentile.	Richard Cohen, "Ergonomics Program Development: Prevention in the Workplace," *American Industrial Hygiene Association Journal*, 2/97, p. 145. (Ex: 502-22)

Appendix VI-B. Summary of Case Studies of Ergonomic Programs/Interventions

#	Job Title or Activity	SIC Code	Ergonomic Program/Interventions	Reported Reduction in Injury Rates		Sources
				Lost Workday MSDs	Total MSDs	
62	Electronics Assembly	367	Job rotation, new assembly line procedures, and ergonomic line balancing.	Not Reported	No new cases of cumulative trauma were reported.	Townes and Imrhan (1991) (Ex. 26-1074)
378	Electronic Circuit Board Assembly Workers	367	Suspended arm support to reduce neck and shoulder muscle static loading.	Not Reported	31 subjects pre-3 months post-shoulder symptoms decreased from 62% to 45%, for neck decreased from 57% to 55%.	(Ex. 26-630)
257	Electronics Manufacturer	367	Implemented an ergonomics program which includes an ergonomics team that determined the objectives; chose hazard-reduction methods and oversaw implementation of the program; reviewed all injuries for those that may be repetitive-strain injuries; inspected the work site to assess job tasks for ergonomic risk factors; completed a worker survey to identify hazards and symptoms that may be related to MSDs and, following collection of this information, prioritized tasks for initiating hazard-control measures. Extensive training was also provided.	While the number of total recordable repetitive strain injuries increased over a 10 year period from 1985 to 1995 (probably due to increased awareness by employees of the work-relatedness of upper extremity pain and encouragement to report injuries), the percentage of repetitive strain injuries with lost workdays dropped from 80-90% to approximately 50%, indicating a reduction in severity of the injury .	Not Reported	Appendix C "Summaries of Studies on Effective Ergonomics Programs and Interventions" (Cohen, 1997). (Ex:32-339-1)

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#	Job Title or Activity	SIC Code	Ergonomic Program/Interventions	Reported Reduction in Injury Rates		Sources
				Lost Workday MSDs	Total MSDs	
199	Electronic Card Assembly	3672	The company expanded its safety program to include ergonomics. It added new employee training on lifting postures and changed work practices to require two workers to move a box over 25 pounds. Now every box must have two handles. The company also redesigned workstations to reduce awkward hand and back movements.	Not Reported	MSDs declined from 32 a year to 17 in 1995. With an average cost of thousands of dollars per MSD case, eliminating 15 per year represents a significant cost saving for IBM.	IBM Spells Safety; I-S-O," *Occupational Hazards*, December (1995). (Ex: 502-22)
63	Electronics Manufacturing, Various Jobs	3674	Redesigned workstations; introduced powered-screwdrivers; job rotation.	Not Reported	Reduced injuries (not quantified).	Burri and Helander (undated) (Ex. 26-1075)

Appendix VI-B. Summary of Case Studies of Ergonomic Programs/Interventions

#	Job Title or Activity	SIC Code	Ergonomic Program/Interventions	Reported Reduction in Injury Rates		Sources
				Lost Workday MSDs	Total MSDs	
213	Electronic Connectors Manufacturing	3678	This facility developed a team of 12 employees from different departments to identify and prioritize problem jobs. The team videotaped the re-reeling jobs and collected information from employees to develop and implement controls. Changes included adding a mechanical arm to maintain the reeling tension; adopting a smaller, lighter reel with slots cut into it for easier handling (or loading older reels only half-way); developing a prototype paper cutoff device to tear the paper; and providing more comfortable chairs and surrounding flat surfaces to encourage better posture and less reaching. Additionally, the facility rotates workers in this department every two hours so they are not reeling the same product all day.	This facility has reduced workers' compensation costs for MSDs from about $73,000 in 1993 to about $28,000 in 1996. During this same time period, the average cost for each MSD claim declined from $6,601 to $2,512.	The site's rate for injuries and illnesses dropped from 12.8 per 100 employees in 1993 to 7.1 in 1996.	Private Sector Ergonomics Programs Yield Positive Results, General Accounting Office, (August 1997), GAO/HEHS-97-163. (Ex: 502-22)

Appendix VI-B. Summary of Case Studies of Ergonomic Programs/Interventions

#	Job Title or Activity	SIC Code	Ergonomic Program/Interventions	Reported Reduction in Injury Rates		Sources
				Lost Workday MSDs	Total MSDs	
66	Motor Vehicle Assembly, Various Jobs	371	Introduction of an ergonomics program, including engineering controls, work practice controls, job rotation/job enlargement, medical management, education, and training. Controls implemented included counterbalanced tools, lift tables, and workstation redesign to prevent awkward postures and excessive reaches.	Lost-time workday rate decreased 65%, and the lost-time case rate decreased 48%.	Over a 3 year period, the injury and illness rate decreased 11% and the severity rate decreased 39%.	OSHA Site Visit Case Study No. 10 (Ex. 26-1180)
65	Unpacking Auto Parts	371	A plywood sheet end board had to be removed to unpack crates, requiring excessive force and awkward postures. Plywood sheets were modified to reduce their weight and permit them to slide more easily in the grooves.	Not Reported	Back and shoulder injuries associated with this operation were eliminated.	Oxenburgh (1994) (Ex. 26-1041), Case 38
64	Vehicle Seat Assembly	371	Ergonomics training was provided. Engineering controls included: • Redesigning seat covers to decrease the number of fasteners by more than 50 percent; • Providing a compression tool to clamp the foam padding to the seat; • Installing adjustable workstations; • Providing electric torque guns. In addition, a program of job rotation was introduced.	Not Reported	Tendinitis cases fell by 93% and carpal tunnel cases fell by 96% in the year following program implementation.	"Problem-solving by committee at General Seating." CTD News (1995) (Ex. 26-1076) (Ex. 32-339-1)

Appendix VI-B. Summary of Case Studies of Ergonomic Programs/Interventions

#	Job Title or Activity	SIC Code	Ergonomic Program/Interventions	Reported Reduction in Injury Rates		Sources
				Lost Workday MSDs	Total MSDs	
318	Automotive Manufacturing	3711	Identified jobs with high-risk factors through medical records, plant surveys and employee complaints. Management and union safety people were trained, employee training developed, ergonomic committees were developed and an ergonomic analysts was put in each plant.	Not Reported	They had a high of 430 CTDs in 1990 which was reduced to 120 CTDs in 1999. A reduction of 72%.	Testimony of William Martin. UAW (TR: 7863-7867)
337	Automotive Assembly	3711	Ergonomics committee came up with a new design for installing a part. New equipment built to raise worker into position instead of worker bending over.	Not Reported	No injuries since the new equipment installed. By 2000, incident rates, were reduced by 50%.	(Ex. 500-12-1)

Appendix VI-B. Summary of Case Studies of Ergonomic Programs/Interventions

#	Job Title or Activity	SIC Code	Ergonomic Program/Interventions	Reported Reduction in Injury Rates		Sources
				Lost Workday MSDs	Total MSDs	
156	Automobile Manufacture	3711	Associates attend a two-hour ergonomics training where they learn how to solve ergonomics problems in their groups. The course explains what causes CTD injuries and what you can do to prevent them. Additionally, in the company's group program, employees nominate a representative who compiles the results of questionnaires about employee comfort and meets with the branch manager, staff engineer, union and safety representatives to discuss ergonomic concerns. This program is activated every time there is an increase in ergonomic concerns.	Not Reported	The first year after training, the company realized a 20% drop in CTDs, followed by an additional 25% drop during the next year.	Kathryn Tyler, "Sit Up Straight," *HR Magazine,* (9/1/98). (Ex: 502-22)

Appendix VI-B. Summary of Case Studies of Ergonomic Programs/Interventions

#	Job Title or Activity	SIC Code	Ergonomic Program/Interventions	Reported Reduction in Injury Rates		Sources
				Lost Workday MSDs	Total MSDs	
178	Auto Manufacturing	3711	The company designed a plant with assembly lines that would tilt so that employees could work underneath cars without having to bend. It installed an overhead conveyor line designed to move at different heights along the assembly line to provide better access to the part of the car being worked on. In addition, the company instituted a comprehensive ergonomics and medical management program at the plant. Supervisors and employees received training in ergonomics. The company also took the lessons learned from production back to the design groups to incorporate into new models.	Overall, workers' compensation costs have declined and production levels have increased.	Even though ergonomics was considered in the initial design, the process of continuous improvement led to a 40% reduction in work-related musculoskeletal disorders in the trim department.	Ergonomics: The Mazda Way," *Occupational Hazards*, (April 1990). (Ex: 502-22)
154	Auto Assembly	3711	The company designed a special manipulator arm that was suspended from an overhead crane track to install the heavy instrument panels. This design eliminated many of the manual handling activities, repetitive motions and awkward postures. It also improved product quality and increased productivity.	Over a three-year period during which one million instrument panels were installed, the company had no workers' compensation claims reported. Installation of the panels can now be performed by two employees compared with five to six employees using the old method.	Not Reported	*Modern Materials Handling*, (December 1997). (Ex: 502-22)