



# UPSTREAM ASSETS CRITICALITIES OF PREDICTIVE MAINTENANCE, ISSUES, OPPORTUNITIES, INITIATIVES TAKEN

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- Types of maintenance
- Advantages & disadvantages of each type
- Predictive Maintenance techniques being used in ONGC, Mumbai.
- Initiatives taken based on predictive maintenance techniques.
- Total maintenance concept.



# Types of Maintenance



- Reactive or breakdown
- Preventive
- Predictive
- Reliability centered

# Reactive Maintenance



- It is basically “run to fail” maint.
- It has advantages of less operating cost and less staff.
- The disadvantages are increased cost due to unplanned downtime, increased labour cost, cost involved with repair or replacement of equipment etc.

# Preventive Maintenance



- It is defined as actions performed on a time or machine run based schedule that detect or mitigate degradation of a component or system with the aim of sustaining or extending its useful life through controlling degradation to an acceptable level.

# Advantages & Disadvantages



- Advantages include cost effective, increased component life cycle, reduced equipment and process failures and flexible maintenance schedules.
- Disadvantages are labour intensive, performance of unneeded maintenance etc.

# Predictive Maintenance



- It is defined as “Measurements that detect the onset of a degradation mechanism, thereby allowing casual stressors to be eliminated or controlled prior to any significant deterioration in the component physical state.



# Advantages & Disadvantages

- Advantages include increased component life, preemptive corrective action, reduced downtime, reduced spares and labour cost, improved worker moral etc.
- Disadvantages are increased investment in diagnostic equipments, staff training etc.

# Reliability centered Maintenance



- It is a process used to determine the maintenance requirements of any physical asset in its operating context.
- It recognises that all equipments in a facility are not of equal importance and different equipments will have a higher probability of failure from different degradation mechanisms than others.



# Advantages & Disadvantages

- Advantages include most efficient maintenance program, lower costs by eliminating unnecessary maintenance or overhauls, minimise frequency of overhauls, focused maintenance activities on critical equipments, reduced probability of sudden equipment failure.
- Disadvantages are it can have significant startup cost, training, equipment etc.

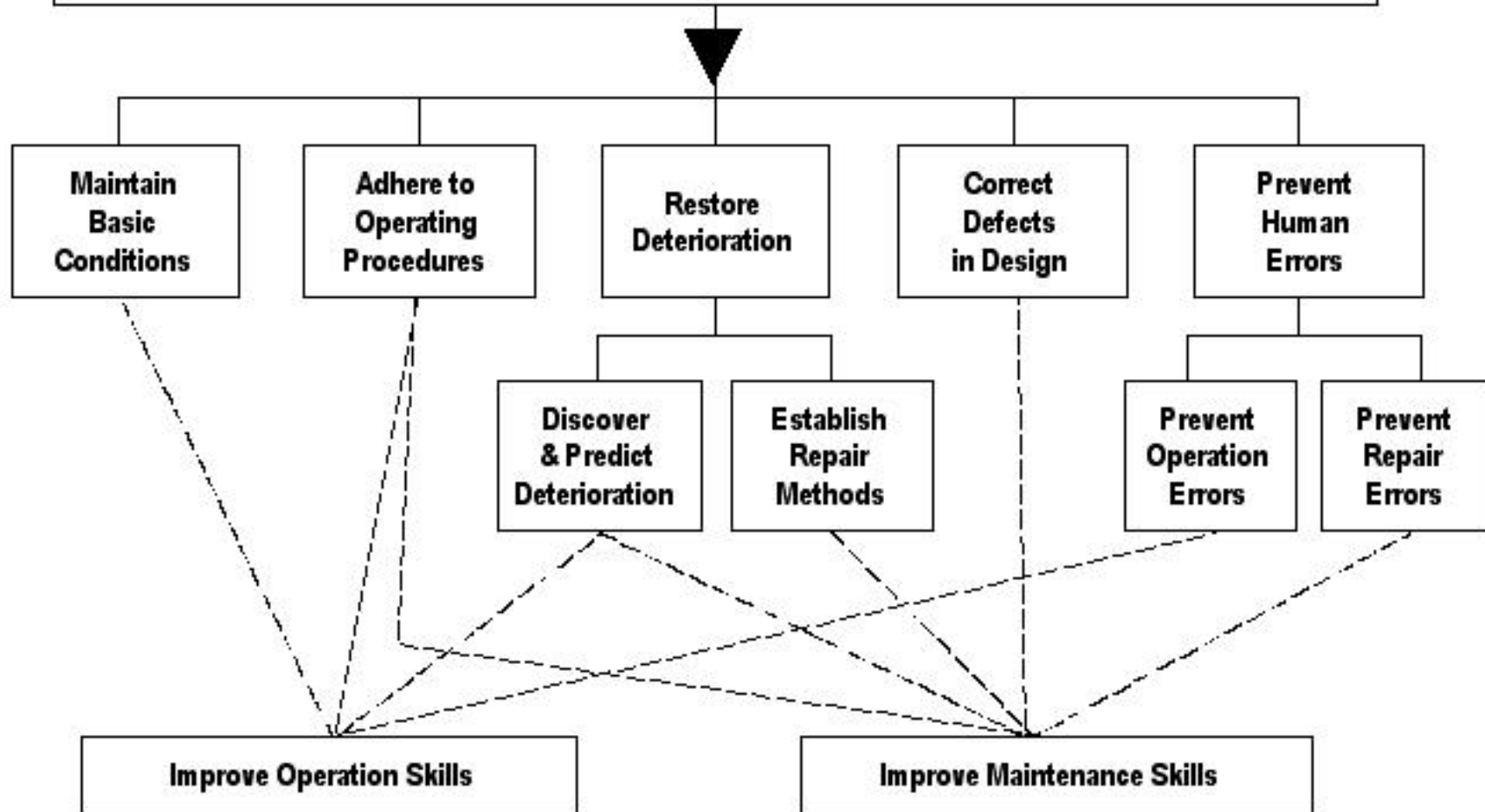
# Tools for predictive maintenance



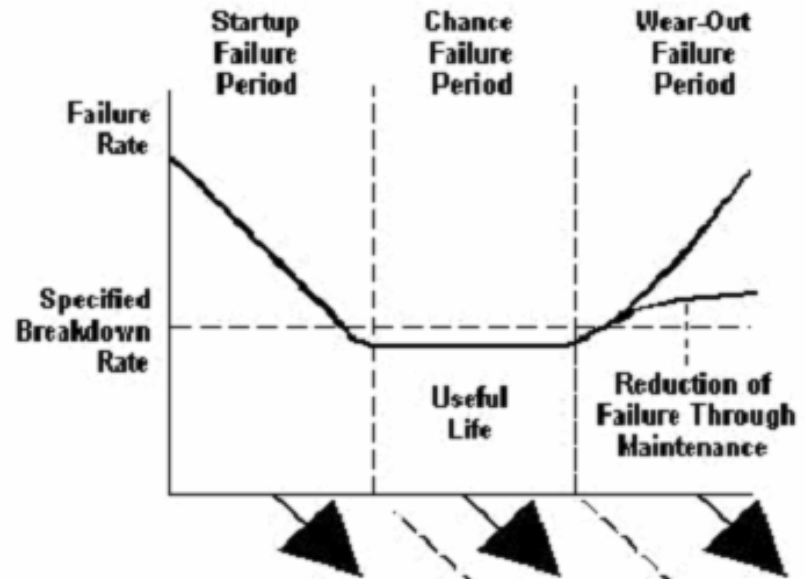
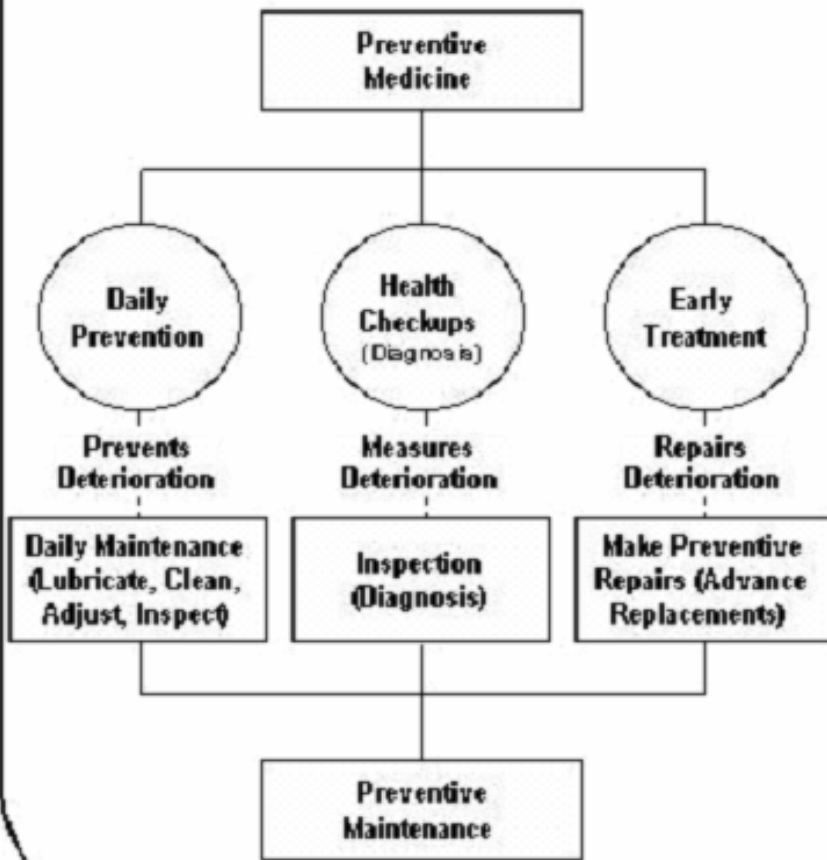
- ❖ Vibration data analysis
  - i. Shaft Orbit Analysis
  - ii. Phase Analysis
  - iii. Start up / Shut down analysis.
- ❖ Motor current analysis
- ❖ Thermography (Mechanical)
- ❖ Debris analysis (Analytical Ferrography )
- ❖ Noise Analysis

# COUNTERMEASURES FOR BREAKDOWNS

## The Five Types of Breakdown Countermeasures



# TOTAL MAINTENANCE CONCEPT



CATEGORY	STARTUP FAILURE	CHANCE FAILURE	WEAR-OUT FAILURE
CAUSE	Decision/ Manufacturing Errors	Operational Errors	Wear-Out
COUNTER MEASURES	Trial runs at Acceptance & Start-up Control	Proper Operation	Preventive & Maintainability Improvement
	Maintenance Prevention		

# Initiatives Taken



- Replacement of LPG column of LPG II plant at Uran.
- Specific repair of propane compressor of LPG I plant of Uran.
- Trim balancing of high speed centrifugal compressors of offshore platforms.
- Thermography of all HT machines and bus bars at offshore platforms.
- Transformer oil analysis and ferrographic analysis of lub oils of all major equipments of offshore platforms.
- Control system upgradation of PGC and TG modules with OCC compliance and system I features at offshore platforms.
- Onshore Control Center has been established to capture real time data of all major equipments and to have 24x7 interaction with all vendors.

The background is a deep blue gradient. At the top, there are wispy white clouds. On the left side, a bright sun is partially visible, creating a lens flare effect. The text 'THANK YOU' is centered in white, uppercase letters. A small yellow dot is positioned to the left of the text.

THANK YOU