

Part 1 - Introduction to Equipment Reliability Concepts

LIMITATIONS OF MACHINES AND MATERIALS

- Understand How Machines are Designed and the Limits They Must Live Within
- The Unforgiving Nature of Machine Design
- Strength of Materials Limitations
- The Degradation Cycle
- Repeated Over-Stressing Causes Fatigue
- The Overload Cycle
- Stress and Fatigue are Optional

DETERMINING THE RELIABILITY OF PARTS

- What is Reliability?
- What is the Reliability of this this Glass? (In other words: 'what's the chance it will hold water next time you use it?')
- How do you Measure Reliability of a Glass?
- Measuring the Number of Failures
- Measuring the Rate of Failures
- Converting to Chance of Failure
- Drawing the Reliability Curve for a Glass
- No Maintenance for Random Failures
- Random Failures are Preventable
- What is the Reliability of These Parts and Systems?
- What is the Reliability of a Car Tyre?
- Preventive Maintenance for Wearing Parts
- What is the Reliability of a Knife?
- Preventive Maintenance for Wearing Parts
- What is the Reliability of a Roller Bearing?
- Roller Bearing Failure Mechanisms
- Tell-tale Bearing Failure Mode Signs
- Failure Rate for Roller Bearings
- Bearing Failure Rate Variation
- 'Reading' Failure Curve Shapes

RELIABILITY OF COMPLEX PARTS

- Modelling Reliability of Complex Parts
- Calculating the Reliability of a Part
- Modelling Failure Data on a Spreadsheet
- Failure Rate from History of Failures
- Probability of Failure
- Formula for the Reliability of a Part
- Reliability Mathematics in 'Random Failure' Zone
- Failure Rate and Reliability Curves
- Remaining Life Left in a Part
- The Odds of a Part Surviving For Longer
- Chance of a Part Surviving Another Month

RELIABILITY PREDICTION

## Reliability and Maintenance Management1.txt

- Studies into Individual Parts Failure Curves
- Using Weibull Curves for Failure Prediction
- Graph of Weibull Component Life Prediction
- High Reliability of Parts is Valuable
- Using Reliability to Decide Renewal of 'Wear-out' Parts in Machines
- Using Reliability to Decide Renewal of 'Random Failure' Parts in Machines
- Using Reliability to Decide Renewal of 'Wear-in' Parts in Machines
- Maintenance Strategies for Parts and Components
- Using Reliability to Decide when to Do Preventive Maintenance
- Stability of Failure Rate for Analysis
- Reliability of Series Systems
- Reliability Implications for Series Systems
- Reliability of Parallel Systems
- Reliability Implications for Parallel Systems
- A Machine is a Series System of Parts and Components
- Machine Failure Rate is the Sum of Its Parts Instantaneous Failure Rate

### RELIABILITY OF MACHINES

- Reliability of Machines in Series Process
- Reliability of Machines in Long Series Processes- The Never Ending Challenge
- Reliability of Machines
- Improving the Reliability of Machines
- Financial Benefits of Reliable Machines
- Meeting The Reliability Challenge
- Risk - Reduce Chance or Reduce Consequence?
- Building for the Physics of Failure
- Modelling Machine Reliability
- Machine Reliability Block Diagram

### INSTALLING RELIABILITY PRINCIPLES INTO MAINTENANCE

- Best Practice Reliability Engineering Application
- Quality Function Deployment - The Voice of the 'Customer'
- Failure Mode and Effects Analysis
- Failure Modes and Functional Loss
- Failure Modes and Evidence of Failure
- Activity 1 - Identify failure modes and functional failures in a pump installation
- Crow-AMSSA Reliability Plot of Systems
- Crow - AMSSA Reliability Growth Plotting