

# MAINTENANCE MANAGEMENT

- Why Maintain?
- Developing Maintenance Strategies
- Types of Maintenance
- Maintenance and Design
- Recommended Reading

## Maintenance Management

Why maintain?

# Why Maintain?



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# Why Maintain?

## Legal and other obligations

- to observe H&S requirements
- to observe lease requirements
- to observe statutory requirements
- to observe warranty requirements

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## Why Maintain?

### Operational Issues

- to maintain operational condition
- to keep plant / equipment working efficiently
- to avoid breakdown
- to minimise downtime
- to avoid deterioration
- to optimise performance

## Why Maintain?

### People and Social Issues

- to maintain visual appearance
- to keep business operational
- To maintain staff comfort
- To reduce energy use
- To protect the Environment

- So what do you say to the Finance Director when he asks you to cut 10% off the Maintenance Budget?

## Compliance

- Meaning - to ensure compliance with statutory requirements!



## Statutory Testing & Maintenance 1

- Air conditioning maintenance
- Automatic door servicing
- Boiler (gas, coal, oil) servicing and flue cleaning
- Emergency lighting maintenance
- Kitchen extract fan, canopy cleaning, testing and sterilisation
- Fire alarm maintenance
- Fire fighting and sprinkler equipment testing
- Fire hose reel maintenance
- Fixed electric installation testing
- Gas installation (pipework) testing



## Statutory Testing & Maintenance 2

- Generator testing
- Intruder alarms (access, burglar, CCTV)
- Lift maintenance
- Oil line and tank testing
- Portable electrical equipment testing and inspection
- Pressure vessel testing
- Sewage / water treatment and septic tank cleaning
- UPS power supply maintenance
- Water hygiene inspection and monitoring



## Occupiers Liability Acts: 1957 (Visitors) 1984 (Trespassers)

- Occupiers = Landlords, Tenants, Licensees
- Concerns duty of care owed by those who occupy real property towards people who visit or trespass
- Concerns liability for accidents caused by defective / dangerous condition of premises.
- NB Scottish law in line with English law

## Health & Safety at Work Act (HASWA) 1974

Employers' Duty to ensure, so far as is reasonably practicable, the health, safety and welfare of all employees and:

- ***provision and maintenance of plant and systems of work that are safe and without risks to health***
- making arrangements to remove risks in connection with the use, handling, storage and transport of articles and substances
- provision of information, instruction, training and supervision

## Health & Safety at Work Act (HASWA) 1974 (contd)

- ***ensuring any place of work is maintained in a safe condition without risks to health and the provision of safe access and egress***
- provision of a safe, risk-free working environment with adequate facilities and welfare arrangements



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## Workshop - Maintenance Management

- How would you use the following to help you to remain compliant?
- The terms of your contract with your maintenance service partner
- SLA's and KPI's
- Arranging for a third party to audit the performance of your service partner
- Regular meetings with your service partner

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# Maintenance Management

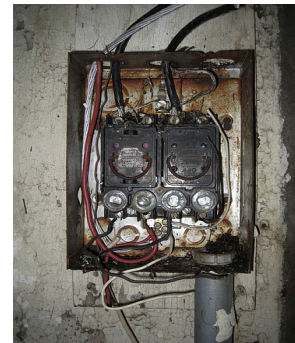
## Developing Maintenance Strategies



## The Bathtub Curve

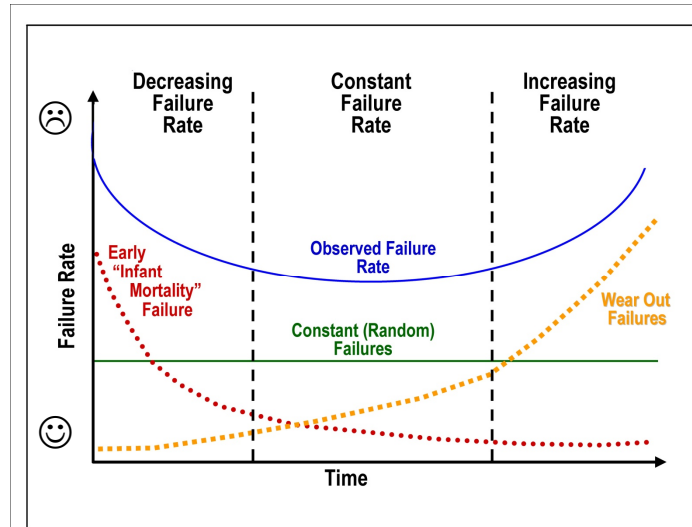
Building systems and assets may fail due to:

- Design or manufacturing defects
- Poor or no maintenance
- Wear and tear
- How long it has been used
- How it has been used
- But one thing is clear – that defects and breakdown occur most at *start* and *end* of equipment life





# The Bathtub Curve



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## Life Cycle Costing (1)

LCC defined as the cost to own and operate an asset throughout its useful life.

Example: Electric lamp with life of 1 year – cost £2

Over a 10 year life of a building lease it will need to be changed 10 times.

– Total Cost is  $10 \times £2 = £20$

Labour cost to change lamp £20

Over 10 year period total labour cost is

$10 \times £20 = £200$ .

Overall cost is  $£20 + £200 = \mathbf{£220}$ .



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## Life Cycle Costing (2)

Instead of the ordinary lamp we could use a lamp with a life of 10 years at a cost of £20

Over the 10 year life of a building lease it will need to be changed 1 time.

– Lamp cost is  $1 \times £20 = £20$

– Labour cost is  $1 \times £20 = £20$

Overall cost is  $£20 + £20 = \mathbf{£40}$



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## Budget – Prioritise Use of funds

- Avoid spreading budget lightly over all budget headings
- Hotels often use the front of house / back of house principle
- Spend most money on items which are critical to the business and would seriously affect the business should they fail
- In emergency, postpone non-critical budget spend to later period if necessary



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## Developing Maintenance Strategies Summary

- Use equipment with a low life cycle cost
- For each asset consider its bath tub curve and life cycle cost
- Plan to replace plant and equipment before it becomes unreliable and costly to maintain i.e. at the end of its useful life
- Target maintenance funds to those areas which will have the biggest impact on the business
- Use this data to develop appropriate maintenance strategies and to respond wisely to changes

## Developing the Maintenance Plan

### **Structural and external fabric**

- Building frame (columns, beams)
- Slab
- Cladding
- Fenestration
- Roof



## Building Condition Survey

- Undertaken by qualified Building Surveyor
- Start point – database of each building element to be surveyed
- Database includes description, age, supplier, performance details
- Selection and design of survey recording medium – manual or electronic



## Building Condition Survey

- Inspections: uncovering as necessary, analyses, measurements
- Assessment of state of repair (good, fair, poor) and any specific defects
- Report and summary of findings: narrative, photographs, results of analysis, indication of remaining life
- Outcome: proposed capital works, repairs and maintenance and priorities, budget costs and programme



### BUILDING CONDITION SURVEY - External Fabric

Element	Condition	Action	Estimated cost £					Comments
			Year 1	Year 2	Year 3	Year 4	Year 5	
<b>External walls</b>								
Brickwork	Good							
Timber cladding	Fair	Decorate	4000	1000	1000	1000	1000	Urgent treatment needed
<b>Fenestration</b>								
Softwood	Fair	Decorate	1000	1000	1000	1000	1000	Proposed rolling programme
Metal	Good							
<b>Roof</b>								
Pitched	Good							
Flat	Fair	Repair	1000	1000	15000	0	0	Renew within 3 years



# Developing the Maintenance Plan

## M&E Services

- HVAC
- Lifts
- Electrical incoming mains and distribution
- Plumbing services



# Developing the Maintenance Plan

Starting off point - Asset register of all plant and equipment, including:

- Description
- Age
- Expected life
- Supplier
- Performance details
- Original purchase price



# Developing the Maintenance Plan

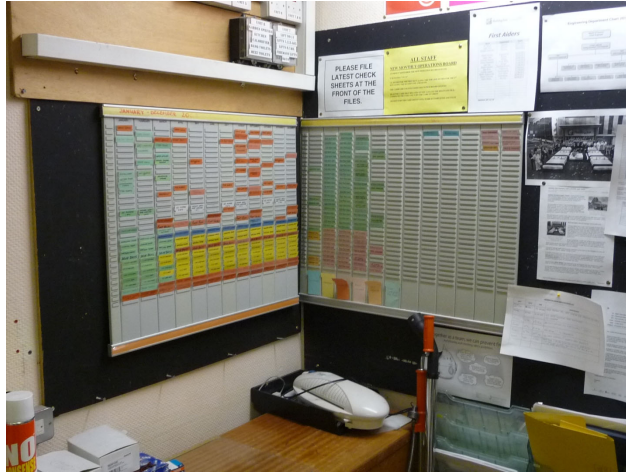
## Planned Preventive Maintenance system (PPM)

- Asset register
- Maintenance requirements - as specified by Manufacturer
- Frequency - as recommended by Manufacturer
- Consider age / condition of plant / equipment
- Consider impact of downtime on the business
- Modify maintenance needs and frequency accordingly
- Outcome - PPM

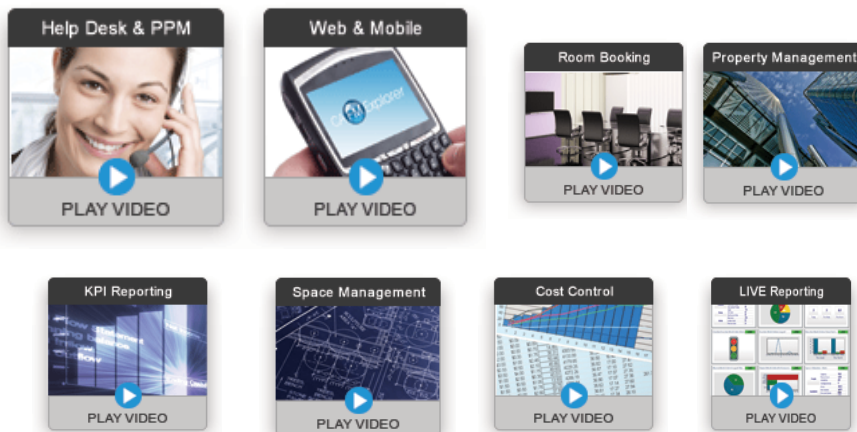


Planned Preventative Maintenance Plan												
Description	Programme											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Boiler	█			█			█			█		
Chiller		█			█			█			█	
Fancoils			█			█			█			█
Filters		█			█			█			█	

# PPM Manual System



# CAFM, PPM and Technology





# CAFM, PPM and Technology

Useful links:

- [www.cafmexplorer.com](http://www.cafmexplorer.com)
- <https://www.swg.com/software/facilities-maintenance-management-software/>



## Developing the Maintenance Plan

Operation of PPM:

- Produces schedule of jobs detailing tools, spares, consumables and methods
- Operative carries out maintenance actions
- Reports results of inspections and repairs / remedial actions taken or required
- Priorities altered where necessary to avoid budget overruns
- Plant history records updated
- Certificates issued and filed



# Developing the Maintenance Plan

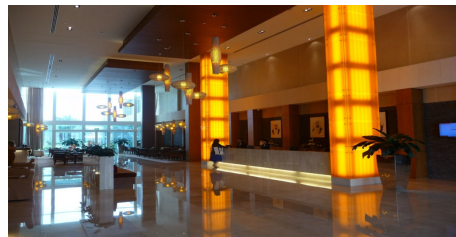
## Internal Fabric

- Partitions, Internal glazing
- Doors, Ironmongery
- Ceiling, Lighting
- Carpet, raised floor tiles
- Floor boxes
- Desks, chairs, cabinets



# Developing the Maintenance Plan

- Regular (monthly?) inspection
- Use checklist
- Carried out by - Facilities staff / Service partner
- H&S issues have priority
- Use checklist to develop immediate or future maintenance actions

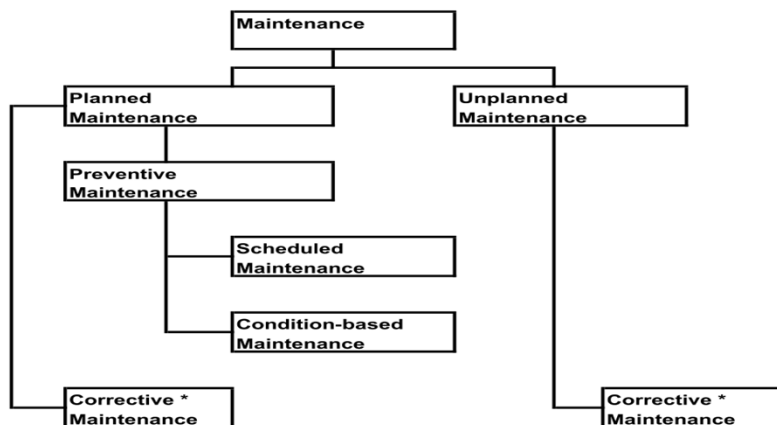


# Maintenance Management

## Types of Maintenance

## Types of Maintenance

How various forms of maintenance relate



\* Includes Emergency

# Types of Maintenance

Definitions - BS 3811

- **Maintenance**  
The combination of all technical and associated administrative actions intended to retain an item in, or restore it to, a state in which it can perform its required function.
- **Planned maintenance**  
Maintenance organised and carried out with forethought, control and the use of records to a predetermined plan.
- **Preventive maintenance**  
Maintenance carried out at predetermined intervals or corresponding to prescribed criteria and intended to reduce the probability of failure or the performance degradation of an item.
- **Scheduled maintenance**  
Preventive maintenance carried out to a predetermined interval of time, number of operations, mileage etc.



# Types of Maintenance

Definitions - BS 3811

- **Condition-based maintenance**  
Preventive maintenance initiated as a result of knowledge of the condition of an item from routine or continuous monitoring.
- **Unplanned maintenance**  
Maintenance carried out to no predetermined plan.
- **Corrective maintenance**  
Maintenance carried out after a failure has occurred and intended to restore an item to a state in which it can perform its required function.
- **Emergency maintenance**  
Maintenance which it is necessary to put in hand immediately to avoid serious consequences.



## Other Maintenance Techniques

### Oil Sampling

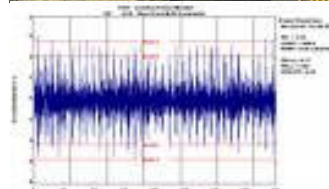
- Decomposition in transformers
- Bearing breakdown in machines
- Corrosion in pipework



## Other Maintenance Techniques

### Vibration Analysis

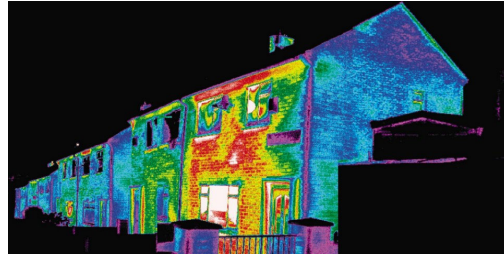
- Early indication of wear



## Other Maintenance Techniques

### Thermal Imaging

- Building insulation performance
- Electrical overheating



## Maintenance Management

### Maintenance and Design

## Poor design results in:

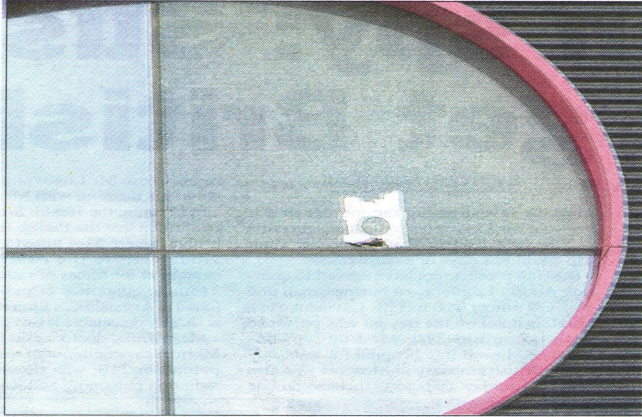
- costly maintenance
- faults which are costly to fix...



### Ring clean: Birmingham Bullring gets its first polish



The 15,862 silver disks on the facade of the Selfridges building in Birmingham's Bullring shopping centre received their first wash this month. They had to be individually hand cleaned using a mild detergent and elbow grease – the operation took two staff from Europa Support Services, the Bullring's FM provider, 12 days to complete. The rings will have to be cleaned twice a year. The 250,000 sq ft, £40 million store, designed by Future Systems, was inspired by a 1960s Paco Rabanne chain-mail dress. The centre opened in September 2003.



Smashed: The arts centre's broken window pane Picture: News Team International

## ...and £40,000 bill to fix one broken window

TAXPAYERS are being landed with a £40,000 bill to repair a broken window after it was discovered that it cannot be reached without pulling down a nearby wall. The 1m by 1m glass pane was smashed by vandals at the Public, a new arts centre in West Bromwich. However, the local Tory council leader Tony Ward yesterday spoke of a

'massive design fault' by Will Alsop, the architect who designed the unfinished pink and purple building. He said: 'Windows break all the time and it is no good if every time it costs this huge amount.' The arts centre is already in administration after the original £32million cost soared to £55million. Mr Ward is calling for an inquiry into the cost.







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## Maintenance Expertise

- Good maintenance requires blend of Management and Technical
- Imbalance results in:
  - high cost
  - or
  - inappropriate maintenance
- FM's need to develop understanding of technical matters
- Experienced FM's well qualified to comment on maintenance aspects of proposed design

- **Highly** recommended reading for all aspects of Building Maintenance Management

