Ergonomics is a design-based discipline concerned with fitting tasks and environments to workers. In the office, recent emphasis has centered on improving the computer interface. When a proper fit is achieved, workers tend to report reduced discomfort, improved task efficiency, and fewer work related musculoskeletal disorders. Successful office ergonomics interventions typically involve augmenting personal control of work components and training on equipment, healthy working postures, and technique.

The following summarizes salient research findings in the field of office ergonomics. Justification is provided for the implementation of ergonomic work tools, and an ergonomics training program. Journal citations are listed for all research findings.

**Benefits of ergonomics interventions and employee level training**


This study reports the effects of an ergonomic intervention in an office environment. Three hundreds and fifty-six office workers received a negative-slope keyboard with upper mouse tray, an ergonomic chair, and ergonomics training. Before-and-after surveys were conducted to test the effectiveness of the intervention. Results show that the ergonomic intervention reduced the prevalence of musculoskeletal symptoms by an average of 40%.


TELUS, British Columbia, Canada established an ergonomics “Train the Trainer” program and found the following:

- 76% reduction in incidence of upper extremity MSD’s
- Decreased lost workdays from 540 before training to 240 and 330 in the two years following the training
- Reduction of $97,266 in workers compensation claims
- Total cost savings were calculated as follows:
  - Savings in workers compensation claim costs + Savings in days lost – training cost = $163,131

Eastman Chemical Company established an ergonomics program in 1992, which consisted of the following:

- A mandatory one-hour office ergonomics training course for all new hire office/support personnel
- An optional course on office ergonomics for any existing employees who work on computer workstations
- Workstation evaluations available for all employees
- An ergonomic intranet website that provided general ergonomic information as well as detailed guidelines for computer workstations, and a catalogue of frequently purchased ergonomic products
- A loaner program for ergonomic products so an employee could try out a product before ordering

Results:

- 82 percent reduction in cumulative trauma-related OSHA Recordables
- 84 percent reduction in cumulative trauma-related workers’ compensation costs

Musculoskeletal benefit of an articulating keyboard support


- Positioned hands in a neutral posture 62% of the time compared with 42% for the traditional KB position
- Predicted carpal tunnel pressure remained below the critical threshold 82% of the time compared with 48% for traditional KB position
- Significant improvements in upper body comfort found for shoulders, upper arms, neck and back
- 91% of those using the tray said it helped their work performance and preferred it to their previous system


- Established a direct correlation between wrist extension angle, intracarpal tunnel pressure, and wrist extensor muscle activity risk factors
- 30 degrees of wrist extension correlates to a 27.5% increase in forearm muscle activity and greater than a two-fold increase in intracarpal tunnel pressure
- Findings validate the use of an articulating, negatively sloping keyboard support for reducing carpal tunnel syndrome

This study was conducted on 15 subjects aged 20-28 years. Twenty-three upper extremity muscle groups were assessed bilaterally using a dynamometer to determine changes in strength at baseline, 10 min., and 60 min. intervals of computer keyboarding in standard and tiltdown posture. A trend indicating a reduction in proportionate fatigue of the extrinsic finger flexors and extensors, wrist extensors and radial deviators, forearm pronators and supinators, elbow flexors and extensors, and shoulder abductor and deviators in tiltdown posture was observed. Subjective discomfort was reported by 53% of those tested to be greater in standard position. Only 17% of the sample reported minimal discomfort following computer keyboard activity in tiltdown position. The tiltdown keyboard position was preferred by 87% of the participants. One subject preferred the standard keyboard position and one subject had no preference.

**Cost benefits of ergonomic program implementation**

*GAO/HEHS-97-163 ‘Private Sector Ergonomics Programs Yield Positive Results’*

**American Express Financial Advisors**
- Workers Compensation claims dropped 80% from $484,000 in year 1 to $98,000 in year 5
- $420,000 reduction in first year alone

**Merrill Lynch**
- 70% decrease in MSDs
- savings of $1.5 million

*Marsh Report: Best practices in ergonomics*

Summary of case study findings:
- Navistar, Chicago, IL – reduced workers’ compensation costs for MSDs by 65% over a 6 year period
- SunTrust Banks, Atlanta Georgia – reduced workers’ compensation costs for MSDs by $2.65 million over three years
- New York Times, New York, NY – reduced the number of cases by 84% over a four year period; reduced number of lost workdays related to MSDs by 91%


**AT&T Global, San Diego**
- Conducted extensive worksite analysis to identify ergonomic deficiencies and made workstation improvements
- Decline in lost workdays from 298 before implementation to 0 in both 1993 and 1994
- Claims dropped 75% from $400,000 to $94,000 in first year
- Savings of $1.48 million
**Selected Bibliography**

The following is a list of relevant research studies specific to key components of an ergonomic workstation.

**1.0 Keyboard Research**


**2.0 Case Studies**


**3.0 Low Back Pain Research**

4.0 Economics of Ergonomics


5.0 Mouse Research


6.0 Carpal Tunnel Research

7.0 Seating Research


8.0 Sit-Stand Research


9.0 Workstation Design


### 10.0 Postural Studies


### 11.0 VDT/Glare Research

