

ERGONOMICS, WORK AND HEALTH

WHAT THE HECK IS ERGONOMICS ???

Ergonomics is not about in the words of Dolly Parton “*Working 9 to 5, what a way to make a living*”.

NOW THE SCIENCE PART !!!!

“*She blinded me with Science*” (Thomas Dolby).

The science of ergonomics in its present form dates back to World War 2.

Ergonomics was founded by a group of British scientists who had been working on various projects concerned with the efficiency of the fighting man for the armed forces.

The group included anatomists, physiologists, psychologists and engineers and they believed that a multidisciplinary scientific approach to the study of working efficiency could be equally relevant to industry in peace time.

However, they did not have a name for this area of research and therefore invented the name of “Ergonomics”. The word is derived from the Greek: *ergos* meaning work and *nomos* meaning natural law.

In North America a similar discipline evolved which was called “Human Factors” which simply means people are different, people have limitations and people have predictable reactions.

This simplest definition is that “Ergonomics is the scientific study of human work” and “Work” may refer to any kind of human activity that involves purpose or effort.

Ergonomics is concerned with:

- the application of scientific information concerning human beings to the design of objects, systems and environments for human use;
- the design of working systems in which humans interact with machines;
- the science of matching the job to the worker and the product to the user.

An efficient match is one which maximises:

- working efficiency;
- health and safety;
- comfort and ease of use.

ERGONOMICS

“It’s been a hard days night and I’ve been working like a dog” (Lennon and Mc Cartney).

Ergonomics considers:

THE PHYSIOLOGY OF WORK

- Bioenergetics of Exercise
- Static and Dynamic Work
- Physical Workload and Cardiovascular Demands
- Biomechanics of Muscle
- Strength
- Muscle Pain and Dysfunction

POSTURE

- Working Postures
- Standing
- Sitting
- Lying
- Squatting

BACK PAIN AT WORK

- Epidemiology
- Low Back Pain
- Work Related Risk Factors
- Personal Risk Factors

REPETITIVE STRAIN INJURIES

- Neck and Shoulder Pain
- Disorders of Elbow, Forearm, Wrist and Hand

WORK DESIGN

- The Systems Approach
- Task Demands and Working Capacity
- Anthropometrics
- Working Efficiency
- Job Design

ACCIDENTS, ERRORS AND INTERFACES

- Accident Proneness
- Human Error
- Error Ergonomics

STRESS, FATIGUE AND WORKING ENVIRONMENT

- The Semantics of Stress
- The Taxonomy of Stress
- Stress, Arousal and Performance
- Work Stress
- Mental Workload
- Fatigue
- Working Hours

SHIFTWORK

- Circadian Rhythms
- The Effect of Shiftwork on Health and Well Being
- The Design of Shiftwork

VISUAL WORK

- Light and Design
- Visual Displays
- The Visual Environment
- Eyestrain

SEATING

- The Physiology of Comfort
- Seat Design
- Seating and Backpain
- The Office Desk
- Office Chairs
- Adjusting the Workstation

WORKING WITH COMPUTERS

- VDUS and Health
- Workstations and Task Design
- Pausgymnastik

DRIVING

- Driving Posture and Workstation Layout
- Dynamic Loading
- Vibration

HAND FUNCTION AND TOOL DESIGN

- Repetitive Manipulative Tasks
- Hand Function
- Tools and Handles
- Vibration Syndrome

LIFTING AND HANDLING

- Epidemiology
- The Mechanics of Lifting
- Selection
- Training
- Work Design
- Maximum Permissible Loads

THE HUMAN FACTOR BIT !!!!

“ It ain’t what you do, it’s the way that you do it” (Fun Boy Three and Bananarama).

The goal of Ergonomics is to “Fit the job to the person” rather than making the person fit the job.

By fitting the job to the person, we can improve employee well being and workplace efficiency.

Good use of Ergonomics in the design of tools, equipment and workplaces can:

- Reduce injuries, errors, defects and costs;
- Reduce employee turnover and absenteeism;
- Improve ease of use, moral and satisfaction;
- Improve quality and productivity;
- Stimulate innovation.

Designing for our differences, our limitations, and our reactions is good for employees.

Thinking about the relative strengths and weaknesses of people vs machines can help us understand the principles of good ergonomic design.

People.....	But Machines....
Can carry out a range of variable motions and tasks.	Have difficulty with complex motions and tasks.
Are creative, can plan, invent.	Need programmes, pre set responses.
React to unpredictable events, identify and choose options.	Carry out specific functions within defined limits.
Can interpret data.	Are better at processing high volumes of data.

However

Machines can easily.....	But People.....
Do repetitive motions at high force and speed.	Are limited, wear out and lose accuracy quickly.
Detect variations in routine tasks.	Are easily distracted and make errors.
Perform accurately in repeated tasks.	Are inconsistent and need a change in stimuli.
Work in hostile environments (toxic, radioactive, extreme temperature etc)	Are highly affected by environment.
Have limitless design.	Come with a fixed physical design.

WORKPLACE STRESS !!!!!!!!!!!!!!!

“If work was really a good thing, the rich would have found a way of keeping it for themselves”
(Haitian Proverb)

Ergonomics is designing for the total human being both physical and mental to make the most efficient use of their capabilities and talents.

There are two types of stress - physical and mental. Both are important in ergonomic assessment of the workplace.

PHYSICAL STRESS !!!!!!!!!!!

In humans excessive working hours, loads and repetitive motions can cause problems. The human body can repair itself, but need time, rest and recovery to do so and unfortunately the rigors of the workplace often do not allow time for this.

PSYCHOLOGICAL STRESS !!!!!!!!!!!

Humans can become stressed in terms of mental and emotional capability.

The most common example of stress are:

- Overload too much or too difficult;
- Time pressures, deadlines;
- Inefficient, chaotic work methods;
- Underload;
- Repetitive work;
- Lack of job decision latitude;
- Lack of security;
- Lack of sense of belonging, being excluded, criticised, belittled;
- Distracting constant high levels of noise;
- Lack of space, privacy;
- Role ambiguity (not sure what you or others are supposed to do!!!);
- Role conflict (different people have different ideas of what you and they are supposed to do!!!);

Disorders which have been related to stress are:

- Cardiovascular disease;
- Peptic ulcers;
- Infectious and degenerative diseases;
- Migraine headaches;
- Allergic reactions;
- Dermatitis.

REPETITIVE OR CUMULATIVE TRAUMA - THE OUCH BIT !!!!

“The Birdie Song” (Unknown).

Ergonomics has a role in preventative medicine and work can affect health in a number of ways

The body is susceptible to damage under certain conditions at work.

It can suffer injury from performing work motions which have the following risk factors:

- repetition;
- force;
- pressure;
- awkward lifting, lowering, pushing, pulling, carrying, supporting postures, bending, twisting, kneeling, stooping, crouching, overreaching.

Other factors include physical conditions such as cold, heat and vibrations.

Wear and tear can affect muscles, ligaments, tendons and nerves. These disorders are called “repetitive” or “cumulative trauma”. They affect hands and wrists, arms, shoulders, backs and necks,

The costs of “repetitive” or “cumulative trauma” are:

- human pain and suffering;
- workers compensation;
- turnover;
- absenteeism;
- morale;
- product defects;
- production barriers;
- red tape;
- HSE fines.

The principles of prevention are redesigning tasks to:

- Reduce the number of repetitions;
- Reduce force;
- Reduce pressure;
- Redesign or purchase tools and equipment that reduce or eliminate lifting, lowering, pushing, pulling, carrying or supporting postures, bending, twisting, kneeling, stooping, crouching, overreaching;
- Isolate vibration;
- Insulate from heat and cold.

WORKPLACE DESIGN - THE GETTING IT SORTED OUT BIT !!!!!

“To err is human, to forgive is divine” (Unknown !!!!!)

In the design of the workplace consider:

PHYSICAL ISSUES:

- Furniture - chairs, sit lean stands, back, pelvic supports;
- Equipment - anti fatigue mats, foot support, document, equipment holders, wrist supports;
- Height - consider short and tall employees, adjustable workstations, chairs;
- Reaching - consider short and tall employees, storage, tilt tables, adjustable height stands, spring load bins, lazy susans;
- Clearance - for head, arms, torso, knees, feet;
- Lighting - bright light, direct glare, indirect glare, shadows, blinds.

USABILITY

- Easy to use forms and paperwork;
- Easy to understand manuals and instructions;
- Instructions to operate equipment;
- Smooth, easy work methods.

WORK ORGANISATION

- Good Planning - anticipate, think ahead, discuss;
- Job Decision Latitude - provide people with control over daily events of work life balance;
- Employee Involvement - encourage employee ideas and input in decision making;
- Job Enlargement - all employees perform different parts of a job rather than performing the same task over and over again;
- Job Rotation - increases job stimulus, better understanding of all company operations, rotates repetitive tasks;
- Communications - provide mechanisms to share information, coordinate and help plan;
- Team Building - provide a sense of belonging and being valued in all team work;
- Work / Rest Schedules - reduces fatigue and cumulative trauma;
- Work Method - more systematic ways of evaluating the easiest methods of doing a job, then communicating to others;
- Workload Reduction - by reducing workload cumulative disorders can be reduced and overall efficiency reduced.

THE SETTING UP AN ERGONOMICS PROGRAMME BIT !!!

“Whistle while you work” (Snow White and the Seven Dwarves).

ORGANISATION

An overall organisational structure needs to be established.

- Management Responsibility;
- Written Policy and Plan;
- Ergonomics Team;
- Employee Involvement.

TRAINING

Several different types of training are needed.

- Principles of Ergonomics and Cumulative Trauma;
- Employee Work Methods;
- Employee Information on Cumulative Trauma.

COMMUNICATIONS

A good communication plan needs to be established.

- With employers;
- Within a facility;
- Between company facilities.

IDENTIFYING JOBS AT RISK

Systematic approaches to job analysis are needed.

- Accidents books;
- Job Evaluation;
- Questionnaires and Surveys;
- Personal Data Analysis.

MAKING JOB IMPROVEMENTS

Finding ways to improve jobs is the key part of the programme.

- Short term;
- Long term;
- Brainstorming;
- Tracking System.

MEDICAL MANAGEMENT

Programmes to identify or treat employees with symptoms should be developed or upgraded.

Medical management of employees with occupational health problems has to be undertaken.

Medical opinions vary widely, but generally address the following issues:

- Early recognition of symptoms;
- Systematic Evaluation and Referral;
- Conservative Treatment and Follow Up.

MONITORING PROGRESS

The overall programme should be evaluated periodically

- Injury / Illness Trends;
- Ergonomics Log;
- Job Analysis;
- Employee Survey Results;
- Workers Compensations Costs;
- Turnover, Absenteeism Costs;
- Quality and productivity.

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