



CE marking

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Indicates that the product has been assessed before being placed on the market and that it meets the relevant EU safety, health and environmental protection requirement, regardless of where it is manufactured.

HSA

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The Health and Safety Authority

The WEEE Directive

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An EU directive to reduce waste from electrical and electronic equipment.

Red Safety Sign

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Signifies Prohibition





Yellow Safety
Signs

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Signifies caution

Green Safety
Signs

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Signifies a
positive action

Blue Safety
Signs

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Signifies a
mandatory action

Disc Safety
Signs

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Used for prohibitions
and instructions. E.g.
Safety helmets must
be worn.





Triangle Safety Signs

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Used for warnings.
E.g. High voltage/Slippery surface

Square Safety Signs

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Used for emergency and information E.g. Fire exit routes

Toxic

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Poisonous Substances

Health and Safety

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Regulations and procedures intended to prevent accident or injury in workplaces or public environments.





Data Protection

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Privacy rights of individuals in relation to the processing of their personal information

The Office of the Data Protection Commissioner

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Responsible for upholding the privacy rights of individuals on relation to the processing of their data.

Food technology

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A branch of food science that deals with the production processes that make foods.

Additives

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Put in food to improve flavor or smell





Food preservation

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The process of treating and handling food to stop or slow down food spoilage, loss of quality, edibility or nutritional value.

Food preservation methods

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Refrigeration, freezing, vacuum packing, tinning and drying

Genetic Modification (GM)

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Any alteration of genetic material, as in agriculture, to make them capable of producing new substances or performing new functions

Hydrogen fuel cells

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Strip electrons from hydrogen molecules creating an electric current. Used in hydrogen cars.





Henry Ford

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Create assembly line for mass production of cars

Karl Benz

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Created the internal combustion engine

George Stephenson

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Created the steam powered train

Satellites

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Objects that orbit the earth. Some monitor weather, others are used for communications or investigating outer space.





Global
Positioning
System (GPS)

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A satellite-based
navigation system.

Radio waves

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Used to send signals from
radio and television
stations and to carry
messages to and from
mobile telephones.

CCTV

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Closed circuit
television.

Global Warming

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Refers to the increase in
average temperature of
the Earth's atmosphere
and oceans in recent
decades.





The Carbon Trust

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An organization that helps businesses, governments and the public sector to make the move to a more sustainable, low carbon economy.

Environmental Sustainability

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Use of renewable sources of energy, prevention of pollution of air, water, land and waste, as natural resources will eventually run out

Social Sustainability

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An understanding of the needs of society including the development of a reasonable standard of living, education, community and equal opportunity.

Economic Sustainability

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Provide for profit, cost saving, economic growth with research and development





Environmental
Protection
Agency

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Responsible for ensuring
that Ireland's
environment is
protected.

Disposable
Products

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Once products are used or
broken, they are designed
to be able to be thrown out
and not to be repaired and
reused

Recycling

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The action or process
of converting waste
into reusable material

Acid Rain

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Rainfall made so acidic
by atmospheric pollution
that it causes
environmental harm



LC Technology – A Process of Design



Prototype

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An early sample, model, or release of a product built to test a concept or process.

Ergonomics

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Relationship between people and their environment, efficient design of workspace

Anthropometrics

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Measurement and size/proportions of human body

Biometrics

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The science of identifying humans by body characteristics such as fingerprints, eye retinas and voice patterns.

Cut dotted horizontal lines. Fold vertical line.





Aerodynamics

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The movement of air as it interacts with solid objects such as aircraft wings. The flow of air will be influenced by the shape of these solid objects.

CAD

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Computer Aided Design

WBS Chart

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Work breakdown structure chart. A type of chart that shows the decomposition of the work to be executed.

Main phases of every project

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Design/Planning.
Implementation.
Evaluation.
Presentation.





Project management

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The name given to a number of techniques used in industry to manage complex activities such as road and bridge building.

Gantt chart

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A scheduling tool used to visually display the status of a project's tasks.

The Critical Path

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The series of tasks that must each be completed on time for the whole project to be completed on schedule.

EST

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Earliest start time





LST

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Latest start time

EFT

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**Earliest finish
time**

LFT

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**Latest finish
time**

**Critical Path
Diagram**

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A diagram to help you to
identify which tasks are
on the critical path for
the project





Quality

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The desired standard in a product, project or process.

Reliability

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It's probability of operating correctly for a given time frame under specified conditions

Durability

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Measures the length of a product's life

Conformance

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The ability of performance and physical characteristics to meet established standards





Aesthetics

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Allow the user to judge how the product looks, feels, smells or tastes, etc.

Portable

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Able to be easily carried or moved, especially because being of a lighter and smaller version than usual.

Bathtub curve

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Shows the likelihood of products failing over the course of time.

Product lifecycle phases

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- 1.Introduction.
- 2.Growth.
- 3.Maturity.
- 4.Decline.



LC Technology – Quality Management



PDCA/PDSA/Deming
Cycle

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A quality management method for the control and continuous improvement of processes and products. Companies use repeated four-step management method.

Cause and
effect diagrams

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A tool that is used to logically organize the possible causes of a specific problem or effect by displaying them with increasing detail.

QC

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Quality Control

QA

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Quality
Assurance

Cut dotted horizontal lines. Fold vertical line.





Fabrics

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Made by weaving fibres together. E.g. carpets, clothing, sails

Wood

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Hard material that forms the main substance of tree trunks.

Hardwood

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Comes from deciduous trees

Softwood

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Comes from evergreen trees





Ferrous

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Metals that contain iron, have good tensile strength and are magnetic.

Non-ferrous

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Metals that do not contain iron. They are light metals, do not rust and are non-magnetic

Alloys

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A mixture of two or more metals that will form a new metal with enhanced properties, e.g. Brass (alloy of copper and zinc) etc.

Mild Steel

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Alloy of iron and carbon





Composite Material

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A combination of two or more chemically distinct materials which takes advantage of the favorable properties of each.

Plastics

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Usually made from oil, but can also be made from coal, natural gas, wood or grain.

Thermoplastic

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Can be shaped again with heat (strong primary covalent bonds with weak adjacent bonds). Acrylic, PVC, polystyrene, polythene

Thermosetting

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Can only be set once (strong primary and adjacent bonding, cross linking)
Phenolic Resin, Polyester resin, Bakelite.





HIPS

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High Impact
Polystyrene

LDPE

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Low Density
Polyethylene

HDPE

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High Density
Polyethylene

PET

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Polyethylene
terephthalate





ABS

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Acrylonitrile
Butadiene Styrene

PVC

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Polyvinylchloride

Polymers

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Consists of a large
number of repeating
small molecules bonded
together in a chain.

Ceramics

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Inorganic, non-metallic
materials that can be
shaped the heated and
cooled to make hard,
heat resistant objects.





Smart materials

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Those that change in response to changing conditions in their surroundings or in the application of other, directed influence.

Thermochromics

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Substances which have a reversible change of colour when heated or cooled.

Photochromic

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Changes colour in response to light conditions.

Self-healing materials

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Materials that have the ability to repair damage caused by mechanical usage over time.





Thermal
Conductivity

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Ability to
conduct heat

Electrical
Conductivity

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Ability to
conduct
electricity

Strength

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Ability to withstand
a force without
being damaged

Elasticity

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Measure of which
material deforms
reversibly under
stress





Plasticity

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Measure of ability to be shaped or formed

Malleability

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Ability of material to be stretched out in all directions without breaking

Ductility

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Ability of a material to be drawn out/stretched into wire

Hardness

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Ability of a material to resist wear, scratching and indentation.





Toughness

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Ability of a material to absorb energy and plastically deform without fracturing

Durability

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A measure of the length of time for which the material can be used until it is no longer possible/economical to use.

Stiffness

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The ability to resist deformation when a force is applied.

Corrosion

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The chemical breakdown of a metal due to atmospheric conditions





Elevation

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An external view of an object, taken straight on from a particular direction

Orthographic Projection

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A way of drawing a 3-dimensional object in two dimensions

Pictorial Projection

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Represent an object in picture form and are used to give an idea of the overall appearance of an object

Oblique Projection

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A simple type of technical drawing of graphical projection used for producing two-dimensional images of three-dimensional





Isometric Projection

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A method for visually representing three-dimensional objects in two dimensions in technical and engineering drawings.

Exploded view

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Shows the components of an object slightly separated by distance as though they had been exploded out

Schematic

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A diagram that represents the elements of a system using graphic symbols rather than realistic pictures.

Perspective drawing

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Very realistic drawings representing an object as it you would see it.





Centre of gravity

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The point where weight of the object is evenly dispersed and in equilibrium

Frame structure

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These structures have a sort of skeleton and can be either open or closed

Shell structure

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These structures derive their strength from their shape which often involves the use of curves or ridges

Arch structures

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A vertical curved structure that spans an elevated space and may or may not support the weight above it





Beam

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A long, sturdy piece of squared timber or metal used to support the roof or floor of a building

Cantilevers

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Beams that are held and supported at one end only

Force

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Something that causes an object to change its shape, speed or direction of movement

Loads

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A force measured in newtons. Either static or moving.





Tension

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A force which tries to pull and stretch an object

Compression

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Exerts a force which compacts an object

Shear

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A cutting force

Torsion

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A force that causes a twisting action





Bending

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A force that occurs when the upper surface of a structure is in compression and the lower surface is in tension

Redundant member

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Part of a structure that is neither in tension nor compression

Ties

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A structural member that is in tension

Struts

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A structural member that is in compression





Triangulation

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Adds stability, strength and rigidity to structures as weight and force are pushed down from the top to the wider base of the triangle

Factor of safety (FoS)

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The ratio of its actual loading capability over its required loading expressed as a percentage

Lever

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A rigid bar pivoted around a fixed point

Equilibrium

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A state in which opposing forces or influences are balanced





Work

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The amount of mechanical energy transferred by a force to an object

Power

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The rate at which work is done.
Unit is watts

Mechanical advantage

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The ratio of the two forces, load and effort

FLE

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A method of remembering the lever classes, 1 2 3





Moment of a force

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The turning effect of a force applied to a rotational system at a distance from the axis of rotation

Torque

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The size of force exerted to cause rotation

Gear train

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An arrangement of several simple gears connected together.

Cams

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A type of mechanism that can be used to change one kind of motion to another





Hardware

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The physical components of a computer

Software

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Programs that run inside the computer

Data

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The information that is stored inside the computer or device

Central Processing Unit (CPU)

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The brain of the computer, responsible for running the computer programs





Peripheral Devices

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Any input, output or storage devices of a computer

Read only memory (ROM)

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An IC programmed with data when it was manufactured, it is not modified by the user

Random access memory (RAM)

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The main computer memory, programmers in use are held in this form of memory with contents lost if the computer is switched off

Repeater

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A device that allows existing signals from wireless router to be broadcasted to create or extend networks





Operating System (OS)

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Interface between hardware and user, responsible for the management and coordination of activities and the sharing of the resources of the computer

Applications

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Software designed to perform a variety of functions

Shareware

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Copyrighted software that is available free of charge on a trial basis

Freeware

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Completely free software, usually made available over the internet





Trial Software

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Contains all functionality of full version but can only be used for a limited time period, try before you buy

Word processor software

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Software designed for writing documents and written pieces.

Database

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A computerized filing system with the capacity to store and organize large volumes of information.

Spreadsheet

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Software to sort information in tables, graphs, charts and mathematical forms





Firewall

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Programmes or devices that acts as a barrier to keep destructive elements out of a network or specific computer. They are configured with specific criteria to block unauthorized access to a network

Open Source

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Refers to a program in which the source code is available to the general public for use and/or modification from its original design free of charge.

Wi-Fi

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A local area wireless technology that allows an electronic device to exchange data or connect to the internet without a direct physical connection

Cookies

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Pieces of data stored on a user's computer by their web browser, they can be used for storing site preferences, authentication, tracking computer activity





Cache

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A block of RAM used for the temporary storage of data that is likely to be used again, it will determine how fast data can be accessed.

Phishing

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Attempting to gain sensitive information such as usernames, passwords and credit card details by targeting content relevant to the user.

Socially Engineered Malware

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An attack that tricks users into downloading and installing malicious software that compromises the security of their system

Smart Cards

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Cards with embedded integrated circuits





Local Area Network (LAN)

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Group of computers networked together, uses electric signals to transmit data, has wired connections.

Wireless Local Area Network (WLAN)

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A group of computers networked together without a cable), uses high energy radio frequency waves to transmit data, can be subject to interference.

Switches

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A computer networking device that connects devices together on a computer network by using packet switching to receive, process and forward data to the destination device

Router

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A networking device that forwards data packets and determines the best path for information to travel between computer networks.





Network Node

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This is a connection point, either a redistribution point or an end point for data transmissions.

Motherboard

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The main PCB on a computer

System Bus

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Part of the motherboard and connects the processor to main memory. Also called the front side bus

Expansion Bus

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Allows the processor to communicate with peripherals





Screen Resolution

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Tells you how many pixels your screen can display horizontally and vertically

WiFi Hotspot

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A location where internet access is available wirelessly.

Bitmap Images

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Made of pixels in a grid, tiny dots of individual colour, resolution dependent
e.g. photographs.

Vector Images

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A series of geometric objects such as lines and curves. Each object has properties such as colour, width, size, etc. High quality, sharp images are developed





Data Protection

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Ensuring the safety and privacy of personal data.
This is provided for in Irish law

ISP

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Internet service provider

Bluetooth

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Short range radio technology that allows communication

Amplification

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Increasing the strength of the signal.
Opposite to attenuation





Carbon neutral

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The aim of balancing carbon emitted into the atmosphere with actions that reduce or offset these culminating with net zero carbon emissions

Fossil fuels

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A natural fuel such as coal or gas, formed in the geological past from the remains of living organisms.

Nuclear Energy

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The energy released during nuclear fission or fusion, especially when used to generate electricity.

Non-renewable energy

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Energy sources that will eventually run out





Renewable
energy

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A type of energy
that can be
replenished.

Biomass Energy

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Refers to biological
materials that are living or
have recently been alive
that are used as an energy
source e.g. wood

Potential
Energy

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The capacity to
do work

Electrical
energy

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Refers to the
movement of
electrons through an
electrical conductor





Solar Energy

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Energy from
sunlight

Hybrid Cars

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A vehicle that uses
two or more distinct
power sources to
move the vehicle

Energy Efficiency

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To reduce the amount
of energy required to
provide products and
services.

Kinetic Energy

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Energy due to
the motion of
an object





Voltage

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An electromotive force or potential difference expressed in volts

Astable Circuit

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A circuit with no stable states. The states change continuously

Polarity

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Electric current flowing from + to – (positive to negative).
Device that only works when connected a particular way in a circuit.

Current

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A flow of electricity which results from the ordered directional movement of electrically charged particles.





Resistance

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The measure of the difficulty with which electrons move through a material or electronic component.

Resistors

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Devices providing different levels of resistance to electric current

Frequency

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How often an AC cycle repeats

Semiconductor

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Materials that have the resistance levels between those of a conductor and an insulator





Polarised

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The component must be connected the right way round with + leg connected to + power supply.

Diodes

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Semiconductor devices that allow current to flow in one direction only

Transistors

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Sensitive electronic switches, the main process components used in most electronic devices

Solenoid

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An electrical device that converts electric current to movement in a straight line





Relay

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A mechanical switch that is electrically activated

Product Recycling Fund (PRF)

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The charge applied to offset the cost of recycling electrical goods.
It is applied to the purchase price and varies according to the type of electrical item

Analogue Signal

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Continuously variable signal/system

Digital Signal

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A signal/system with discrete value, one of a number of distinct possible values, usually 1 and 0.





Open-loop system

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Those systems with no feedback to determine if the input has achieved its desired goal, self-monitoring

Closed-loop system

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Those systems that use feedback given from sensors to controller to ensure correct/accurate operation of machine.

Peripheral Interface Controller

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A type of microcontroller that can be programmed to respond to one or more inputs and control one or more outputs

Flowcharts

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Used to design and describe programs by visually representing what a program is supposed to do.





Programmable
Logic Controller
(PLC)

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An industrial grade
computer that
carries out similar
functions to a PIC

Pneumatics

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The use of mechanical
energy stored in
compressed air as a
source of energy to do
work

Air
compressors

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Used to generate the
compressed air for
pneumatic systems

Single acting
actuator

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A pneumatic output
device that delivers
mechanical power in
one direction only





Unidirectional
flow valve

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A control valve that restricts the flow of air to one direction only at a given time

3/2 Valve

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A valve which acts as a simple switch controlling the air flow in a pneumatic circuit

Shuttle Valve

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A valve with two inputs and one output.

Robotics

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The branch of technology that deals with the design, construction, operation, and application of robots





Actuators

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The 'muscles' of a robot, convert potential energy to kinetic.

Manipulators

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Act as a robot's arms allowing robots to carry out particular tasks

Degrees of freedom

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The number of axes along or around which an object can move

Work Envelope

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The volume of space in which a robot can work





Cartesian Arm

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A robot with 3 axes linear movement (XYZ), axes movement at 90 degrees to each other, used as a pick and place robot

Scara Robot

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A robot consisting of two rotary joints with a horizontal axis and a linear joint with a vertical axis

End Effectors

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The equivalent to a robot's hand, allows the robot to hold, lift, move or turn objects.

Encoder

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Give movement feedback to robots. This will determine speed, distance and position for robotic control





Polar coordinate system

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Radius, angle and longitude/latitude required to specify points in space

Cylindrical coordinate system

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Radius, height and angle required to specify points in space

Servo motors

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Widely used for powering robot arms as they offer accurate positioning and smooth control of speed.

Stepper motors

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A type of open-loop DC motor, controlled through the use of electromagnets.





Oscilloscope

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Electronic equipment that provides visual images of varying electrical quantities

Inductor

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Consists of a coil of wire. Used to block any unwanted AC signal circulating in a DC circuit

Transformer

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Made from 2 or more inductors. They are used to convert one AC voltage to a different AC voltage

PSU

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Power supply unit





NC

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Normally
Closed

NO

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Normally Open

COM

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Common

Latch

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A circuit that has two
stable states and can be
used to store state
information





DIL

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Dual in line

**Uninterruptible
Power Supplies
(UPS)**

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Large boxes that can continue to provide mains or DC voltage outputs even when the mains supply is cut off

Photodiode

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A diode that functions as a light sensor

Amplifiers

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A device that magnifies a signal.





Breadboard

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A panel that does not require soldering, it is reusable. This makes it easy to use for creating temporary prototypes and experimenting with circuit design

The Current Rule

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The inputs of an op-amp draw no current

The Gain Rule

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There is infinite gain between the output signal and the difference between the two input signals

The Voltage Rule

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When an op-amp is used in a negative feedback circuit the output of an op-amp attempts to do whatever is necessary to make the voltage difference between its two inputs equal zero





NAND gate

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Opposite of an AND gate
i.e. the output is 0 when
input A and input B are 1,
and all other cases the
output is 1

NOR gate

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Opposite of an OR gate
i.e. the output is 0 when
input A or input B is 1,
output is 1 when A and B
are 0

TTL

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Transistor-
transistor logic

CMOS

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Complementary
metal oxide
semiconductor





Qualitative accelerated life testing

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The process of testing a product by subjecting it to conditions (stress, strain, temperatures, voltage, vibration rate, pressure etc.) in excess of its normal service parameters in an effort to uncover faults and potential modes of failure in a short amount of time.

Quantitative accelerated life testing

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Consists of tests designed to quantify the life characteristics of the product, component or system under normal use conditions, and thereby provide reliability information.

Benchmarking

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Uses the most effective product in the market as a basis for developing new Improvements.

Reverse engineering

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Competitors' products are dismantled and inspected with the best features incorporated into a new design



LC Technology – Option: Manufacturing Systems



International
Organization for
Standardization (ISO)

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An international standard-setting body composed of representatives from various national standards organizations

Batch
Production

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Products produced over a particular period of time
i.e. toys for Christmas.

Mass
Production

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Products produced in large volumes, demand is high and stable, used for household electrical items etc.

Once-off
Production

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Producing a prototype for a new product

Cut dotted horizontal lines. Fold vertical line.



LC Technology – Option: Manufacturing Systems



Just in Time Manufacturing (JIT)

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Inventory strategy that reduces in-process inventory and associated costs. Process relies on signals between different points in process, which tell production when to make next part.

Design for Environment (DfE)

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A set of guiding principles in environmentally responsible design and manufacturing

Break Even Quantity (BEQ)

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This quantity determines which manufacturing system is best to use in the production of a product, depending on the number (quantity) of the product which is required.

Kanban System

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A signalling system used in JIT manufacturing to manage the stock and material levels at each station in the factory

Cut dotted horizontal lines. Fold vertical line.





Pareto Principle

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This is the 80/20 rule where roughly 80% of the effects come from 20% of the causes e.g. 80% of computer crashes are contributed to 20% of software bugs

Business Strategy

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Provides direction and focus for the company through defining of the primary task, assess core competencies, determine order qualifiers and order

Manufacturing Strategy

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Decides how to offer a product and determines production

Facility Layout

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Refers to the arrangement of machines, departments, workstations, storage areas, aisles and common areas within a factory





UCL

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Upper Control
Limit

LCL

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Lower Control
Limit

Quality Control

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This ensures products and services meet consumer expectations, it is product oriented and focuses on defect identification

Quality Assurance

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This is the process or set of processes used to measure and assure the quality of a product and focuses on defect prevention



LC Technology – Option: Manufacturing Systems



Sequential design

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Different areas of the design team work independently, e.g. wall between functional areas, modifications made by the production and marketing teams

Concurrent Design

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Walls broken down, design team picked from all parts of spectrum, representatives from engineering, marketing, water, land and waste, as natural resources will eventually run out

Feasibility Study

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An analysis of the ability to complete a project successfully, taking into account legal, economic, technological, scheduling and other factors

Quality Function Deployment

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A process that identifies, priorities and ranks customer requirements in such a way that the most important and achievable features are made available in the next release of a product

Cut dotted horizontal lines. Fold vertical line.





Prefabrication

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Components which are made in a factory and assembled on site

Resistance to impact

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Ability of a material to cope with shock load. Indicator of material toughness

Embodied Energy

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The sum of all the energy required to produce any goods or services, considered as if that energy was incorporated in the product itself

Reinforced concrete

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Concrete on its own is weak in tension, so steel bars are cast in the wet concrete, the combined material when set has high tensile and compressive strength





Draft Angle

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The amount of taper for molded parts perpendicular to the parting line

Glulam

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Consists of a number of layers of timber bonded with durable, moisture resistant adhesive

Veneers

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A thin layer of hardwood or softwood applied to manufactured wood for aesthetics

Plywood

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Composed of thin layers of wood stuck together





Buckling

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The sudden failure
due to high
compression

Corrosion

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Destruction of
metal due to
chemical reaction

Creep

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Material deforms
under stress,
usually with heat

Fatigue

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Cracking of
metals

