



# **Spare Parts Management Foundations Workbook**

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## About this Workbook

This workbook is designed to provide you with a structure for your note taking and to prompt your thoughts and potential actions for your workplace.

The aim is to provide you with a working document that reinforces the information presented.

Throughout the book there are pages headed, **Planning Exercise**. By completing these pages after reviewing each Focus Area, you will document a series of ideas and actions that you can then use to develop your company-specific spare parts management action plan.

The answers to each exercise are available as a separate download on the Foundations Playbook home page at SparePartsKnowHow.com

## About the Author

Phillip Slater is a spare parts inventory management specialist and the Founder of SparePartsKnowHow.com.

With more than 40 years' experience Phillip has helped rebuild and reorganise MRO stores and spare parts management systems for asset-intensive organisations in +35 countries. While he is university qualified in both mechanical and maintenance engineering, Phillip's greatest sections in spare parts management came from his time working as a maintenance engineer and operations manager.

Phillip is the author of nine books, including Spare Parts Inventory Management, Smart Inventory Solutions and The Optimization Trap and has been published more than 250 times in industry and trade magazines around the world.

For more information on Phillip, please visit [PhillipSlater.com](http://PhillipSlater.com)

SparePartsKnowHow.com is a multi-award-winning website that provides online training in spare parts inventory management. Over the years, more than 20,000 spare parts management professionals, from more than 130 countries, have joined the SparePartsKnowHow.com community.

For more information please visit [SparePartsKnowHow.com](http://SparePartsKnowHow.com).

## Reference Book

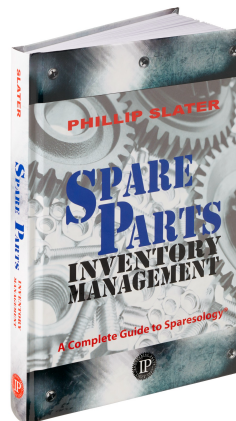
### Spare Parts Inventory Management

A Complete Guide to Sparesology®

Phillip Slater

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## What You Will Learn

### Focus Area: Introduction to Spare Parts Inventory Management

How to:

1. Identify the characteristics that differentiate spare parts inventory from other types of inventories.
2. Identify 5 common supply chain techniques that should not be used with spare parts inventory.
3. Explain how spare parts management fits into the big picture of operations management.
4. Explain the 5 key financial principles for spare parts management.
5. Calculate the cost of holding spare parts inventory.

### Focus Area: Criticality and Deciding What to Stock

How to:

1. Identify critical spare parts and understand how to differentiate between machine critical and inventory critical spare parts.
2. Explain the relationship between the Planning Horizon and Lead Time.
3. Apply the 7 questions that need to be asked before deciding to stock an item in inventory.
4. Determine the requirements for selecting and stocking spare parts for new capital equipment (first time buy).

### Focus Area: Setting Stock Levels

How to:

1. Explain the difference between theory and reality with determining spare parts requirements.
2. Explain the problems with using traditional calculation methods for determining spare parts re-order points and re-order quantities.
3. Apply simple logical techniques for determining appropriate re-order points and re-order quantities.

### Focus Area: Managing Obsolescence

How to:

1. Explain the difference between vendor-led and owner-led obsolescence and the implications of each.
2. Develop an End-Of-Life (EOL) plan and calculate Last-Time-Buy requirements.
3. Recognize the issues involved in managing spare parts disposal.
4. Identify 7 different disposal options and the benefits of each.

### Focus Area: Spare Parts Management Best Practices

How to:

1. Explain the process used to identify best practices.
2. Identify and apply six practices that are shown to make a genuine difference to spare parts inventory management outcomes.

## Action Planning

The first step in developing your action plan is to define your challenge and your goals. Complete the following and use your responses to guide you with the planning exercises.

### Your Challenge

### Your Goals

1.

2.

3.

## Focus Area: Introduction to Spare Parts Inventory Management

### Why Spare Parts are Different (from Other Inventory Types)

List all 8 reasons we spare parts are different from other inventory types and make any related notes on how this is reflected in your workplace.

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.
- 7.
- 8.

### List the Standard Inventory Management Tools that Don't Work with Spare Parts and Why They Don't Work

Standard Tool

Why It Doesn't Work with Spare Parts Inventory

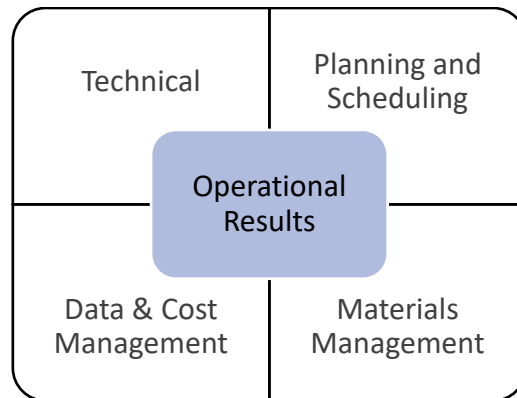
How does the application of these tools cost your business?

## The Big Picture – Putting Spare Parts in Context

Spare parts management is complicated by two factors:

- 1.
- 2.

**This diagram is a simple model of maintenance activities, make your notes about each element and how they relate to spare parts management**



## Financial Considerations

### List the five key financial principles

- 1.
- 2.
- 3.
- 4.
- 5.

The cost of financing working capital is much more than just the interest rate that businesses pay on borrowings.

In business finance, there is a term called the Weighted Average Cost of Capital (or WACC, pronounced *wack*). The WACC will be different for every company because it is based on the sources of capital. Sources of capital include shareholder funds, borrowings from banks, bond issues, and so on.

As this isn't a business finance course, I won't be explaining this concept further except to say that for most companies the WACC is generally between 10–15%. You should ask your Chief Financial Officer (CFO) what WACC to use for your company.

Other costs with holding inventory are the costs of obsolescence, spoilage, and managing and storing inventory. These are usually difficult to estimate. Some companies use estimates that the cost of obsolescence, spoilage, and managing and storing inventory could be as much as 15% per annum of the total investment in inventory! However, for general use, a value of 10% is recommended as a suitable rule of thumb.

### Exercise: How Much Does It Cost to Hold Your Inventory?

Complete the following template to find out.

Value of inventory being considered	\$	A
Estimated the WACC	%	B
Estimated % cost of obsolescence, spoilage, managing and storing inventory	%	C
<hr/>		
Add B to C to calculate the Inventory Cost Ratio	%	D

Now multiply D x A to calculate the annual cost of holding inventory \$

This is how much it costs to hold this inventory **each and every year**.

## Action Planning Exercise

Reflecting on this section please complete the following questions.

1. What are, to you, the most important 3 things that you have learned or been reminded of in this section?

1.

2.

3.

2. What actions/follow up should you take in relation to these three things?

- 
- 
- 

3. Who else should you involve?

4. What prevents or constrains progress in these areas?

5. How can you overcome these constraints?

## Focus Area: Criticality and Deciding What to Stock

Complete the following statements

A critical spare part is a component that...

...and for which

List the Six Steps to Determine Spare Parts Criticality and Complete the Following Decision Matrixes

1.

2.

3.

4.

		Operational Criticality		
		Low	Medium	High
Machine Criticality	No			
	Yes			

5.

		Lead Time	
		Acceptable	Unacceptable
Supplier Quantity	Matches Requirements		
	Excess to Requirements		

6.

Consequence Category	Consequence of Non Availability When Required				
	1	2	3	4	5
Safety	No Safety Concerns	Manageable Safety Issues			Genuine Potential for Injury
Environment	Minor Leakages	Significant Leakages	Significant Pollution	Major Environmental Event	Major Environmental Event
Quality	Minor Product Defect	Significant Product Defect	Serious Product Defect	Major Product Defect	Total Product Defect
Finance/Operations	\$	\$\$	\$\$\$	\$\$\$\$	\$\$\$\$\$
	Likelihood of Demand				
	1	2	3	4	5
Estimated Time to Part Demand	XXX years	XX years	X years	Within 12 months	Every few months

*Example Only*

Likelihood	Consequence				
	1	2	3	4	5
1	Do not Purchase	Do not Purchase	Do not Purchase	Snr Mgr Decision	Snr Mgr Decision
2	Do not Purchase	Do not Purchase	Do not Purchase	Snr Mgr Decision	Purchase Spare
3	Do not Purchase	Do not Purchase	Snr Mgr Decision	Purchase Spare	Purchase Spare
4	Snr Mgr Decision	Snr Mgr Decision	Purchase Spare	Purchase Spare	Purchase Spare
5	Snr Mgr Decision	Purchase Spare	Purchase Spare	Purchase Spare	Purchase Spare

Example Only

**Exercise: Work through the criticality decision process for a spare tyre, using a puncture as the failure mode.**

		Operational Criticality		
		Low	Medium	High
Machine Criticality	No	Order as Required		Investigate Condition Monitoring No ⇒ Risk Matrix
	Yes	Order as Required	Go to Supplier Matrix	Yes ⇒ Order as Required

Consequence Category	Consequence of Nonavailability When Required				
	1	2	3	4	5
Safety	No Safety Issues	Manageable Safety Issues			Potential for Injury
Environment	Minor Leakages	Significant Leakages	Significant Pollution	Environmental Event	Major Environmental Event
Quality	Minor Product Defect	Significant Product Defect	Serious Product Defect	Major Product Defect	Total Product Defect
Finance/Operations	\$	\$\$	\$\$\$	\$\$\$\$	\$\$\$\$\$

	Likelihood of Demand				
	1	2	3	4	5
Estimated Time to Part Demand	10 Years	5 Years	2 Years	Within 12 Months	Every Few Months

Likelihood	Consequence				
	1	2	3	4	5
1	Do not Purchase	Do not Purchase	Do not Purchase	Snr Mgr Decision	Snr Mgr Decision
2	Do not Purchase	Do not Purchase	Do not Purchase	Snr Mgr Decision	Purchase Spare
3	Do not Purchase	Do not Purchase	Snr Mgr Decision	Purchase Spare	Purchase Spare
4	Snr Mgr Decision	Snr Mgr Decision	Purchase Spare	Purchase Spare	Purchase Spare
5	Snr Mgr Decision	Purchase Spare	Purchase Spare	Purchase Spare	Purchase Spare

**Exercise: Now work through the process for brake pads**

		Operational Criticality		
		Low	Medium	High
Machine Criticality	No	Order as Required		Investigate Condition Monitoring No ⇒ Risk Matrix Yes ⇒ Order as Required
	Yes	Order as Required	Go to Supplier Matrix	

		Lead Time	
		Acceptable	Unacceptable
Supplier Quantity	Matches Requirements	Order as Required	Investigate Condition Monitoring No ⇒ Risk Matrix Yes ⇒ Order as Required
	Excess to Requirements	Create Stock Item ROP=0 No Auto Reorder	

## 7 Questions for Deciding What to Stock

There are two reasons why we hold spare parts. List them.

- 1.
- 2.

### The Planning Horizon

Complete this drawing showing the planning horizon impact.



### List the seven questions to ask before deciding to add an item to your inventory

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.
- 7.

**Exercise: For each scenario listed below making your stocking decision and note why you took that decision.**

Scenario	Stocking Decision and Why
<p>1. Filter set used for annual (time-based) replacement.            Planning horizon – 1 year            Lead time – 1 month</p> <p>Should you stock the filter?</p>	
<p>2. The same filters from No. 1 are used as emergency replacement stock in the event of an unexpected blockage.            Planning horizon – 0            Lead time – 1 month</p> <p>Should you stock the filter?</p>	
<p>3. Consider a small electric motor available off the shelf with a lead time of two days. Failure of the motor will halt production and there is no planned maintenance.            Planning horizon – 0</p> <p>Should you stock the electric motor?</p>	
<p>4. Consider the same small motor but this time where there is condition monitoring. This maintenance task is expected to provide at least a six-week forecast of potential failure.            Planning horizon – 6 weeks</p> <p>Should you stock the electric motor?</p>	
<p>5. Consider the same small electric motor, except that this time there is no condition monitoring but there is redundant capacity through an alternate processing line.            Planning horizon – 0</p> <p>Should you stock the electric motor?</p>	

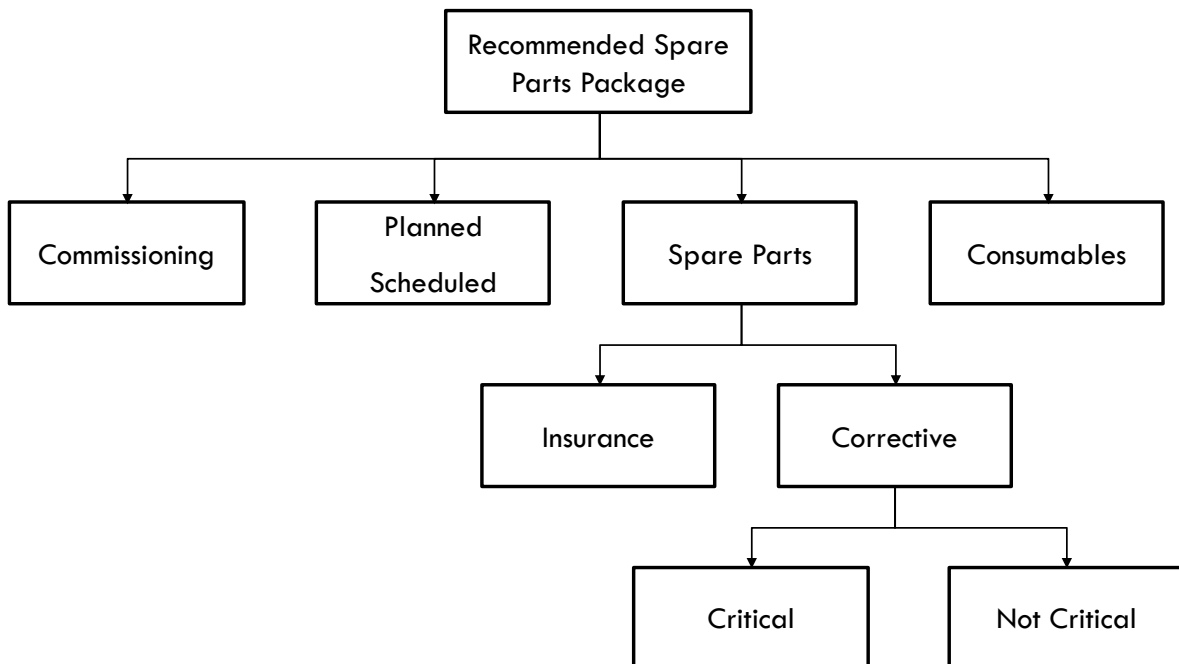
<p>6. Seal kits used for a hydraulic cylinder are sold in boxes of six sets but used one set at a time. A leaking seal can be detected 1 month before functional failure.          Planning horizon – 1 month          Lead time - 1 week</p> <p>Should you stock the seal kits?</p>	
<p>7. A highly reliable pneumatic valve has a primary failure mode of seal wear. The seals can be reliably and safely replaced in-situ in 30 minutes. Removal and installation of a replacement valve takes 15 minutes. The seal kits are sold individually.</p> <p>Should you stock the pneumatic valve?</p>	
<p>8. A major equipment upgrade is planned. The upgrade will require the use of 16 bearings of a type that is already a stocked item in your warehouse, where only 2 are held as a emergency stock.</p> <p>Should you stock the additional 16 bearings as stock items?</p>	

## Capital Equipment and the First Time Buy

List the 6 questions to ask:

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.

Make notes on segmenting the recommended spares package



## Action Planning Exercise

Reflecting on this section please complete the following questions.

1. What are, to you, the most important 3 things that you have learned or been reminded of in this section?

1.

2.

3.

2. What actions/follow up should you take in relation to these three things?

•

•

•

3. Who else should you involve?

4. What prevents or constrains progress in these areas?

5. How can you overcome these constraints?

## Focus Area: Setting Stock Levels

### Max-min or ROP-ROQ

Which does your company use?

Make notes on why they are not the same.

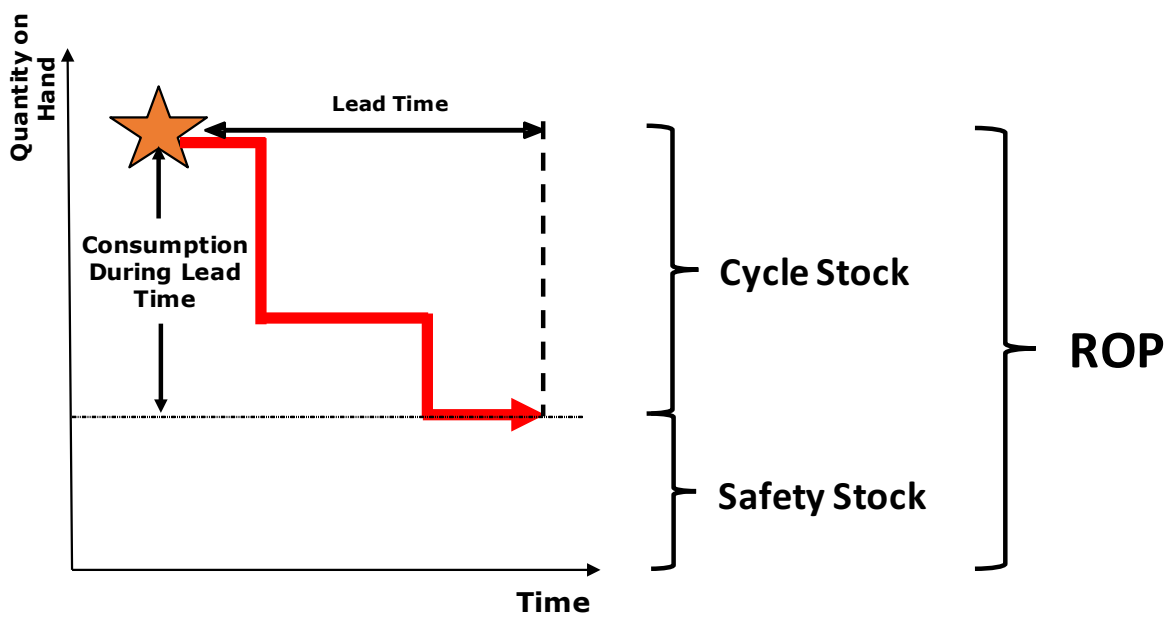
List the 3 steps for determining inventory holding levels

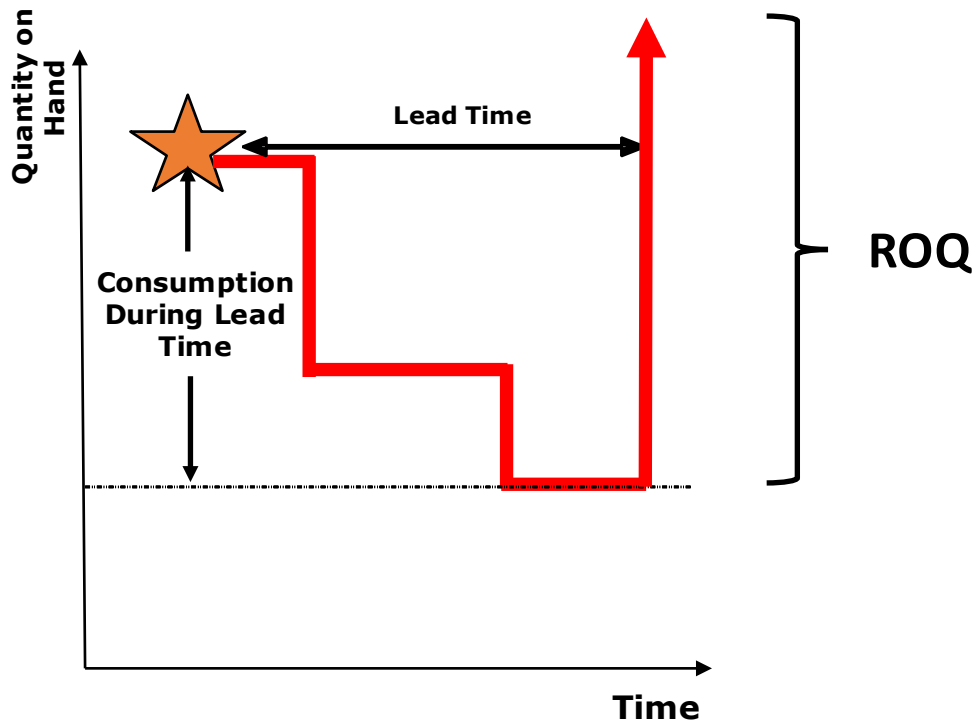
Step 1:

Step 2:

Step 3:

Make your notes on the following diagrams





## Exercise: ROP and ROQ Calculations

### Instructions

These exercises are provided as support to the sections on ROP and ROQ calculations. On the next page is a series of scenarios for calculation.

Building from a base case, each subsequent calculation changes one aspect of the calculation. In each case the changed attribute(s) is highlighted. The intent is that you will see:

1. The effect that the changes have on the results.
2. Situations with apparently quite different data can have very similar ROP and ROQ outcomes.

The answers will be shown in our online session.

Please note that it is possible that different assumptions will produce different results. For example, it may be that for an item with a long lead time, some companies would prefer to hold two items as safety stock rather than one. Similarly, reducing the frequency of reordering will result in higher ROQs.

The key issue is that the final decision is defensible on both a logical and mathematical basis, rather than driven by emotion.

### Max-Min Conversion

At the bottom of the calculation is a section that converts the ROP-ROQ to Max-Min. This uses the terms 'Theoretical Max' and 'Theoretical Min'.

The Theoretical Max is the sum of the ROP and the ROQ. This assumes that the highest quantity of an item that a company would carry occurs if they are restocked (by the ROQ quantity) before using any of the existing stock (the ROP quantity).

The Theoretical Min is the ROP, as this is the minimum quantity that a company would expect to hold, except in the event of an issue such as unexpected extra demand or delayed supply.

	Base Case	Variation 1	Variation 2	Variation 3	Variation 4	Variation 5
Time Period	Month 1	Month 1	Month 1	Month 2	Month 1	Month 1
Demand Frequency (units/time period)	2	2	2	2	4	2
Lead Time (time period)	N	Y	Y	N	N	N
Critical?	1	1	2	1	1	1
Peak Demand	1	1	1	1	1	1
Supplier MOQ	1	1	1	1	1	8
Cycle Stock						
Safety Stock						
ROP						
ROQ						
Expected Re-order Frequency						
Theoretical Max (ROP+ROQ)						
Theoretical Min (=ROP)						

## Action Planning Exercise

Reflecting on this section please complete the following questions.

1. What are, to you, the most important 3 things that you have learned or been reminded of in this section?

1.

2.

3.

2. What actions/follow up should you take in relation to these three things?

- 
- 
- 

3. Who else should you involve?

4. What prevents or constrains progress in these areas?

5. How can you overcome these constraints?

## Focus Area: Managing Obsolescence

### Managing Obsolescence and Disposal

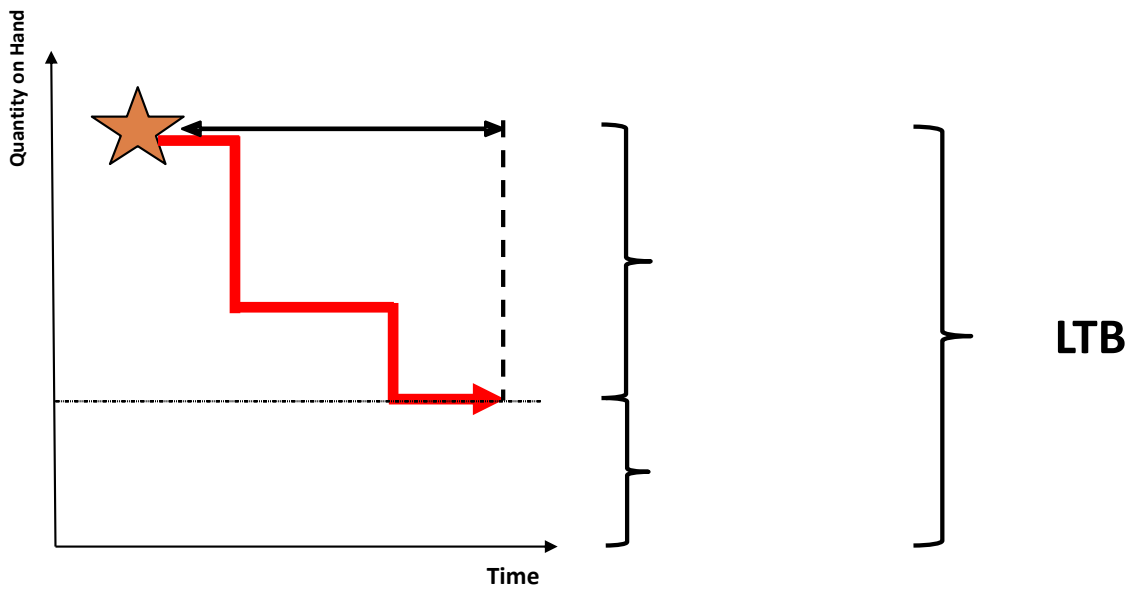
Type of Obsolescence	Vendor-Led	Owner-Led
Description	Occurs when the vendor or OEM no longer sells the item as a new part.	Occurs when your company decides to replace the equipment on which the item is used.
Visibility	May have zero visibility of impending obsolescence.	Have full visibility of impending obsolescence (at least a company level).
Management Actions	Establish relations with more than one vendor Establish high quality relations Ensure contractual obligation	Improve internal communications

#### List the key considerations for EOL and LTB

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.
- 7.

### Exercise: Last Time Buy

Use the values from the example LTB calculation in the paper *'Managing Spare Parts Obsolescence'* to complete this diagram



## Action Planning Exercise

Reflecting on this section please complete the following questions.

1. What are, to you, the most important 3 things that you have learned or been reminded of in this section?

1.

2.

3.

2. What actions/follow up should you take in relation to these three things?

- 
- 
- 

3. Who else should you involve?

4. What prevents or constrains progress in these areas?

5. How can you overcome these constraints?

## **Focus Area: Best Practices and Managing Obsolescence**

**List the 7 Best Practices Found from Our Research**

1.

2.

3.

4.

5.

6.

7.

## Action Planning Exercise

Reflecting on this section please complete the following questions.

1. What are, to you, the most important 3 things that you have learned or been reminded of in this section?

1.

2.

3.

2. What actions/follow up should you take in relation to these three things?

- 
- 
- 

3. Who else should you involve?

4. What prevents or constrains progress in these areas?

5. How can you overcome these constraints?