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Second Internal Test

MP482 - Product Development & Design

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CSE-A

Roll No. 34.

① Value

- It is the ratio of function to cost.
- Value is the lowest price you must pay to provide a reliable function or service.
- Value can therefore be manipulated by either improving the function or reducing the cost.
- $$\text{Value} = \frac{\text{Function}}{\text{Cost}}$$

② Creativity

Creativity is a skill of being able to produce something "new" be it a product, a concept, a process, an idea or a solution to a specific problem having some value.

One of the main creativity exercise is Six Thinking Hats. Six distinct directions are identified and assigned a color. The six directions are:

④ Managing Blue - what is the subject? what are we thinking about? what is the goal?

④ Information white - considering purely - what information is available, what are the facts?

④ Emotions Red - instinctive gut reactions or statements of emotional feeling.

④ Discernment Black - logic applied to identifying reasons to be cautious & conservative.

③ Optimistic response Yellow - logic applied to identifying benefits, seeking harmony. Sees the brighter, sunny side of situations.

④ Creativity Green - statements of provocation and investigation, seeing where a thought goes. Thinks creatively, outside the box.

④ ~~Self~~

Intellectual property is the product or creation of the mind. IPR (Intellectual Property Rights) is the body of law developed to protect the creative people who have disclosed their invention for benefit of mankind. Intellectual property can be one of the most valuable assets of firms.

Therefore, legal mechanisms have been developed to protect the rights of intellectual property owners.

There are different methods to protect the intellectual property.

They are:

③ Patent: A patent is a grant from the gov. which confers on the guarantee for a limited period of time the exclusive privilege of making, selling & using the invention for which a patent has been granted.

③ Trademark: Exclusive right given by government to the trademark owner to use a specific name or symbol in association with a class of product or process.

③ Trade Secret: A symbol, logo, word, sound, color, design or other device that is used to identify a business or a product in commerce.

- ④ Copyright - Exclusive right granted by the government to copy & distribute an original work of expression, whether literature, graphics, music, art, entertainment or show. It can last upto 95 years.

Part B.

- ① Ergonomics is defined as the relationship between man and machine and the application of some principles to solve the problem arising from this relationship.

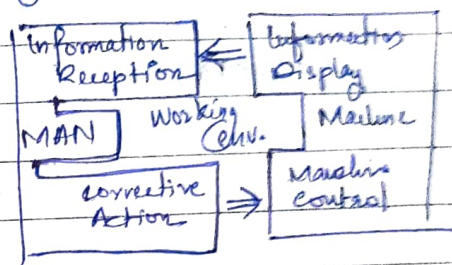
The word ergonomics means → "ergon" ⇒ work
"nomos" ⇒ natural laws

Ergonomics is scientific study of man and machine and environment. The main objective of the ergonomics is to make machine fit for the user rather than to make the user adapt himself to the machine.

eg: the arrangement & placement of PC components (mouse, monitor)

Part B

- ②
- Any machine cannot be continue working for a longer period of time without the aid of man.
 - The work can be performed by a man machine system.
 - Hence a man-machine system may be defined as a combination of activities b/w man and machine to get the desire o/p from the given i/p.



- From display instruments, the operator can get the information about the operation of machine.
- ~~This~~ If he feels that the correction is necessary then he take the corrective action to operate the control or lever.
- This corrective action of man alter the performance of the machine.
- The control of man machine system in a closed loop system arise at two places - information display instrument which gives information to the man & control which will operate by man to adjust the machine.

Part B

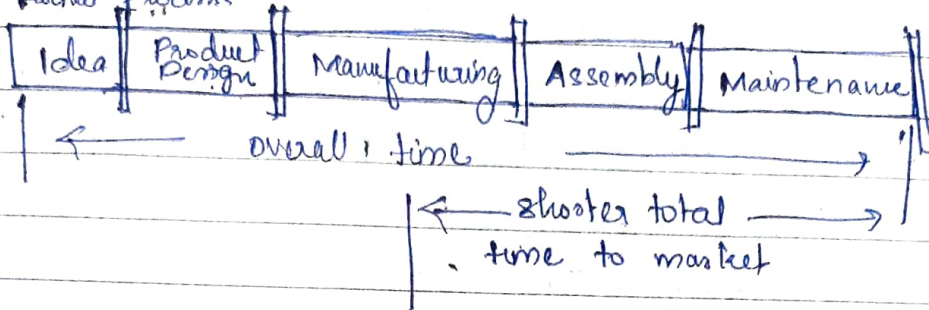
③ Concurrent Engineering

It is a business strategy which replaces the traditional product development process with one in which tasks are done in parallel and there is an early consideration for every aspect of a product's development process.

This strategy focuses on the optimization and distribution of a firm's resource in the design & development process to ensure effective and efficient product development process.

This allows engineers and managers of different disciplines to work together simultaneously in developing product and process design.

Partial processes



concurrent engineering methodologies permit the separate tasks of the product development process to be carried out

simultaneously rather than sequentially.

Potential ~~process~~ problems in fabrication, assembly, support and quality are identified & resolved early in the design process.

Advantages of concurrent Engineering

- Less work in progress
- Reduced Design & Development Times.
- Reduces waste & reworking of design.
- Decrease in time to market.
- Continuous improvement of product quality
- Increased productivity.
- Faster product development
- Increase product life cycle profitability
- Company operates more efficiently.

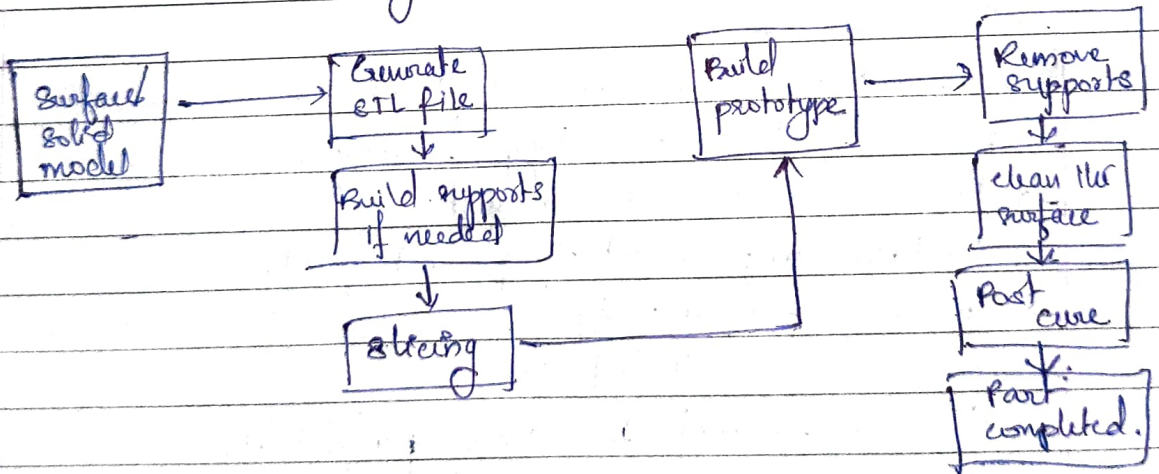
Part A

② Rapid Prototyping.

Rapid prototyping technology employs various engg. eg: ~~cat~~ computer control and sw techniques including laser, optical scanning, photosensitive polymers, material extrusion and deposition, etc to directly produce a physical model layer by layer manufacturing in accordance with the geometrical data delivered from a 3D CAD model.

Need of RPT

- Complex designs ^{which} ~~must~~ ~~are~~ are difficult in conventional methods are possible.
- Reduced cost
- Reduced time.
- Errors can be detected much earlier.
- Users are actively involved in the development.



CAD
model

Pre
process

RP
process

Post
process

Workflow layout.

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All RP techniques employ the basic five steps processes:

- Create a CAD model of the design.
- Convert CAD model to STL format.
- Slice the STL file into thin cross-sectional layers.
- Construct the model one layer atop another.
- Clean & finish the model.

④ Types of RPR

→ Solid Based

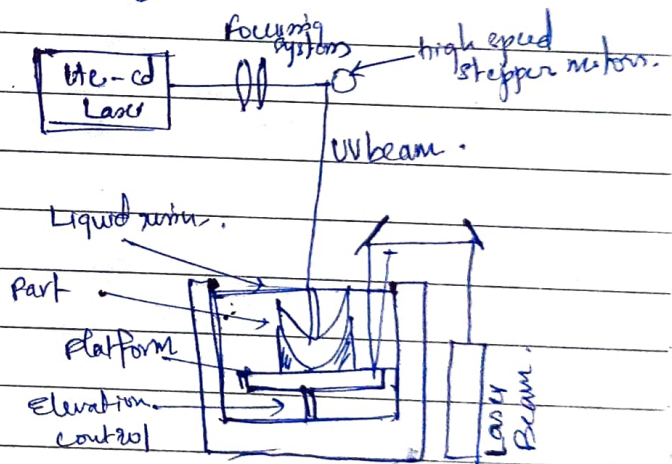
- ① Except for powder, solid-based RP systems are meant to encompass all forms of material in the solid state.
- ② eg: fused decomposition modeling.

→ Powder Based

- ① However it is intentionally created as a category outside the solid based RP systems to mean powder in grain like form.
- eg: selective laser sintering.

STEREO LITHOGRAPHY (SLA)

- i) works based on the principle of curing liquid photoinitiator into specific shape.
- ii) A vat which can be lowered & raised filled with photocurable liquid acrylate polymer.
- iii) The beam cures the portion of photo polymer and produces a solid body.
- iv) This process is repeated till the level is reached.
- v) then another portion of the cylinder is shaped till the portion is reached.



Fused deposition modeling

- ④ A gantry robot controlled extruder head moves in two principle directions over a table.
- ④ Table can be raised or lowered as needed.
- ④ Thermo plastic is extruded through the small orifice.
- ④ Initial layer placed on a foam foundation with a constant rate.
- ④ Extruder head follows a predetermined path from the file.
- ④ After first layer the table is lowered and subsequent layers are formed.

