

Pearson BTEC Levels 4 Higher Nationals in Engineering (RQF)

## Unit 18: Maintenance Engineering

# Unit Workbook 2

in a series of 4 for this unit

Learning Outcome 2

## Maintenance Strategies

## INTRODUCTION

**LO2 Differentiate between the merits and use of different types of maintenance strategies in an industrial workplace**

*Maintenance strategies:*

Definition of, and need for, maintenance

Component failure, bathtub curve

Equipment design life and periodic maintenance (e.g. belt adjustment, lubrication etc.)

Reactive, preventive, predictive and reliability centred maintenance

Comparison of the presented maintenance programmes

SAMPLE

## Contents

INTRODUCTION .....	2
Maintenance strategies: .....	4
Definition and need for maintenance.....	4
Component failure and the Bathtub Curve.....	4
Equipment design life and periodic maintenance .....	6
Reactive, preventive, predictive and reliability centred maintenance.....	6
Reactive (Corrective) Maintenance.....	6
Preventive Maintenance .....	7
Predictive Maintenance .....	8
Reliability Centred Maintenance.....	9
Comparison of the presented maintenance programmes .....	9
Preventive Maintenance Advantages and Disadvantages.....	9

SAMPLE

- Dust ingress
- Excessive light exposure
- Inadequate protection devices

That's quite a list, and there are many other causes of failure which could be added to it.

You may be familiar with problems with new devices; a car is a good example. A car is a complex machine with lots of systems and sub-systems. Any one system can be found to be faulty in a new car. When a car has been 'run-in' for a few weeks or months then the chance of finding a faulty system or component diminishes. The car then has a reasonable useful lifetime. After quite a few years, however, the car starts to present problems because the systems are ageing, suffering from friction and heat damage. This is a very typical situation for most devices and can be described by a 'Bathtub Curve', as depicted in figure 1.

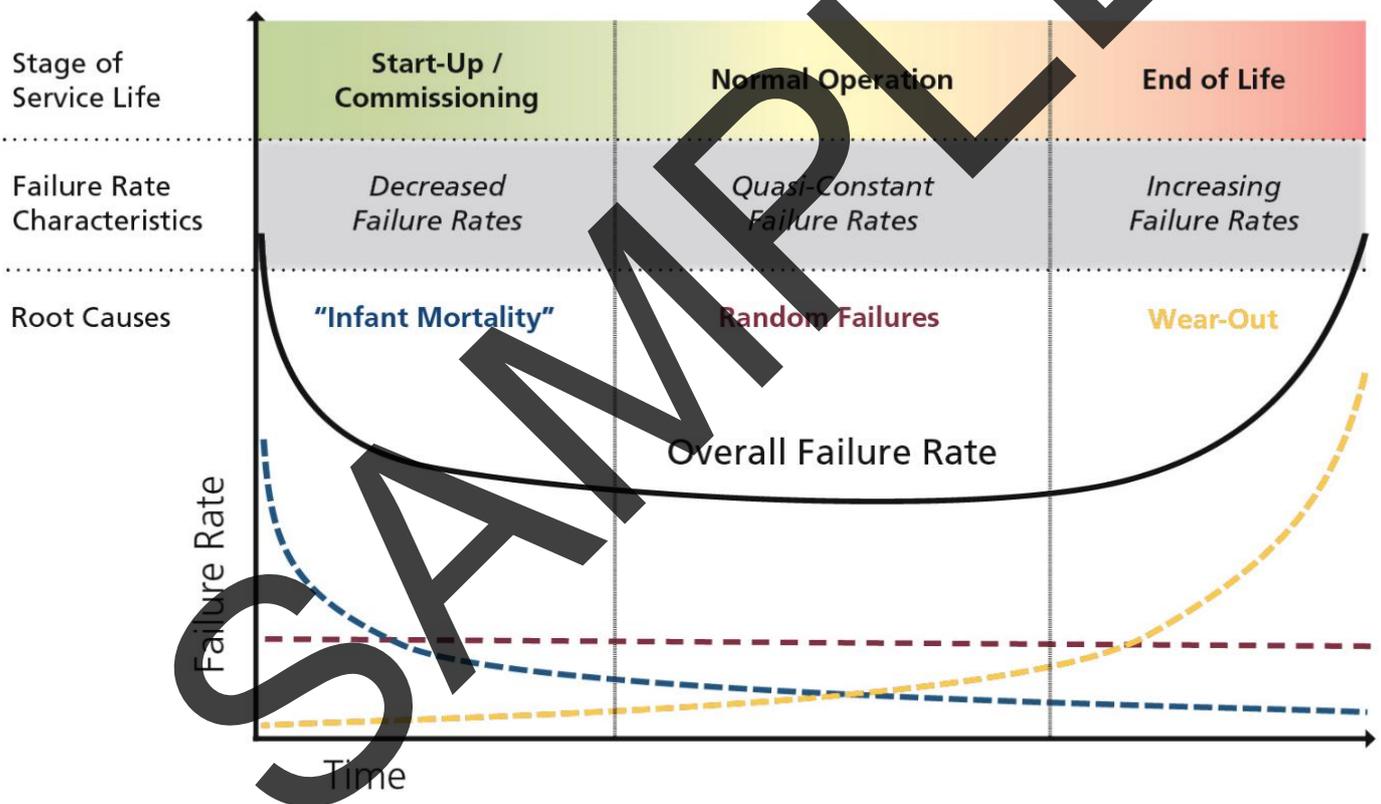


Figure 1 The bathtub curve



### Predictive Maintenance

This uses performance data, visual inspection and nonintrusive testing to ascertain the condition of an item. Such inspection and testing will be useful when planning maintenance schedules to avoid system or sub-system failure.

Predictive testing and inspection data is assessed to determine the condition of an item. Pattern recognition in the data and testing of limits and ranges in the data can be an early indicator of the need for servicing.



The performance of Preventive Maintenance has many advantages including...

- increase in equipment availability
- performed as and when convenient
- balanced workload
- reduction in overtime
- increase in production revenue
- consistency in quality
- reduction in need for standby equipment
- stimulation in preaction instead of reaction
- reduction in parts inventory
- improved safety
- standardized procedures, times, and costs
- scheduled resources on hand
- useful in promoting benefit/cost optimization

Some disadvantages of Preventive Maintenance are...

- exposing equipment to possible damage
- using a greater number of parts
- increases in initial costs
- failures in new parts/components
- demands more frequent access to equipment

Reliability Centred Maintenance Advantages and Disadvantages

The application of RCM has many benefits, including...

- improvement in safety and environmental protection
- improvement in product quality
- improvement in the useful life of costly items
- a maintenance database
- improvement in teamwork
- improvement in maintenance cost-effectiveness
- greater motivation of individuals
- higher plant availability and reliability.

Occasionally, application of RCM has resulted in failure. Some reasons for its failure were...

- an analysis conducted at too low a level
- too much emphasis placed on failure data
- the application was superfluous or hurried