

Ease of maintainance

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Product characteristics

5. Ease of maintenance and durability

- The selection of materials and class of workmanship is closely related to two factors - design of the product and the economical analysis of its cost.
- Quality is not an attribute to define, the two responsible factors are durability and dependability .
- The length of the service life or endurance of the product is defined as durability.
- Maintenance and repair are the aspects of durability. The preventive maintenance and requisite repair required for some products is closely akin to quality and design policy.

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- There are different types of maintenance that agriculturists use to increase the availability of their machinery.
- Based on an farmers' budget, amount of resources, level of combined experience, and maintenance goals, one or more maintenance types are used.

The types are:

1. Preventive maintenance
2. Predictive Maintenance (Condition Monitoring)
3. Corrective maintenance
4. Breakdown Maintenance

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1. Preventive maintenance:

- Preventive maintenance is the most popular type of proactive maintenance. To start conducting preventive maintenance tasks (PMs).
- This is not the case with predictive maintenance which requires condition monitoring sensors and new software integrations.
- However, with preventive maintenance, the agriculturists runs the risk of over-scheduling maintenance tasks because tasks are scheduled based on time rather than actual conditions.

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2. Predictive Maintenance (Condition Monitoring)

- Predictive maintenance is what savvy maintenance teams aspire to have or are already implementing.
- The major barrier to this is the time it takes to implement rather than the cost of the technology itself.
- For instance, a vibration sensor that can identify imbalance, misalignment, and resonance issues only costs around Rs. 5000, but the time it takes to install, integrate with other maintenance software, and adopt a culture around is not time that all practitioners are willing to allocate.

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3. Corrective maintenance

- Corrective maintenance is inherently part of emergency maintenance because, when there is an emergency, something needs corrected or fixed.
- In this way, corrective maintenance is mostly reactive.
- However, it can also be proactive. If an asset with a condition monitoring sensor detects an issue, a work order is created and a technician is sent to correct it.

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4. Breakdown maintenance

- Emergency maintenance occurs when an asset requires immediate attention in order to keep a facility operational or safe.
- This is the most reactive and intrusive type of maintenance as it pulls technicians away from other jobs and lowers schedule compliance.
- In extreme circumstances, emergency maintenance can set an organization back days depending on the scope of the repair, available parts, and the asset's level of importance.
- To reduce the amount of emergency maintenance that is both unplanned and unscheduled, organizations adopt various forms of proactive maintenance.

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Design for Maintainability:

- Maintainability is created during the design process. It cannot be added later.
- Establish the maintenance philosophy in terms of 'repair versus disposal' of the product or components. Do this before starting any design work.
- Consider where maintenance will take place (1st. 2nd or 3rd line).
- Consult the maintenance engineer during the design phase and agree upon a set of documents to be handed over to the maintenance people.
- Keep it simple. Complex arrangements are usually harder to maintain.
- Make it testable. Reactive (fault finding) tests often reveal latent problems that will become faults in the near future. Include diagnostic test points in electrical circuits. Include mechanisms that provide early warning of impending failure.

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Design for Maintainability:

- Design reliability into items that are difficult to maintain (such as components deep within an engine), to reduce the need for maintenance access.
- Reduce maintenance frequency overall by ruggedizing and over-specifying components to withstand occasional overload.
- Provide warning labels where a maintenance engineer may be exposed to danger. For example on hot or heavy items or where there is stored mechanical or electrical energy.
- Provide maintenance instructions and information panels if the routine is difficult to remember, and fix them as close to the point of maintenance as possible.
- Design equipment to fail-safe so that risk of injury to maintenance engineers is reduced.
- Avoid the requirement for special tools.