

A New Approach – Holistic Ergonomics

The Origins and Definition of Ergonomics

Ergonomics is a term that is frequently used, but has many meanings. We know it plays a fundamental role in the health and performance of people.

The foundations of the science of ergonomics emerged as part of the culture of ancient Greece. Evidence indicates that Hellenic civilization in the 5th century used ergonomic principles in the design of their tools, jobs, and workplaces. One example of this can be found in the description Hippocrates gave of how a surgeon's workplace should be designed (Marmaras, 1999). In modern times, the practice of ergonomics became formalized with the advent of World War II and the need to design military equipment to fit soldiers' needs. Today, ergonomics is a multi-disciplinary science; the practice of which is based on either an engineering, or a psychological approach (the latter also known as "cognitive" ergonomics).

Engineering ergonomics focuses on the fit between a person's body size and physical capabilities (if you want to impress your friends this is known as "anthropometrics") and design of job task and workspace (Brookhuis, et. al, 2005). Using this information, an engineering ergonomist can provide recommendations on how to set up a work space. While this approach plays a significant role in determining design and furnishings in the office, it is limited by its exclusive focus on the physical mechanics of work. It does not consider issues related to the flow of work, decision-making, thought processes, and how they relate to performance.

Cognitive ergonomics concentrates on the analysis of thought processes: mental work load, decision making and planning that are required of knowledge workers (Marmaras and Kontogiannis, 2001). Most cognitive ergonomists create training programs to improve job performance or help to design software interfaces, but some of them apply their skills to improve the fit between thought processes and workspace design. This approach is limited because it does not consider the physical requirements of people in the workplace. In addition, it does not address broader contextual issues such



as workspace layout, organizational and technology design, workplace culture, or the social aspects of work.

Holistic Ergonomics

At Knoll we take an approach called **holistic ergonomics** that integrates the engineering and psychology worlds – plus a broader perspective on how work and ideas flow within organizations, and the impact of culture on organizational effectiveness (see illustration below; O'Neill and Wymer, 2009). Thus, holistic ergonomics is all about creating products and workspaces that support both **how people think and move**.

Benefits of Holistic Ergonomics

The successful design of furniture products and workspaces requires consideration of all aspects of the work environment — organization, technology, business process and culture (Hendrick and Kleiner, 2001). Products should be designed to support not only the basic anthropometric and physical requirements of people and reduce their risk of injuries, but also address the intangible aspects of knowledge work related to increased human performance, such as support for idea and work flow between individual and group modes, workplace culture, and social interaction.



References

- Brookhuis, K., Hedge, A., Hendrick, H., Salas, E., and Stanton, N. (2005). *Handbook of Human Factors and Ergonomics Models*. Florida: CRC Press.
- Marmaras, N. P. (1999). Ergonomic Design in Ancient Greece. *Applied Ergonomics*, 361-368.
- Marmaras, N. and Kontogiannis, T. (2001). Cognitive Tasks. In: G. Salvendy (eds), *Handbook of Industrial Engineering* (pp. 1013-1040). 3rd Edition, New York: Wiley Press.
- Hendrick, H. and Kleiner, B. (2001). Macroergonomics: An introduction to work system design, *HFES Issues in Human Factors and Ergonomics Book Series*, Volume 2, HFES, Santa Monica, CA.
- O'Neill, M. and Wymer, T. (2009). Design for Integrated Work. *Knoll White Paper*, Knoll, Inc.

Knoll researches links between workspace design and human behavior, health and performance, and the quality of the user experience. We share and apply what we learn to inform product development and help our customers shape their work environments.

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