

Product Development & Design

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88, CSE B
No: 10

Assignment - 2

Q1) Identify any one electromechanical device at home & perform a value analysis on it. Use at least 5 criteria and 3 weighting factors.

→ Design and Development of a
Low-cost washing machine
suitable for polythene materials.

Materials Selection
Each of the entire washing selected area, load because of these strength. The materials considered for component parts of this machine, were carefully based on their application to the distributed stress and acting on them. It is this synergy that we chose materials with better tensile strength.

Methods
Washing machine works on the principle of centrifugal and centripetal force. Detergent lowers the surface tension of the water and allows the pure water to become wet. The detergent attaches itself to the hydrophobic part of the dirt, and the hydrophilic part of the detergent attaches itself to the

to the water. A motor causes the inner drum to rotate, causing the pure water jacket to be tossed from side to side.

Material selection chart

Slon	Components	Strength & material requirements	Material used	Justification
1	Iron stand (supported)	Having ability to withstand compressed loading & shocks	Mild steel CAISI 1020 SAE C45 grade	It is ductile & can endure stress
2	Outer Tub	Ability to resist wear & hardness	Mild steel CAISI 1020 SAE grade Coated with resin on the inside	It is hard & can be easily rolled into desired shapes It is cheap & can be bent easily.
3	Baffle plates	Hardness, toughness & ability to absorb shock	Aluminium Sheet (6061)	It is cheap & can be bent easily.
4	Shaft	Toughness, hardness, ability to withstand fatigue & endure stress	Mild steel	It is ductile & tough, can endure stress.
5	Pulley	The ability to withstand fatigue, hardness & have ability to endure stress	Cast iron for the pulley side & aluminium from the drive	Aluminium is high hence load on the motor

6	Bearing Housing	Toughness, hardness & can endure stress, shocks & vibration	galvanized steel	It can endure stress & toughness
7	Inner Tub	Hardness, ability to withstand compressive loading & absorb shock	plastic (LOPE)	Corrosion resistant, readily available & cheap.

Q2) Detail the ergonomic aspects of the same product. Comment on the possible improvements possible on it.

- ⇒ First appearance should be pleasing to the customer's eye.
- * Symmetry should be maintained as much as possible.
- * Sharp edges should be avoided or chamfered.
- * Comfortability during use

Requirements

- * Minimize discomfort during use.
- * Maintain clearance.
- * Maintain reach.
- * Improve posture.

- * Working light between 820-950nm
- * Display Zone between 1227-1482nm
- * Display information
- * Reduce memory load
- * Minimise the vibration and noise level.

→ Vibration: - use vibration pads or mats.

→ Noise: - using acoustical absorbing material in laundry room.

→ Lightings: - use high efficiency lights in a laundry room.

Q3) With sketches, detail any 2 rapid prototyping processes.

→ Rapid prototyping (RP) includes a variety of manufacturing technologies, although most utilise layered additive manufacturing. However, other technologies used for RP include high-speed machining, casting, moulding and extruding. While additive manufacturing is the most common

Rapid prototyping process, other more conventional processes, can also be used to create prototypes.

These processes include:

(i) Subtractive - whereby a block of material is carved to produce the desired shape using milling, grinding or turning.

(ii) Compressive - whereby a semi-solid or liquid material is forced into the desired shape before being solidified, such as with casting, compressive sintering or moulding.

