ACHIEVING RELIABILITY FROM DATA

Module 01en

Maintenance decisions – Stating the basic problem

Living RCM Certified®

"Dynamic" RCM

1

The basic problem in physical asset management

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An analogy

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Failures do not happen at fixed times.
They occur randomly based on a ….

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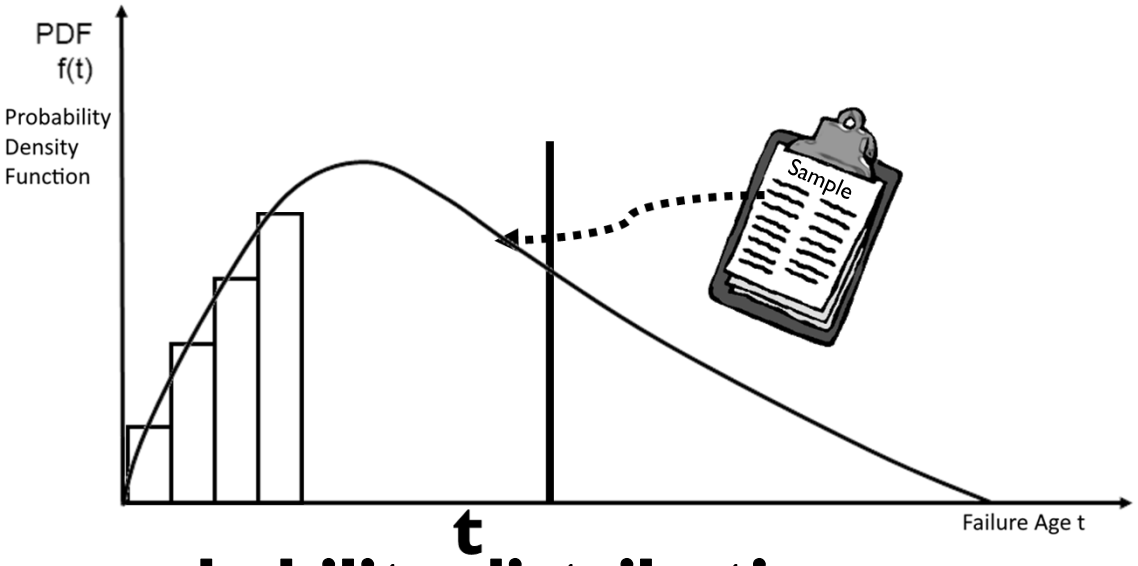
But can we draw probability density curve ***exactly***?



probability distribution

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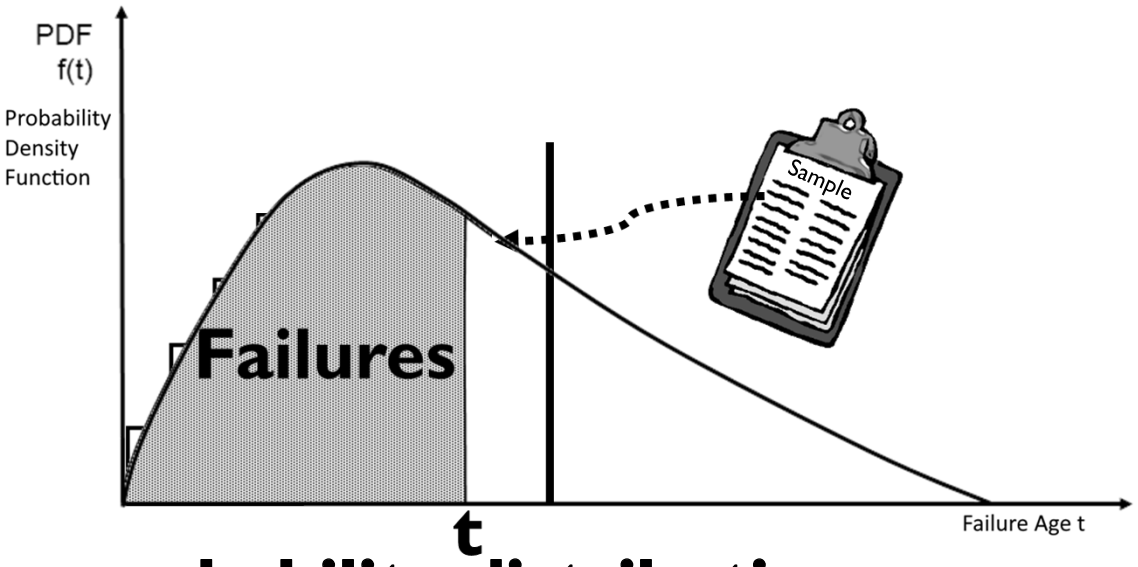

probability distribution

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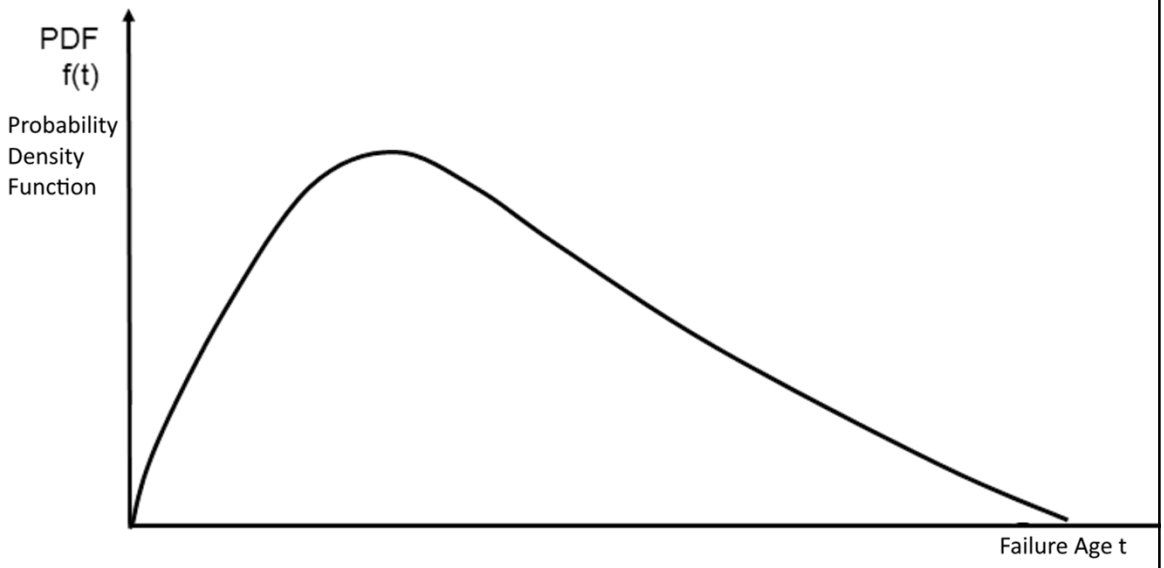
But how does knowing the probability distribution help us make a decision on **when** to perform maintenance?



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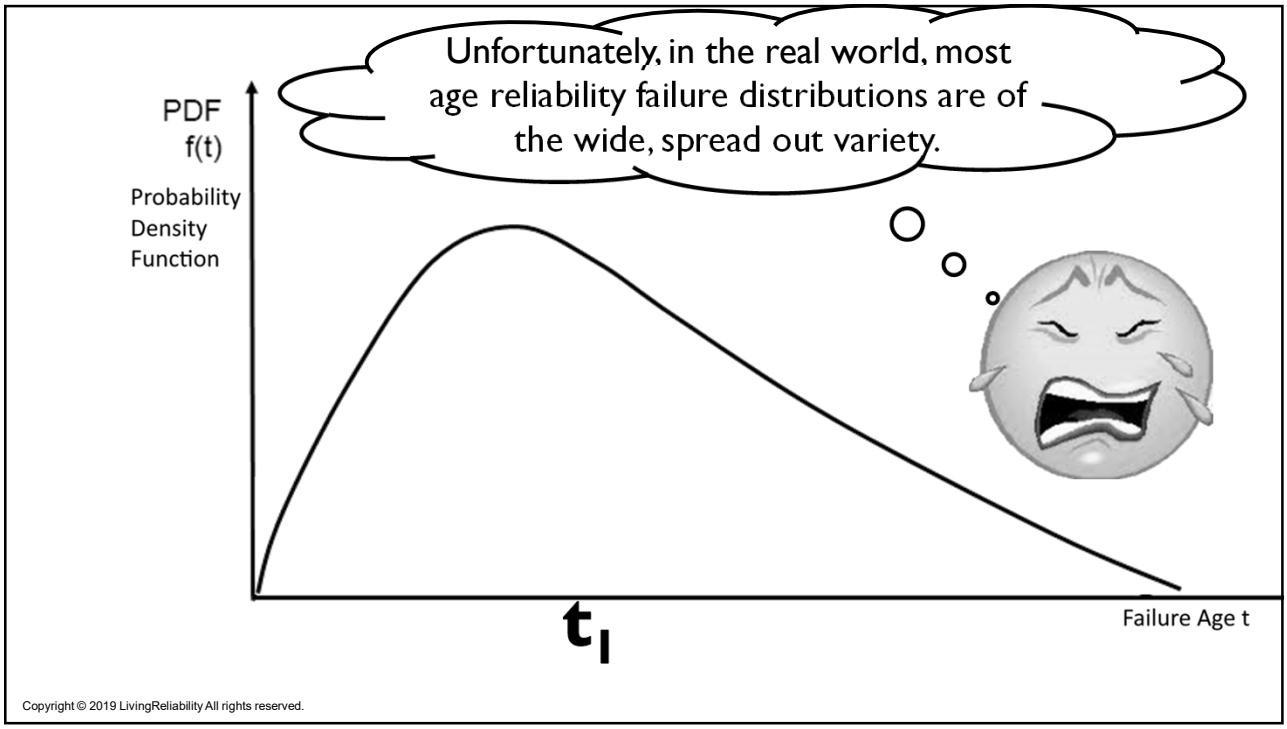

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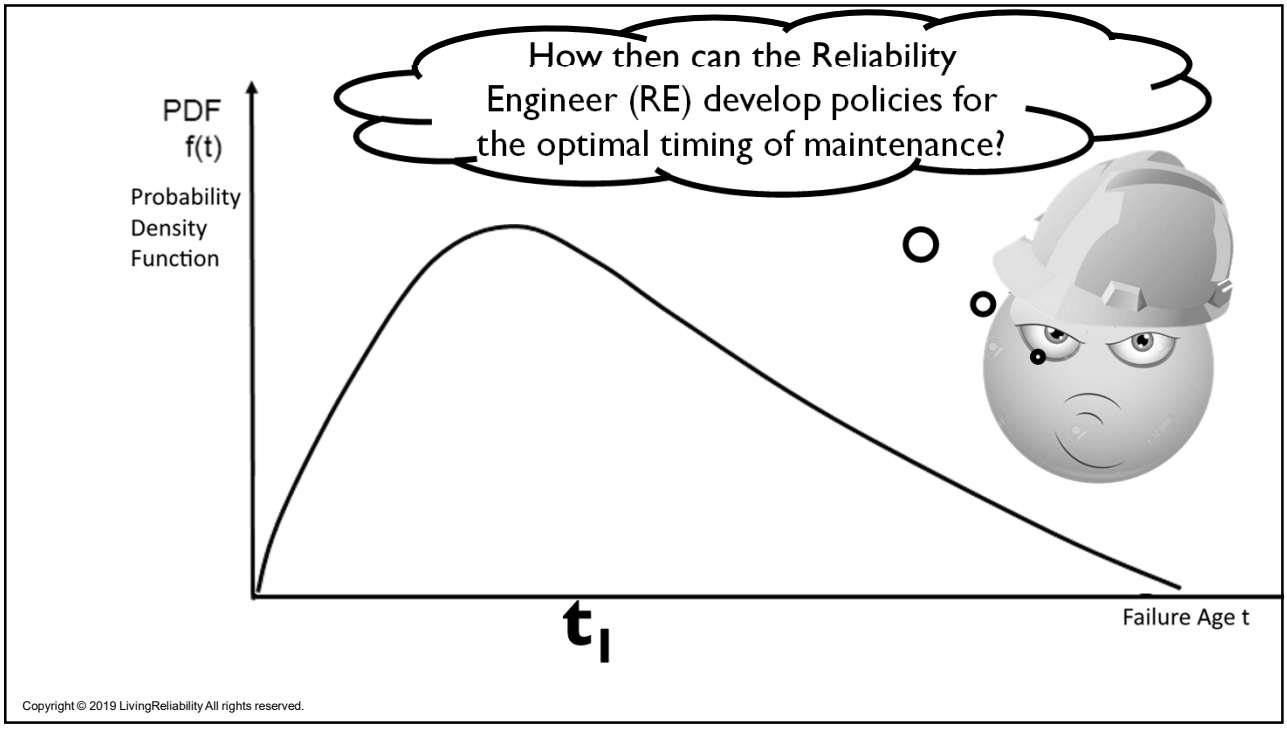

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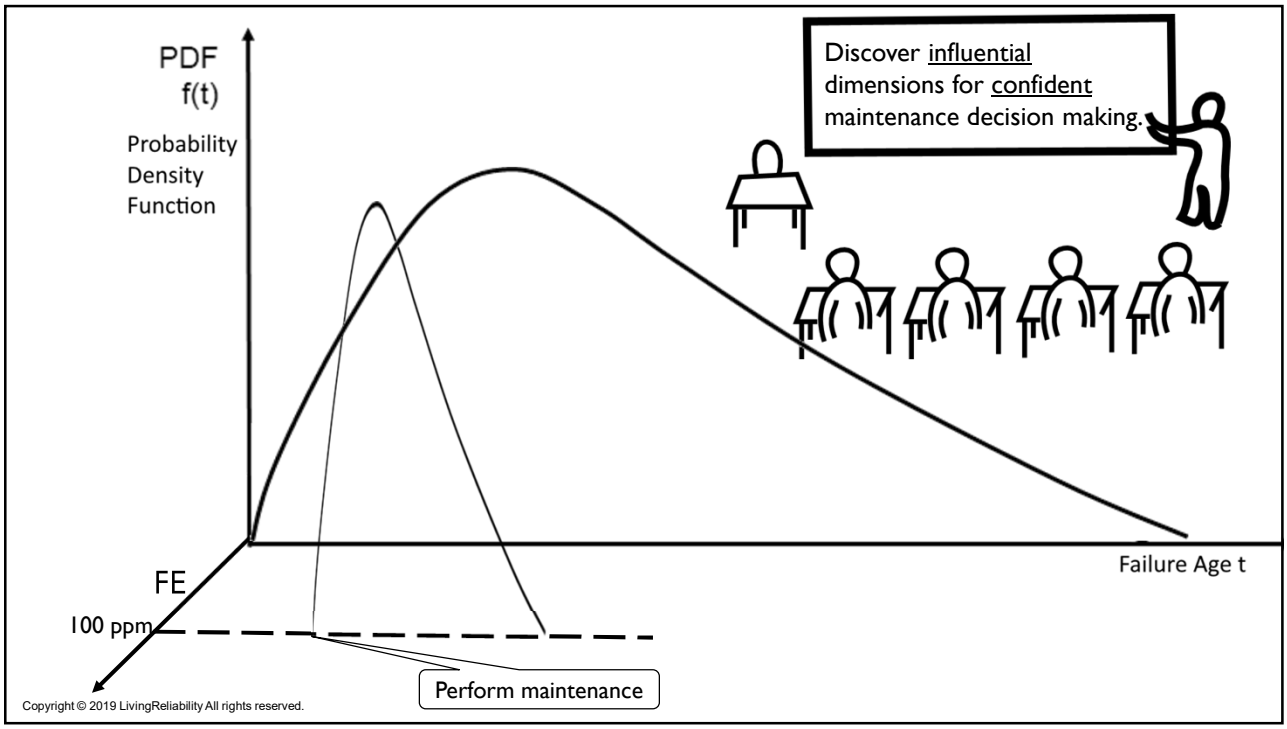

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Adding significant dimensions (called "condition indicators") to the maintenance decision process is known as **Condition Based Maintenance**, or

CBM

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CBM is also called …

- Predictive Maintenance
- Condition Maintenance
- Prognostice Health Monitoring
- On-Condition Mantenance

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Although there are subtle differences among programs with these various titles, they all mean, essentially the **same** thing:

The gathering, processing, and analyzing of **relevant** data and observations, in order to make one of these **decision** choices, either:

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The gathering, processing, and analyzing of **relevant** data and observations, in order to make one of these **decision** choices, either:

1. **Intervene immediately** and conduct maintenance on an equipment at this time, or
2. **Plan** to conduct maintenance within a specified time, or
3. **Defer** the decision until the next CBM evaluation.

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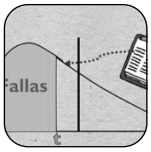
The optimized CBM decision process considers:



The probability of failure in an upcoming time interval

The severity (consequences) of the failure.

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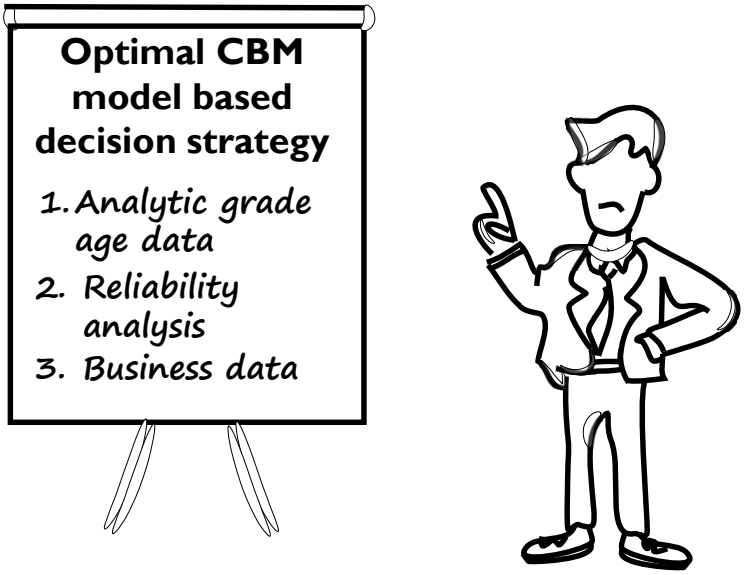

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1.1 QUIZ 1 BASIC PROBLEM

- https://forms.gle/2dRtkbMSX5Wjbm8W7

1. Which of the following does NOT correctly describe the mean time to failure or MTTF of an item (An "item" is a part, component, equipment, or any entity subject to failure)? * 1 point

- 1. It is the average life of an item.
- 2. It is a convenient and useful approximation of the reliability of an item.
- 3. It can be used to accurately predict when failure will occur.
- 4. It can be calculated from the probability density function.

2. In the context of physical asset management, reliability, and maintenance which of the following does NOT accurately describe the concept of a "sample"? 1 point

- 1. A sample is a single reading such as a vibration level or oil analysis reading.
- 2. A sample is usually a collection of work orders exectuted on an item over a period of time.
- 3. A sample should be large enough to represent the failure probability distribution (and therefore allow us to understand) the failure behavior of the item.
- 4. Management should provide tools, standards, and training to technicians so as to ensure good samples from the work order data base.

3. The purpose of collecting maintenance related data for samples in physical asset management is: 1 point

- 1. To develop effective procedures for converting observations into optimal decisions for maintenance action.
- 2. To subject the sample to a variety of analysis techniques in order to understand the failure behavior of an item.
- 3. To increase the profitiability of an asset.
- 4. To assist in complying with the requirements of ISO 9000, 55000, 14224, Health, safety, and environmental regulations.
- 5. All of the above

4. Condition based maintenance is: 1 point

- 1. also called predictive maintenance, prognostic health management, condition monitoring and other names.
- 2. a set of data related procedures to decide when to intevene and perform a specified maintenance action.
- 3. the application of a set of rules or policies derived from the analysis of samples.
- 4. scheduled visual or sensor based observations that may result in immediate or scheduled remedial action.
- 5. all of the above.

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