

Ergonomics Evaluation: An Origin and Overview

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ABSTRACT

Ergonomics is the study of human abilities and characteristics which affect the design of equipment, systems, and jobs. The terms ergonomics and human factors can be used interchangeably. "Ergonomics (or human factors) is the scientific discipline concerned with the understanding of the interactions among human and other elements of a system, and the profession that applies theory, principles, data and methods to design in order to optimize human well-being and overall system performance." "Origin - The name ergonomics officially proposed at a 1949 meeting of the British Admiralty (July 12), by Prof. Hugh Murrell. The name 'Ergonomics' officially accepted in 1950. The name Ergonomics was derived from the Greek words: Ergon - work; Nomos - natural law. First use of the word actually can be traced to a series of four articles written by Prof. Wojciech Jastrzebowski in Poland in 1857. Britain - The Ergonomic Society was formed in 1952 with people from psychology, biology, physiology, and design. United States - The Human Factors Society was formed in 1957. In the US "human factors engineering" was emphasized by the US military with concentration on human engineering and engineering psychology. US efforts also focused on the "role" of an individual within a complex system.

Keywords: Ergonomics, History, Development,

INTRODUCTION

Ergonomics is the study of aligning the needs of a job with the ability of the worker and work environment to provide the most efficient workspace possible while simultaneously reducing the risk of injury. Historically the primary goal of ergonomics has been reducing the rate of work-related musculoskeletal disorders (WMSDs), but it also includes the efficiency, quality, quantity, and comfort of the labor being produced with aims for maximizing these components while minimizing worker injury, turnover, and fatigue/overexertion.

Successful application of ergonomics can reduce the chance of illness and injuries, improve worker productivity, and increase satisfaction in the workplace. Conversely, it can often lead to increased work-related musculoskeletal disorders (WMSDs) if applied incorrectly. WMSDs are disorders of the musculoskeletal system due to work environments and/or when a pre-existing musculoskeletal disorder worsens due to work conditions or risk factors inherent in the workplace. Examples of workplace risk factors include jobs requiring repetitious, forceful, or persistent use of the upper extremity, frequent lifting, pushing, pulling heavy objects, or maintaining prolonged uncomfortable postures for an extended period. Ergonomics is defined as "fitting the job to the people" The main aim of the ergonomics is to adapt the work to the person and vice versa. According to International Labour Organisation, Occupational Safety

and Health (OSH) has been defined as “the science of anticipation, recognition, evaluation and control of hazards arising in or workplace that could impair the health and wellbeing of the workers”. It is the basic right of the employees to work in a safety environment. The main ironic issue is that all these work-related musculoskeletal disorders can be easily averted by simple ergonomic interventions. Practice of Ergonomics can improve the work efficiency and thus the health of the work is not compromised. Studies have shown that by providing primary care regular medical screening and health education on practising Ergonomics can avert majority of the musculoskeletal problems experienced by the Software Engineers.

OBJECTIVE

To discuss the historical aspects of ergonomics for the development of the ergonomics.

S.NO.	YEAR	AUTHOR	SUMMARY
1.	<u>400BC</u>	Hippocrates (460 BC to 375 BC) The famous philosopher	Documented his ideas on the ‘flow’ of the workplace. In particular, he talked about how a surgeon’s room should be laid out and how the tools should be arranged.
2.	<u>1713</u>	Bernardino ramazinni	Supplement to his 1700 publications of his book “disease of workers
3.	18 th century		Industrial revolution
4.	1857	Prof. Wojciech Jastrzebowski	First use of the word ERGONOMIC actually can be traced to a series of four articles written in Poland
5.	1890s	Frederick winslow taylor A mechanical engineer	Set out on a mission to improve the efficiency in the work place.
6.	1900s	Lillian and frank gilbert	Time and motion studies This examines the no. of motions required to perform a given task
7.	Mid 19 th century	The industrial revolution	Large scale manufacturing to improve the process on ergonomic principles
8.	1910	Gilbert and his wife, psychologist Parents of ergonomics	Systematic observation of work and time and motion.
9.	1914-1918	During WW-I	Ergonomic designs were implemented into crafts by way of the displays, controls and chairs.
10.	1919	Josefa joteyko (a polish scientist)	Published the science of labour and its organization in ergonomics
11.	1921	Kan-ichi tanaka	Research of efficiency ergonomics was published
12.	1921	Kan-ichi tanaka	Introduced human engineering to japan
13.	1921	Gito Teruoka	He found the Kurashiki Institute of Science of labor and became its director.

		The pioneer of ergonomic research in japan	
14.	1939- 1945	During world war II	The introduction of complex and sophisticated machines and weapons
15.	1949	K. F. H Murrell	coined the term “Ergonomics” which came to prominence in 1950
16.	1950	In Britain	The coining of the term Ergonomic was officially accepted.
17.	1952	people from psychology, biology, physiology, and design.	The Ergonomic Society was formed in Britain
18.	1957	The united states	The Human Factors Society was formed in United states
19.	1970s	Henry dreyfuss	Measure of man and niels diffrient, human scale were published
20.	1980s		As computers became more mainstream within populations and ergonomic science shifted once again to try and ascertain the human factors.
21.	1987	Christensen	Importance of a “good fit” between humans and tools
22.	1987	Australopithecus Prometheus	He selected the pebble tools and made scoops from antelope bones in a clear display of creating objects to make tasks easier to accomplish
23.	1997	Prof. Wojciech Jastrzebowski (a polish scholar)	An outline of ergonomics was reprinted in english
24.	20 th century		The development of preventive measures based on an ergonomic perspective.
25.	2000		Ergonomics has come on leaps and bounds. It is considered as essential components in the employment of an individual.
26.	Ancient Egypt, greek and roman period	Bernardino Ramazzini an Italian physician (1633- 1714)	De Morbis Artificum Diatribe the relationship between working conditions and pathology was first systematized from an occupational health perspective

DISCUSSION

The Industrial Revolution was one of the first big booms for Ergonomics. Manual labor was essential during this time as the advancements in technology we have today were not available. Early Ergonomics pioneers evaluated manual tasks to find easier ways to complete those tasks, with a focus on standardization and job process simplification to eliminate non-value-added steps to improve production and efficiency; these are considered some of the first traditional ergonomic assessments.

The field of Ergonomics continued to grow during and immediately following World War II; the focus of Ergonomics shifted from overall production and efficiency to also include worker safety. Research in the field of Ergonomics started to grow to incorporate applied biomechanics and physiology to understand the impact of work on the individual.

Muscular forces, physiological responses, perceived rates of exertion, and other cognitive loads began to be of interest to Ergonomics researchers to minimize exposure to musculoskeletal disorders (MSDs).

For many years, physical assessments have served as a staple and focus of the Ergonomics industry. The NIOSH Lifting Equation, Rapid Entire Body Assessment (REBA), Rapid Upper Limb Assessment (RULA), Job Strain Index, and numerous other physical assessments have been conducted manually for many years, but with the emergency of technology, the field of Ergonomics has seen incredible strides in terms of innovation and the ability to perform these same assessments.

We have seen the emergence of improved robotics and automated solutions, the adoption of human modeling and simulation tools, and even the implementation of both active and passive exoskeletons. A new wave of technology and innovation in the Ergonomics industry is in the form of wearable technology, motion capture, and artificial intelligence.

Wearable technology devices have become popular additions to the workforce in warehousing, manufacturing, and many other industries. These devices allow for easy tracking of data surrounding biomechanics and postures, repetitive motion, personal protective equipment (PPE), lone worker/employee down alerting, environmental temperature, forklift and vehicle driving, as well as contact tracing and social distancing.

Motion capture and artificial intelligence are emerging as players in the Ergonomics space as well due to the ability to perform industry-accepted evaluations efficiently. There are various motion capture and artificial intelligence products that require manual video capturing, uploading, and performing manual inputs based on each video's operational details to retrieve an evaluation score and risk level. Even more on the cutting edge, there are 24/7 analysis solutions with prebuilt rules and rely on computer vision and machine learning to minimize manual inputs.

At Intenseye, our platform can perform 24/7 analysis, see the unseen, and perform Ergonomic assessments and evaluations in real time without historical manual interaction. Intenseye allows for Ergonomic exposures to be captured, proactively, without the reliance on incident reporting to trigger an assessment of the operation of interest.

CONCLUSION

To conclude it is essential to create knowledge about ergonomics, this article gave guideline for history and evaluation of ergonomics.

Ergonomics is not a panacea. Ergonomics focuses first on fitting the job to the worker, then on fitting the worker into the job. The appropriate application of ergonomic principles, while keeping in mind the individual differences among workers, will lead to improvement in the health and safety of any

occupational setting. Perhaps the real significance of ergonomic programs is best considered in light of the possible alternatives. These words from Weiner (1950), also cited by Christensen (1987), sum up the problem of taking a narrow, short term view of the workplace, and the consequences of failing to actively strive for improved ergonomic working conditions:

It is a degradation to a human being to chain him to an oar and use him as a source of power; but it is an almost equal degradation to assign him purely repetitive tasks in a factory, which demand less than a millionth of his brainpower. But it is simpler to organize a factory or galley which uses individual human being for a trivial fraction of their worth than it is to provide a world in which they can grow to their full stature (Weiner, 1950).

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