

# SUBJECT- OPERATIONS MANAGEMENT TOPIC –MAINTENANCE AND IT'S TYPES

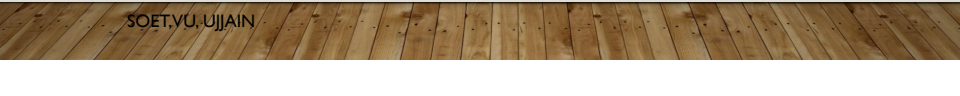
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LECTURE NOTES

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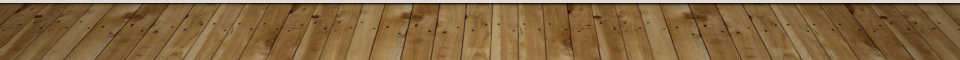
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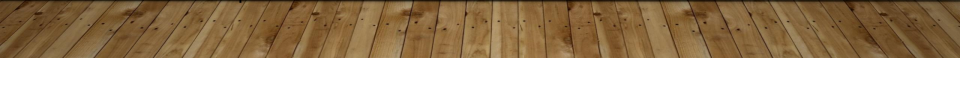
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# MAINTENANCE

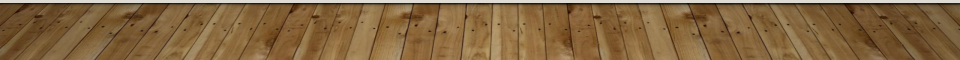
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- It is a function of production management.
  - Maintenance is concerned with day to day problem of keeping the physical plant in good operating condition.
  - It covers all the activities undertaken to keep equipment in a particular condition or return it to such condition.
  - Any action that restores failed units to an operational condition or retains non failed units in an operational state.
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# MAINTENANCE OBJECTIVES

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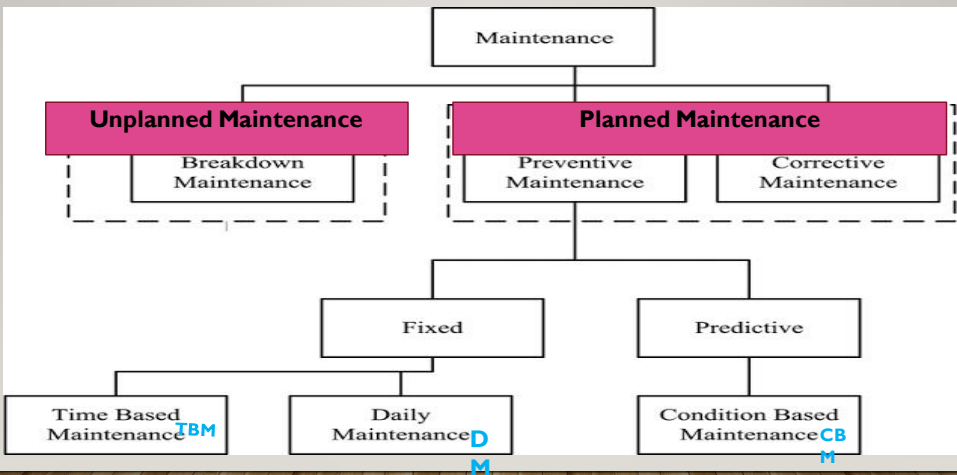
- To increase functional reliability of production facilities.
- To maximize life of equipment.
- To maximize production capacity .
- To achieve quality product or services by well operated equipments.
- To minimize interruptions in operations.
- To minimize breakdowns.
- To enhance manpower safety.
- To decrease production cost.



# TYPES OF MAINTENANCE

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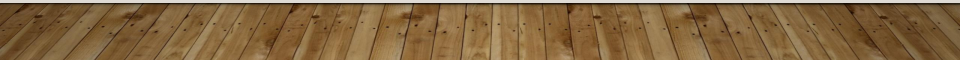
1. Planned maintenance-
  - Organized maintenance work carried out as per defined procedures and having control.
2. Unplanned maintenance



# BREAKDOWN MAINTENANCE

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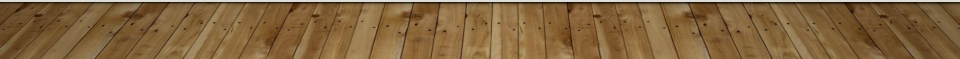
- Emergency based policy.
- Equipment or facility is operated until it fails and than brought back to running condition by repair.
- Failure of equipment is unpredictable.
- It includes repairs , replacement of parts and even overhaul.
- May work good for small factories because-
  - Few equipments
  - Simple machines that does not require specialists.
  - Sudden failure does not cause serious financial loss.



# CORRECTIVE MAINTENANCE

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- Organized work to restore failed units.
- it is also known as **run-to-failure** maintenance.
- It occurs when technician discover problem after preventive maintenance or during work order.
- It identify, isolate and rectify faults to keep the equipment working.





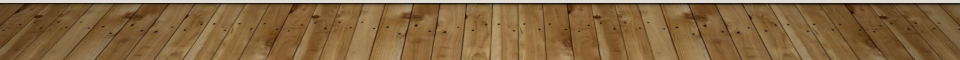
# PREVENTIVE MAINTENANCE

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- Planned proactive approach to minimize breakdowns.

“ Prevention is better than cure”

- Consistant practices to improve performance and safety of units.
- Aim is to decrease equipment downtime and lessen number of repairs.



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Preventive maintenance includes:

- Identification of all items, their coding and documentation.
- Periodic inspection- inspection at regular interval.
- Lubrication and cleaning of equipments.
- Upkeep machine through repairs.
- Failure analysis and planning for failure elimination

# PREDICTIVE MAINTENANCE

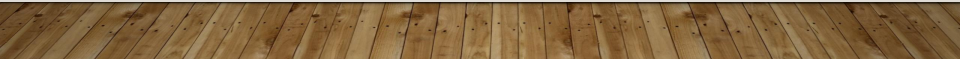
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- Predicting failures before they occurs.
- Identifying cause of for symptom of failur.
- Eliminating those cauSes before they lead to a damage of unit.

# CONDITION BASED MAINTENANCE

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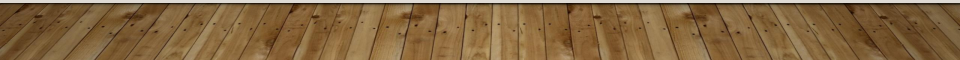
- Condition of equipment continuously monitored using sophisticated instruments so that failure may be predicted and corrective actions are taken for prevention.
- Consists of following steps-
  - Machine identification and codification
  - Critical machine selection
  - Fixing condition parameter
  - Monitoring techniques, schedule and frequency.
  - Repair schedule and execution
  - Follow up



# CONDITION MONITORING TECHNIQUES-

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- Temperature
- Visual
- Vibration
- Leakages monitoring
- Lubricating monitoring
- Noise and sound



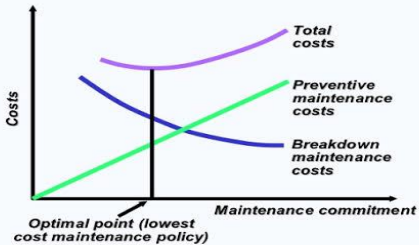
# BENEFITS OF CONDITION BASED MONITORING

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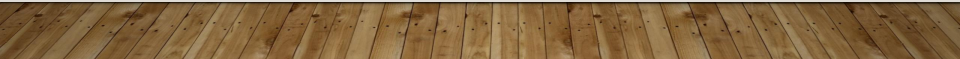
- Improved maintenance
- Better product quality
- Increased system availability
- Improved plant operations
- Improved safety

# MAINTENANCE COSTS

## Maintenance Costs



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- Breakdown of component or equipment makes workers and machines idle resulting in loss of production, delay and repairs.
  - These downtime cost exceeds preventive maintenance cost but after optimal point it is not economical to adopt the preventive methods.
  - So beyond that point breakdown maintenance will be economical.
  - To achieve this the costs of breakdown maintenance and preventive maintenance must be known.





# DIFFERENCE IN BREAKDOWN MAINTENANCE AND PREVENTIVE MAINTENANCE

Preventive maintenance	Breakdown maintenance
Improve equipment life	Decrease Overall equipment life
Routine inspection	Emergency repair
Prevent major operating problem	Execute when equipment fails
No loss of production time	Loss of time and material
Good for safety	Chances of accidents
Planned	Unplanned