

## The Importance of Ergonomics in Industrial Engineering

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### Introduction

All around the world, occupational health and safety is a major concern within all economic sectors and particularly within industry. As it can be deduced from the name this discipline focuses on the protection of the safety, health and welfare of people engaged in work. For obvious reasons, the first concern of the discipline has been (and should be) the elimination, if possible, or minimization of work-related deaths, either as a result of occupational accidents or illnesses. Once this goal has been more or less achieved, and never forgetting it, efforts tend to focus on reducing workplace nonfatal injuries and illnesses. This has been the historical evolution of occupational health and safety.

However, for some time there is a new source of concern focusing on work-related damages which, although usually not severely disabling, significantly impair workers' quality of life and productivity. These could be called "ergonomic-related disorders" or better disorders related to a lack of ergonomics.

### Ergonomics

Industrial ergonomics could be defined as the branch of science that aims at achieving an optimal fitting of the work environment and job activities to the worker. The work environment can affect a worker's performance in many different ways varying from health damage to effects that reduce the individual's ability to perform a task or those that cause dissatisfaction and uncooperative attitudes. The scope of ergonomics include physical work load, posture at work, lifting and carrying, machine-human system interaction, but also lighting, thermal comfort and noise. It deals with the assessment of human's capabilities and limitations, work and environmental stress, static and dynamic forces on the human body structure, fatigue, etc.

### Ergonomic-related disorders

As previously stated, the exposure to poor ergonomic conditions does not result in fatal injuries. The development of serious disabling injuries, although possible, is not very frequent either. The most usual outcomes of adverse ergonomic characteristics of work are many different types of not so dramatic disorders, frequently referred to as musculoskeletal disorders. They are the most commonly reported work-related illnesses in the working population [1, 2]. One of the few things that they all have in common is that they cause pain, and because of this they significantly affect the worker's ability to perform a work and thus their productivity. Furthermore, the evidence shows that they have a huge impact on work-related absence and a high proportion of days lost all around the world. In summary, ergonomic-related disorders represent a considerable economic burden to employers, employees and to society as a whole [3-5] and therefore should be a major concern for industrial and production engineers.

### The risk factors

Ergonomic-related disorders are connected to risk factors that include working conditions (postures and movements, repetitiveness, force required, vibration, temperature, etc.) and workplace design (tools and machines, dimensions, distances, etc.), but also individual factors such as age, gender, physical condition, etc. For example, the

aging of the working population and its influence on the development of musculoskeletal disorders is a crucial aspect that should be taken into account in the near future.

Recent published works study the prevalence of musculoskeletal disorders among different occupational groups and sectors, especially office workers and health professionals [6-16], but this type of studies are seldom carried out in industrial sectors [17-19]. Other few works focus on specific risk factors [20-22] but the mechanisms of influence of many factors are still not well known.

### Concluding Remarks

The existence of adequate ergonomic conditions is essential to guarantee an optimal performance of work and to preserve the most important asset of an enterprise: the human capital. The best way to achieve this is to implement ergonomic principles from design (of machines, production processes, management systems...), and there the industrial engineer acquires greater prominence.

On the other hand, there is a strong need for research in ergonomics, as the continuous changes in technology and production systems introduce new risk factors with still unknown effects on this type of disorders.

Taking all this into account, ergonomics should be included in the training of all industrial engineers, as ergonomic principles should accompany them along their whole professional life.

### References

1. Schneider E, Irastorza X (2010) OSH in figures: Work-related musculoskeletal disorders in the EU — Facts and figures. European Agency for Safety and Health at Work, Luxembourg: Publications Office of the European Union.
2. Niu S (2010) Ergonomics and occupational safety and health: an ILO perspective. *Appl Ergon* 41: 744-753.
3. Buckle PW, Devereux JJ (2002) The nature of work-related neck and upper limb musculoskeletal disorders. *Appl Ergon* 33: 207-217.
4. Hanson MA, Burton K, Kendall NAS, Lancaster RJ, Pilkington A (2006) The Costs and Benefits of Active Case Management and Rehabilitation for Musculoskeletal Disorders (RR 493), Health and Safety Executive Research Report, HSE, Sudbury.
5. Dunning KK, Davis KG, Cook C, Kotowski SE, Hamrick C (2010) Costs by industry and diagnosis among musculoskeletal claims in a state workers compensation system: 1999-2004. *Am J Ind Med* 53: 276-284.
6. Scuffham AM, Legg SJ, Firth EC, Stevenson MA (2010) Prevalence and

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- risk factors associated with musculoskeletal discomfort in New Zealand veterinarians. *Appl Ergon* 41: 444-453.
7. Jensen C, Finsen L, Sogaard K, Christensen H (2002) Musculoskeletal symptoms and duration of computer and mouse use. *Int J Ind Ergonom* 30: 265-275.
  8. Robertson M, Amick III BC, Derango KRT, Bazzani L (2009) The effects of an office ergonomics training and chair intervention on worker knowledge, behavior and musculoskeletal risk. *Appl Ergon* 40: 124-135.
  9. Choobineh A, Motamedzade M, Kazemi MMA, Pahlaviane AH (2011) The impact of ergonomics intervention on psychosocial factors and musculoskeletal symptoms among office workers. *Int J IndErgonom* 41: 671-676.
  10. Luttmann A, Schmidt KH, Jäger M (2010) Working conditions, muscular activity and complaints of office workers. *Int J Ind Ergonom* 40: 549-559.
  11. Cavanagh J, Brake M, Kearns D, Hong P (2012) Work environment discomfort and injury: an ergonomic survey study of the American Society of Pediatric Otolaryngology members. *Am J Otolaryng* 33: 441-446.
  12. Daraiseh NM, Cronin SN, Davis LS, Shell RL, Karwowski W, et al. (2010) Low back symptoms among hospital nurses, associations to individual factors and pain in multiple body regions. *Int J Ind Ergonom* 40: 19-24.
  13. Jaworek M, Marek T, Karwowski WC, Waldemar K, Chris A et al. (2010) Burnout syndrome as a mediator for the effect of work-related factors on musculoskeletal complaints among hospital nurses. *Int J IndErgonom* 40: 368-375.
  14. Long MH, Johnston V, Bogossian F (2012) Work-related upper quadrant musculoskeletal disorders in midwives, nurses and physicians: A systematic review of risk factors and functional consequences. *Appl Ergon* 43: 455-467.
  15. Callison MC, Nussbaum MA (2012) Identification of physically demanding patient-handling tasks in an acute care hospital. *Int J Ind Ergonom* 42: 261-267.
  16. Lin TH, Liu YC, Hsieh TY, Hsiao FY, Lai YC et al. (2012) Prevalence of and risk factors for musculoskeletal complaints among Taiwanese dentists. *J Dent Sci* 7: 65-71.
  17. Ferguson SA, Marras WS, Allread WG, Knapik GG, Splittstoesser RE et al. (2012) Musculoskeletal disorder risk during automotive assembly: current vs. seated. *Appl Ergon* 43: 671-678.
  18. Yu W, Yu IT, Li Z, Wang X, Sun T et al. (2012) Work-related injuries and musculoskeletal disorders among factory workers in a major city of China. *Accident Anal Prev* 48: 457-463.
  19. Mortimer C, McCauley-Bush P, Crumpton-Young L, Kordestani R (2012) An Ergonomic Case Study of Scale-Pits in Transportation. *Ind Eng Manage* 1:104.
  20. Widanarko B, Legg S, Stevenson M, Jason D, Amanda E et al. (2011) Prevalence of musculoskeletal symptoms in relation to gender, age, and occupational/industrial group. *Int J Ind Ergonom* 41: 561-572.
  21. Eatough EM, Way JD, Chang CH (2012) Understanding the link between psychosocial work stressors and work-related musculoskeletal complaints. *Appl Ergon* 43: 554-563.
  22. Mariscal Saldaria MA, Garcia Herrero S, Garcia Rodriguez J, Ritzel D (2012) The Impact of Occupational Hazard Information on Employee Health and Safety: An Analysis by Professional Sectors in Spain. *Int Electron J Health Educ* 15: 83-98.