DEADSTOCK INVENTORY IDENTIFICATION AND DISPOSITION

A Thesis in
Industrial Engineering

by
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ABSTRACT

The current research focuses on identifying the dead stock inventory using SAP software and determining the necessary steps in disposing each category of dead stock. Dead Stock stands for the inventory that is not sold to the customers and has been residing over the shelves for a specific period in the Warehouse.

The main objective of the project is to reduce the dead stock (D-stock) since overstocking causes customer reductions, quality issues, over order/over shipments etc. Dead stock also costs businesses money. The reduction of Dead Stock inventory is determined by following a systematic procedure. Initially, the as-Is process is documented to acquire knowledge about the past and present state of the organization’s process and capabilities. Based on the as-Is process, to-be process is developed by focusing on parameters that would result in faster disposal and faster space free up when compared with the as-Is process. One of the tool that was developed to clear the inventory is “Scrap Check List”. In addition, different Six Sigma principles have been used to identify and validate the deviations in to-be process, and to develop counter measures there by achieving cost reduction as well as continuous improvement. In addition, the book value and the Inventory holding cost are also taken into consideration to determine the amount of money saved by implementing the to-be process.

The disposition process steps includes selling the parts to Aftermarket, return to vendor for rework/dis-assemble to reuse parts, customer delivery. If none of the above steps is accomplished and the components have no other alternative use, scrap documentation has to be submitted to clear the inventory. A process model in the form a swim lane drawn using Visio software is established to provide an overview of the dead stock disposition process. In addition, an overview of inventory management software is provided and the necessary steps involved in extracting data pertaining to dead stock using SAP is discussed.

By standardizing the to-be process and implementing continuous improvement techniques, the dead stock amount has been reduced from $16 Million to $3.3 Million.

_key Words: Dead Stock, Inventory Management software, SAP_
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Chapter 1: INTRODUCTION

Inventory is the goods and materials in stock that is potentially considered as the portion of a business’s assets. Different types of inventory include raw materials, work in progress and finished goods. Raw materials represent goods that are used in the production as a source material. Examples of raw materials are metal bought by car manufacturers, food ingredients held by food preparation companies and crude oil held by refineries.

Work in progress includes goods that are in the process of being transformed during manufacturing and are about to be converted into finished goods. For example, a half-assembled airliner or a ship that is being built would be work in process. Finished goods are products that have gone through the production and ready for sale, such as completed airliners, ready-to-ship cars and electronics.

Based on the frequency of consumption, Inventory is grouped into three categories as fast moving, slow moving and Non-moving (dead stock). Materials that are quite regularly required are fast moving; those that are required very occasionally are slow moving. Spare parts and some special purpose items required for a particular kind of project are examples of slow moving items. Materials that have been sitting in the warehouse without any further usage or demand come under dead stock. Dead stock due to reasons such as losing their own function due to being damaged, unplanned engineering changes etc. Dead stock costs money to the business organizations by taking up the valuable warehouse space. In addition, Dead stock is a kind of freeloader that does not pull its weight and will pull the business down in the long-term. Excess stock is an example of dead stock. Excess stock occurs when then there is an abrupt decrease in demand. In addition, inadequate materials planning would result in excess stocks. Tersine and Toelle [7] suggested that excess stock would use valuable storage space, inflates assets, diminished working capital and causes a reduction in return of investment (ROI). In literature, we have several mathematical models for optimizing the inventory. Most of these models are suitable for Fast moving inventory that exhibit a consumption pattern. The most popular model is the Economic Order Quantity model for A-class and fast moving items. For slow moving items, the demand is not regular and their movement off the shelf is occasional, and the inventory models are different from those that are applicable to fast moving items.

There have been several models developed to prevent the excess stock as well to dispose the excess stock by retaining the optimal quantity when excess stock occurs. From the literature, we understand that researches have explored various models on disposal of excess stock by determining an economic retention quantity or time period of stock. Some of the models are described below:

i) Simpson [1] who was an early contributor developed a break-even relationship between the cost of retaining stock and the cost associated with disposing stock by using a constant probability of obsolescence method. His model was

\[
\ln\left[D(i + p) + r(1 - p)(1 + i)/i + p + r(1 - p)(1 + i)\right]
\]

\[\frac{1 - P}{\ln[1]}\]

+ I Where:

D = fraction of unit acquisition cost obtained when item is disposed
i = interest rate  p = probability of obsolescence

r = storage cost of item (expressed as a fraction of the item's dollar value)

The value resulting from this expression, when multiplied by the constant annual demand, would give the economic retention quantity.

ii) Mohan and Garg [2] extended Simpson’s research on disposal of excess stock by taking inflation and obsolescence into consideration. They have used exponential distribution that would help in suggesting a higher obsolescence likelihood during early stages of panning horizon.

iii) Rosenfield [3] developed a disposal model for slow-moving or obsolete inventory in which a relationship was established to keep the optimal number of items when stochastic demand and perishability are taken into consideration.

iv) Cerag Pince, and Rommert [4] Dekker had developed an inventory model for slow moving items that are subject to obsolescence. In this model, they have implemented continuous review inventory system to adapt to a lower demand rate that was accomplished by an advanced change in control policy and this resulted in consumption of excess stock by demand.

v) Silver and Keith [5] developed an analytical model to determine excess stock disposal at the completion of the construction phase of large-scale projects. In this, they have considered non-constant marginal salvage value as the parameter.

vi) Keith [6] presented various approaches to determine the appropriate amount of excess stock to be disposed when an organization finds itself with an excess stock on hand. He has explained both simple decision rules and analytical models to determine excess stock for disposal.

In all the above models, it was identified that excess stock disposal would benefit in two ways mainly the salvage revenue obtained from surplus unit disposal and decrease in inventory holding cost. In addition, the above models only determine the amount of excess stock to be disposed and not the disposal method. Only few authors like Silver and Keith [5], Tersine and Toelle [7] mentioned various disposal options for excess stock that include return to supplier, third party sale, charitable donation, sell or trade in on a future purchase. Some of these options cannot be applicable to dead stock in automotive manufacturing companies. In addition, it was observed in the literature survey that many of the researchers have considered only excess stock as dead stock or non-moving stock.

In this paper, we discuss about the various categories of dead stock and the options for disposal for each kind of dead stock. A process model is presented in chapter 2. In addition, we discuss the use of SAP (inventory management software) in extracting data and steps to submit scrap requests pertaining to dead stock using web based software WORKON.
Chapter 2: MATHEMATICAL MODEL FOR DEAD STOCK

In this section, we present a mathematical model that completely defines the dead stock and a swim lane that provides an overview of dead stock disposition process.

The following are the terms and their notations used in the mathematical model.

Dead Stock – D
Goods receipt date – GR
Shelf life Expiration Date – SLED
Total stock on S-hold = TS
Standard Price = P
Days since Good Receipt – DGR
Dead Inventory – DI
Expired Inventory – EI
Quality Affected Inventory – QI
Damaged Inventory – Dam I
Missing Inventory - MI

Dead stock is sum of excess stock, damaged stock, missing inventory, expired inventory and quality affected inventory.

\[ D = DI + EI + QI + Dam I + MI \]

• Dead Inventory is based on the parameter “demand”.

\[ DI = \text{sum of inventory with no demand} \]

• Expired Inventory is based on the parameter SLED. All the materials manufactured would have a period that indicates how long a material can be stored in location for usage. If the material exceeds this period, then this can no longer be sold to customer and needs to go through disposition method stated in the section.

\[ EI = \text{sum of inventory with shelf life expired} \]

• Quality Affected Inventory and Damaged Inventory is based on the parameter “QL number”. Each material that is potentially considered as quality affected is assigned with a QL number.

\[ QI \text{ or Dam I} = \text{sum of inventory with QL number} \]

For easier identification and disposition, material that fall into dead stock category are put on “S” hold. So, in other words, dead stock inventory for a material is the sum of S-hold inventory.

\[ D = \text{Sum of S – hold inventory} \]
The value of dead stock is based on the parameter “standard price”. Standard Price $(P)$ is obtained by the formula:

$$\text{Standard Price}(P) = \frac{\text{PPC}}{D}$$

**PPC** = Price per 100 pcs  
**D** = Sum of S-hold Inventory  

**2.1 Process Model for Dead stock Disposition Process**

The below process model gives an overview on handling the dead stock. Visio software is used for drawing this swim lane. The terms LOP (Logistics Planning), AA (After market), Sales, Vendor, LOW (Logistics warehouse), quality and LOC (Logistics Controlling) on the left portion of the swim lane indicate the respective department responsibilities.

---

**Process model**

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Chapter 3: INVENTORY MANAGEMENT SOFTWARE – SAP ERP

In order to identify the dead stock, it is essential for enterprises to manage their inventory. Inventory management is the supervision of the goods and materials in stock. Its key function is to keep a detailed record of each new or returned product as it enters or leaves warehouse. In larger organizations, Inventory management is a complex process but the basics still hold the same regardless of organization’s size. There are various ways to keep track of the goods as they move through the process, including handling units, Batch numbers, goods receipt date etc. The tracking is done using Inventory Management Software systems. The software systems for inventory management generally began as simple spreadsheets that tracked the quantities of goods in a warehouse, but have become more complex. Inventory management software can now go several layers deep and integrate with accounting and ERP systems. The systems keep track of goods in inventory, sometimes across several warehouse locations. The software also calculates the costs -- often in multiple currencies -- so that accounting systems always have an accurate assessment of the value of the goods. With businesses that do not use Inventory Management software, dead stock can remain on warehouse shelves forgotten and useless.

SAP is one of the most widely used software among manufacturing and other business organizations for inventory management. SAP means System Application & Products in Data Processing. SAP is the name of a German based multinational software corporation that makes enterprise software to manage business operations. SAP software is a reliable and robust ERP system that integrates the function of sales, planning, procurement, production, warehouse management, quality, reporting, controlling etc. This integration helps in making the information flow from one SAP component to another without any redundant data entry. In addition, it facilitates the effective use of resources, including labor, machines and production capacities.

As per the 2016 corporate fact sheet, SAP serves more than 335,000 customers in 190 countries, of which 80% are small and medium sized businesses.

The first version of SAP was releases in 1973 and it was named as SAP R/1. It used only a single-tier architecture. The tier architecture comprises of the servers database, application and presentation. In R/1, all these servers were on a single platform. SAP R/1 offered a common system for multiple tasks and permitted the use of a centralized data storage. In 1979, SAP released SAP R/2 that used two-tier architecture. This version of software helped in expanding the business to other functions such as material management and production planning. In R/2, presentation server was based on one platform and applications and data were on another platform. The R/2 was replaced by R/3 in 1992 followed by SAP ERP (or SAP ECC) system in 2004. Currently, SAP ERP 6.0 that was released in 2006 is being used in the market.

SAP ERP system is a combination of SAP’s functional and technical modules, each of which has submodules that enables organizations to manage business processes through a unified system. SAP’s functional modules include Material Management (MM), Production planning (PP), Sales and Distribution (SD), Plant Maintenance (PM), Financial Accounting (FI), Controlling (CO), Quality Management (QM) etc. Each of these functional modules have submodules.

SAP Material Management (MM) module manages materials required. Different types of procurement processes are managed in this module. Some of the popular submodules of SAP MM are purchasing, inventory management, invoice verification etc.
SAP Production Planning (PP) module includes software designed specifically for production planning and management. This module also consists of master data, system configuration and transactions in order to accomplish plan procedure for production. SAP PP module collaborates with master data, sales and operations planning, distribution resource planning, material requirements planning, Kanban, product cost planning etc. while working towards production management in enterprises.

SAP Sales and Distribution (SD) module deals with managing all transactions ranging from enquiries, proposals, quotations, pricing and more. The sales and distribution module helps greatly in inventory control and management. Some of the submodules of SAP SD module include master data, sales support, sales, shipping and transportation, billing, credit management, sales information system and so on.

SAP Financial Accounting (FI) module deals with managing financial transactions within enterprises. This financial accounting module helps employees to manage data involved in any financial and business transactions in a unified system. The SAP FI module is very flexible and functions well in any type of economic situation. As Financial Accounting module helps one to get real-time financial position of an enterprise in the market. SAP FI incorporates with other SAP modules such as SAP SD, SAP MM, SAP PP, Payroll and more for better work results.

SAP Quality Management (QM) module helps in management of quality in productions across processes in an organization. This quality management module helps an organization to accelerate their business by adopting a structured and functional way of managing quality in different processes. SAP QM module collaborates with procurement and sales, production, planning, inspection, notification, control, audit management and so on.

SAP’s technical modules include SAP Basis, SAP security, SAP Net Weaver, Information Systems Management (SAP IS) etc.

In this paper, we use SAP MM and PP submodules to obtain the data pertaining to dead stock. These submodules include SAP APO and SAP POE. APO (Advanced Planning and Optimization) offers a fully integrated pallet of functions used to plan and execute supply chain processes. APO also supports business collaboration on a strategic, tactical and operational planning level. In addition, APO also supports constant optimization and evaluation of the supply chain network’s efficiency.
**Fig.1: SAP APO**

POE is main software module used to generate dead stock reports.

**Fig.2: SAP POE**
POE consists of transactions that are used to find out the data related to Dead stock. Some of them include MD04 to find customer demand, QM03 to find out details on a QL attached to material etc.

Fig. 3: SAP POE Transactions
Chapter 4: DETERMINATION OF DEAD STOCK USING POE MODULE IN SAP

Dead stock is determined based on the GR (Goods Receipt) date. GR date is the date scanned into the system when the material is received at receiving dock of warehouse. If a material is, having a GR date, which is older than 90 days from today, that material comes under Dead stock. The Dead stock in POE (SAP) is determined by using the transaction code “/RB04/YL2_LX03” in POE.

- Upon running the transaction, simply enter the warehouse number and then click box for “Only Bins with Stock”.
- Click on execute.

Fig.4: Transaction RB04/YL2_LX03

After it runs, choose a layout as shown in the below screenshot. This type of layout would be easy to analyze the data.

Fig.5: Layout for Dead stock report

Export it to a spreadsheet and add the following columns “End Date and Days since GR”. In general, the end date would be current date on which the report is being generated and the Days since GR is determined using the Excel formula

\[
\text{Days (end date, start date)}
\]
In the above formula, the start date would be the GR date. All the part numbers having “Days since GR” is greater than 90, are classified as Dead Stock. From the Dead stock report generated from SAP, check for the columns Blocked Stock and Lock Flag-1. The reason for S-Block on materials can be due to various reasons such as damaged, missing, quality issue etc. All these reasons are stated under the column Lock flag-1 of the Dead stock report.
Chapter 5: CLASSIFICATION OF DEAD STOCK INVENTORY

The following are the different categories of Dead stock Inventory that should be addressed:

- Dead Inventory
- Expired Inventory
- Quality Affected Inventory
- Damaged Inventory
- Missing Inventory

In this section, steps involved in handling each dead stock category is discussed. The four categories of Dead stock i.e. dead inventory, expired inventory, quality affected inventory and damaged inventory will be scrapped if found no use. The process for scrapping is discussed in the section. In case of Missing Inventory, scrapping procedure is not applicable and instead “Inventory Adjustment” process is used and is discussed in the section.

![Fig.7: Categories of Dead Stock Inventory](image)

5.1 Dead Inventory:

Material that is in stock in SAP with good condition but has no customer, vendor and After-market demand is identified as Dead Inventory.

5.1.1 Steps to handle the Dead Inventory:

- Use transaction MD04 in POE (SAP) to find out the customer demand.
Check if there are any Schedule Agreements/Schedule Lines and shipping notes.

If no SA’s are found in MD04, the customer logistics planner confirms with the customer on no further demand for the current part number.

If no demand on Customer side, Planner should analyze the decreases in customer demand resulting in Dead stock and should contact the corresponding company Sales representative to check for the possibility to claim concerning dead stock against customer.

In addition, planner should contact vendor plant to evaluate if material has any possible use at their location or at other customer locations of the vendor plant.

If no further use at vendor plant, planner should contact After-Market representatives to evaluate any possible use at AA-customers.

If no further use at AA customer, Planner should fill in the designed “Scrap request template” selecting the option “Dead Parts”, documenting all the confirmations, dates and evidences from all entities mentioned above.
Fig. 10: Scrap request template for Dead Inventory

- Planner should initiate the “Scrap request” on the corresponding company’s web-based software.

5.1.2 Steps to analyze customer releases for the short-term decrease resulting in dead stock:

- Please run the release analysis in SAP by using the transaction

  /RB04/YP3_REL_SUM - Transaction /RB04/YP3_REL_SUM

- The material number and Schedule Agreement number are mandatory fields.
- Release dates range is selected based on various criteria’s such as product life cycle, customer forecasted quantity etc.
- For instance, the customer demand started in August 2017 and the product is building out in May 2018, the Logistics Planner can run the REL_SUM transaction in between those months and obtain the customer forecasted Quantity or the order quantity.
- Then select “Discrete Quantities” and Check the box “Only Active Schedule Lines”
- We should compare the date on these dates with the actual quantity that we have shipped to customer.
- The shipped quantity is determined using transaction MB51 and fill in the fields Material number, Plant, movement type and posting date.
- The following example explains the above steps:

**Fig.11: Transaction /RB04/YP3_REL_SUM**

![Customer Release Summary Report Requirements - Selection](image)

**Fig.12: Customer Order releases**
For this part number, we see that only 1 pc was shipped.

- So when comparing the data for the above example, we see that on April 2nd the customer forecasted 72 pcs through build out and in May it was dropped to 27 pcs. In this date range, we have shipped 1 pc which is customer demand.
The percentage decrease is obtained using the formula “Difference between the release date order quantities and quantity shipped/ Order quantity on start of forecast for the material” * 100 i.e. 72-27-1 = 44 pcs.

So 44 / 72 = 0.61 * 100 = 61% decrease.

- We see that there is 61% decrease in customer demand that resulted in dead stock.
- Present this data to Sales team and ask them file claim against the customer for this decrease.

5.2 Expired Inventory

Material that is in stock in SAP with expired shelf-life date and there is no technical possibility to extend it is determined as Expired Inventory. SAP “User UC4CPIC” sends a notification to the MRP controller (Planner) assigned to the Part Number, with 3 months in advance as shown below. This Email makes the planner aware that material is about to reach out its shelf-life limit.

Fig.15: Automatic notification from SAP on material about to expire  The Shelf life expiration date for a particular material can also be found by using “LS24” transaction in SAP.

Fig.16: Transaction LS24
Fill in the mandatory fields such as warehouse number, material number, plant and click “Enter”. The following screen appears in which the SLED is highlighted.

![Stock per Material](image)

**Fig.17: Transaction LS24 displaying SLED**

### 5.2.1 Steps to handle the Expired Inventory:

- Planner immediately creates a delivery to customer when current demand exists and if material is in storage location AWEA and status 821.

- If material has an “S-block”, planner investigates in transaction “/rb04/yl2_lager_alp” if any QL number is available (The transaction “QM03” can provide more detailed information and documentation to any QL number), and evaluate, with Quality team, the possibility to release it before expired.

- If material reached out the expiration date, planner contacts the vendor plant to evaluate any possibility to extend the shelf-life date or even to return the material back to the vendor in case of any rework/re-flash procedure necessary.

- If no use at the vendor plant, planner fills in the “Scrap request template” selecting the option “expiration date”, documenting any confirmations, dates and evidences from the vendor plant.
Fig.18: Scrap request template for Expired Inventory

- Planner initiates the ‘Scrap request’ on the web-based software ‘WorkOn’
- Once the WorkOn scrap request code is available, planner should request warehouse Inventory team to block the material and locate it into AWEX (not MRP relevant storage location)

5.3 Quality Affected Inventory

Material with any kind of quality issue, impeding the performance of the part, confirmed by the corresponding QMC department is determined as Quality affected Inventory. In general, the vendor plant notifies the corresponding Material Planner to block the materials for a quality issue.

5.3.1 Steps to handle Quality affected Inventory:

- Upon the notification from Vendor, Planner contacts Quality Management team (QMC) requesting to put the material on ‘S-Block’ while inspection is performed.
- Once the inspection is complete and if the material is found to have no quality issues and is in good condition, QMC removes the hold and notifies the planner stating the material can be used.
- If material is found to have Quality issue and needs to be scrapped, QMC sends QL notification to Planner to scrap the parts.
- Use transaction /n/RB04/YT2_QCO to find information related to Quality issue for a material.
<table>
<thead>
<tr>
<th>Step</th>
<th>To Do</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Type in the plant and the PN</td>
</tr>
<tr>
<td>2</td>
<td>Here you can choose different views e.g. “Notifications”</td>
</tr>
<tr>
<td>3</td>
<td>Here you can find the QL number and the description of it</td>
</tr>
</tbody>
</table>

**Fig.19: Transaction RB04/YT2_QCO to find quality issue**

- Use transaction /n/RB04/2L3_QM03 to find the attachments and reason for scrapping for a material.

<table>
<thead>
<tr>
<th>Step</th>
<th>To Do</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Insert the QL number and hit Enter</td>
</tr>
<tr>
<td>2</td>
<td>Relevant documents can be found on side tool bar by clicking “Show DMS Documents”</td>
</tr>
<tr>
<td>3</td>
<td>This is the file that is attached to the QL number.</td>
</tr>
</tbody>
</table>

**Fig.20: Transaction RB04/2L3_QM03 to find DMS documents**
Step | To Do
--- | ---
1 | Go to Sheet “Cause of blocking”
2 | Here you can find the reason for Scrap

Fig. 21: Transaction RB04/2L3_QM03 to find reason for scrapping

- Planner then fills in the “Scrap request template” selecting the option “quality issue”, documenting any confirmations, dates and evidences from the QMC team.

**Scrap Template V1.0**

To issue scrap WorkOn, it is necessary to fill out this checklist below. It has to be clearly identified that further use options are checked. A scrap WorkOn can only be approved by completion of the analysis below.

<table>
<thead>
<tr>
<th>Part Number/Material</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>CPI/LOP-NA planner:</td>
<td></td>
</tr>
</tbody>
</table>

**Reason for scrapping:**

- Dead Parts
- Quality Issues
- Damage

**Goods received (date or time range):**

<table>
<thead>
<tr>
<th>Cause: Quality issues</th>
<th>Y/N</th>
<th>Date</th>
<th>Person contacted</th>
<th>Department</th>
<th>Comment / Result</th>
<th>Evidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) QL Number required</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2) Quality Department</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Are those parts need to me scrapped?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>mail</td>
<td></td>
</tr>
</tbody>
</table>

Fig. 22: Scrap request template for Quality affected Inventory

- Planner initiates the ‘Scrap request’ on the web-based software ‘WorkOn’.
- Once the WorkOn scrap request code is available, planner requests the warehouse team move the material into AWEX location (not MRP relevant storage location).
- Planner needs to re-order the material from vendor to meet customer demand.
5.4 Damaged Inventory

Material with a physical damage, impeding the performance of the part, is determined as Damaged Inventory. In general, the receiving team at Warehouse confirm if the material is in good or damaged condition while receiving the material at the dock from the transportation carrier.

5.4.1 Steps to handle Damaged Inventory:

- Planner is advised via E-mail by Warehouse Receiving team about a damage in material through a ‘Damage report’, indicating type of damage, quantity affected and responsibility. This form also indicates if material can be inspected or if it needs to be scrapped.
- If the Damage report states that material can be inspected, Planner notifies QMC team and requests to put the material on hold until inspection is performed.
- If the Damage report states that material needs to be scrapped, planner fills in the “Scrap request template” selecting the option “damage”, documenting any confirmations, dates and evidences from the Warehouse Receiving.

Fig.23: Scrap request template for Damaged Inventory

- Planner informs the Company Transportation team in case of a transport damage to evaluate the possibility of a carrier claim.
Chapter 6: SCRAPPING PROCESS DESCRIPTION

Scrap Runs should be conducted every quarter of a year as a regular process so as to clean the dead stock and free up the aisle space. There are some exceptions in where extra runs can be performed upon prior agreement and approval by both Planning and Warehouse Management Team. Every scrap run must be in compliance with the Fair trade zone requirements.

Every Scrap run has two main phases. The First phase comprises of evidence collection for scrapping material and creation of Scrap requests by Logistics Planning team. The second phase consists of verifying scrap approvals and completing physical scrap run which is handled by Logistics Warehouse team.

![Fig.24: Scrap Process](image)

As part of the first phase, once planner collects the appropriate material to scrap the material, a disposal request must be submitted using WORKON software and documented.

6.1 Creation of Scrap request using WORKON

The steps to create scrap request using WORKON software is discussed below:

- Open the web based software
- Choose Workflows and search for EMEA Scrapping and inventory difference
- Search for “EMEA Scrapping and inventory difference”
- Choose “New Request”
- Go to Workflows

![Fig.25: WorkON - web based software](image)

Check if the General Information is correct and select Scrapping.
**Fig.26: Scrap request creation using WorkON**

- Insert Data to the WorkOn
- Go to the Folder *Scrapping* and type in the Materials you want to scrap and fill out required information.

**Fig.27: Data tab for entering scrap material information**

<table>
<thead>
<tr>
<th>COLUMN</th>
<th>TOPIC</th>
<th>FILL IN</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>System</td>
<td>POE</td>
</tr>
<tr>
<td>B</td>
<td>Plant</td>
<td>E710</td>
</tr>
<tr>
<td>C</td>
<td>Material Number</td>
<td>To the 13 digit part number</td>
</tr>
<tr>
<td>D</td>
<td>Material Name</td>
<td>Description of the part</td>
</tr>
<tr>
<td>E</td>
<td>EZKL/Profit Center</td>
<td>E0XXXX or P0XXXX</td>
</tr>
<tr>
<td>F</td>
<td>Storage Location</td>
<td>AWEA, AWEX...</td>
</tr>
<tr>
<td>G</td>
<td>Storage Type/SUID/HU</td>
<td>All those that are to be scrapped</td>
</tr>
<tr>
<td>H</td>
<td>Quantity</td>
<td>Exact amount to be included in scrap request.</td>
</tr>
<tr>
<td>I</td>
<td>Unit of Quantity</td>
<td>PC</td>
</tr>
<tr>
<td>J</td>
<td>Value per Material Number</td>
<td>Make sure to input currency in German format</td>
</tr>
</tbody>
</table>

*Table 1: Table showing the data to be entered*

- Use transaction /n/RB04/2L3_MM011 to find out the Profit center and correct price.
Step | To Do
--- | ---
1  | Insert the Plant # and the Part #
2  | Click Execute

Fig.28: Transaction RB04/2L3_MM011

Step | Explanation
--- | ---
1  | Use this Profit Center (not the Selling PC)
2  | This is the price per 100 pc

Fig.29: Profit center and Price determination using transaction RB04/2L3_MM011

- Use transaction n/RB04/YL2_/LX03 to find out SUIDs

Step | To Do
--- | ---
1  | Enter the warehouse number E17
2  | Mark the field “Only bins with stock”
3  | Unhide dynamic section
4  | Choose Quants and than Material
5 | Insert the Part # you are looking for

6 | Click Execute

Fig.30: SUID determination using transaction RB04/YL2_/LX03 Enter

the information as shown below:

- Select USD from the currency dropdown.
- Select the reason for scrapping.
- Answer all the questions and issues below and attach all the necessary documents that proves your answers.
• The attached documents should include the part numbers, the quantity and the dollar amount that has to be scrapped. It also has to include the reason why the freight has to be scrapped and that all other possibilities for further use are not possible.

• Other important hints and comments that should be included:
  a. **Quality issue:** must include the *QL number* in the *comments*.
  b. **Damage:** Must include copies of the *delivery complaints* as well as any pertinent photos, emails and QL issued.
  c. **No demand/obsolete:** Must include sufficient backup showing due diligence that was used in confirming this information with the GB. This would be contacting the below parties:
   i. **Customer:** Will they take any parts? If they reduced orders, will they absorb any of the scrap costs?
   ii. **Vendor/Supplier:** Will they take any parts? Any other customers or plants that they can ship same parts to?
   iii. **AA:** Any Aftermarket demand?
   iv. Is Reflash possible?
  d. **Where multiple parts are to be scrapped using the SAME back up materials** – only *ONE* scrap request should be submitted.

• Go to *Workflow* and add the people who have to approve the Scrap.
• Usage check: Material Planner
• **Controlling Parts:** *Logistics Controlling/Accounting Department*  □ Choose the **Financial Approval** based on total value amount. Note Level 1 and 2 approvals are always listed, even if only Level 3 is required. Make sure they are entered in the order.
  o Level 1: Up to **5,000 USD**- Logistics Planning Manager
  o Level 2: Up to **25,000 USD**- Chose based on reason for scrap:
  ▪ Obsolete Material: Logistics Vice President
• **GB contacts should also be entered for Obsolete approvals!**
  ▪ Transportation Damage: Logistics Transportation Director
  ▪ Inventory Adjustments: Logistics Warehouse Director
• **Level 3:** Up to **500,000 USD**- Logistics President

• **Factual Approval:** *Logistics Controlling/Accounting*
• **Scrapping:** *Logistics Controlling/Accounting*
• Now you can create the request. You will find the button at the bottom of the page.
6.2 Documentation of Scrap Workons:

- Once the Workon is submitted, the Planner is responsible for entering the below mentioned data in a share point that would have access to Planning Team. This documentation would be helpful during the Physical Scrap run.

<table>
<thead>
<tr>
<th>COLUMN</th>
<th>TOPIC</th>
<th>FILL IN</th>
</tr>
</thead>
<tbody>
<tr>
<td>E</td>
<td>Header</td>
<td>The Key of the WorkOn</td>
</tr>
<tr>
<td>F</td>
<td>Part</td>
<td>Part number of the freight</td>
</tr>
<tr>
<td>G</td>
<td>Qty</td>
<td>The Qty that has to be scrapped</td>
</tr>
<tr>
<td>H</td>
<td>Batch</td>
<td>The Batch of the Freight</td>
</tr>
<tr>
<td>I</td>
<td>SUID</td>
<td>SUID of the Freight</td>
</tr>
<tr>
<td>J</td>
<td>Comments</td>
<td>Enter why the freight has to be scrapped.</td>
</tr>
<tr>
<td>K</td>
<td>Requestor</td>
<td>The Name of the Applicant/ the person who created the WorkOn.</td>
</tr>
<tr>
<td>L</td>
<td>Planner</td>
<td>The name of the Planner who initiated the WorkOn.</td>
</tr>
<tr>
<td>M</td>
<td>QL#</td>
<td>If the freight has to be scrapped because of a quality issue add here the Quality number (QL#)</td>
</tr>
<tr>
<td>N</td>
<td>Delivery Complaint attached</td>
<td>Y= Yes; N=No</td>
</tr>
<tr>
<td>O</td>
<td>Warehouse responsible</td>
<td>Y= Yes; N=No</td>
</tr>
<tr>
<td>P</td>
<td>Reason</td>
<td>What happened to the freight? Better explanation of the issue in greater detail</td>
</tr>
</tbody>
</table>

4.3 Approval of the WorkOn:

The corresponding Financial approver mentioned in the workon submission gets notified via email for approval of workon. The steps to approve the workon are discussed below:

- Open the workon and check the following date:
  a. Check if **Total Value** confirms to the single Values.
  b. Check if the **currency** is **USD**.
  c. Check if the content of the attachments fit to the comments and numbers at the WorkOn. (Qty, amount, SUID)
  d. Check in the attachments if the **damage is anywhere explained** or if its anywhere written down (e.g. Mail, Bosch form etc.)
    i. Is the reason for scrap a quality issue, check if the **QL number** is in the **comments**, if not: check the attachments if there is an explanation.
    ii. If being scrapped due to **damage**, check if the attached copies include the delivery complaints as well as any pertinent photos and emails.
    iii. If being scrapped due to **no demand/obsolete**, check if the due diligence was used in confirming this information with the GB. This would be contacting the below parties:
1. Customer: Will they take any parts? If they reduced orders, will they absorb any of the scrap costs?

2. Vendor/Supplier: Will they take any parts? Any other customers or plants that they can ship same parts to?

3. AA: Any Aftermarket demand?

4. Is Reflash possible?

iv. Failure to provide the above backup may result in a rejected WorkOn.

- Choose the chapter **Workflow**
  
  e. Check if the **Approval Level** are correct based on the total dollar value submitted for Scrapping. If anything is wrong, write an email to the Applicant of the Work On (Planner) with the Key of the Sheet and clarify the issues.

- If everything looks goods, then Click **Approve** at the bottom of the screen.

  ![Workflow Image]

  - Enter the **Total Value** to scrap and enter at the **comment ok to crap and damage** and click **Approve**.
Chapter 7: INVENTORY ADJUSTMENT PROCESS DESCRIPTION

The inventory adjustment process is specifically used for “Missing Inventory” that falls under the category of dead stock. Missing inventory is the one that is present in the system but not physically in the warehouse. In the dead stock report generated from SAP, if Lock Flag-1 column consists of “Missing”, then the corresponding material falls under this category. In these cases, corresponding material planner should request the inventory team at warehouse to conduct a cycle count. Upon the completion of cycle count, if the material is found, the hold is removed and material is put into pickable location for delivery to customer. If the material is found, missing then the inventory team notifies the Planner and planner should submit a request for Inventory adjustment using WORKON software.

The steps for creating a request for Inventory adjustment are discussed below:

- Open the web based software
- Choose Workflows and search for EMEA Scrapping and inventory

1. Go to Workflows
2. Search for “EMEA Scrapping and inventory difference”
3. Choose “New Request”

- Check if the General Information is correct and select Inventory Difference.

- Go to the Tab Inventory difference and type in the Materials you want to adjust and fill out required information.

<table>
<thead>
<tr>
<th>Column</th>
<th>Topic</th>
<th>Fill in</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>System</td>
<td>POE</td>
</tr>
<tr>
<td>B</td>
<td>Plant</td>
<td>E710</td>
</tr>
<tr>
<td>C</td>
<td>Serial Number</td>
<td>Material number</td>
</tr>
<tr>
<td></td>
<td>Material Name</td>
<td></td>
</tr>
<tr>
<td>---</td>
<td>---------------</td>
<td>---</td>
</tr>
<tr>
<td>E</td>
<td>EZKL/Profit Center</td>
<td>E0XXXX or P0XXXX</td>
</tr>
<tr>
<td>F</td>
<td>Storage Location</td>
<td>AWEA, AWEX, DMHU…</td>
</tr>
<tr>
<td>G</td>
<td>Storage Type</td>
<td></td>
</tr>
<tr>
<td>H</td>
<td>SUID/HU</td>
<td>Batch, SUID..</td>
</tr>
<tr>
<td>I</td>
<td>Quantity</td>
<td></td>
</tr>
<tr>
<td>J</td>
<td>System Qty</td>
<td>Qty of SAP</td>
</tr>
<tr>
<td>K</td>
<td>Physical Qty</td>
<td>Qty of the Cycle Count, Qty that is physically I the warehouse.</td>
</tr>
<tr>
<td>L</td>
<td>Difference</td>
<td>Amount of the Qty Make sure to input currency in German format 1234.56 instead of 1,234.56</td>
</tr>
</tbody>
</table>

- Select **USD** from the **Currency** dropdown
- Answer all the questions and issues below and attach all the necessary documents that proves your answers.
- Go to **Workflow** and add the people who have to approve the Inventory Difference:
- **Controlling Parts**: Logistics Controlling/Accounting Team
- Choose the **Financial Approval** based on Total Difference amount. Note Level 1 and 2 approvals are always listed, even if only Level 3 is required. Make sure they are entered in the order, for example, CP/LOP-NA should always be listed first. Level 1: Up to 5,000 USD - Logistics Planning Manager Level 2: Up to 25,000 USD - Logistics Warehouse Director Level 3: Up to 500,000 USD - Logistics President
- **Factual Approval and Posting**: Logistics Controlling/Accounting Team
- Now you can create the request. You will find the button at the bottom of the page.

  ![Workflow](image)

- Upon creation of work on, the corresponding financial approver is notified via email for approval. The procedure for approving the work on is same as discussed in section 6.3.
CHAPTER 8: CONCLUSION AND FUTURE WORK

In this paper, we have designed and defined a systematic procedure for dead stock identification and disposition that is applicable to most of the manufacturing, retail companies. We also discussed the importance of inventory management using SAP and presented steps and the transactions involved in extracting the data related to dead stock based on different criteria. In addition, reduction of dead stock is directly proportional to inventory holding cost savings and the inventory storage space. We have designed a scrap checklist for dead stock management that would result in faster disposal and space free up.

The future work can be focused on developing new metrics and parameters that would improve the efficiency of the designed process in this paper. In addition, a research work on lot size that could affect the inventory could be a significant contribution.
References


[4] Cerag Pince, Rommert Dekker, An Inventory model for Slow Moving Items Subject to Obsolescence, ERS2009-053-LIS.


[14] https://searcherp.techtarget.com/definition/inventory-management
APPENDIX

APPENDIX-A

**Fig: Scrap request template designed using Excel Macros**
APPENDIX-B

Inventory On Hand References:

Storage Locations:
  a. AWEA – Freight available to ship. Planners can see
  b. AWEX- Freight has an issue and cannot be shipped. Planners cannot see
     a. Typically used for blocked stock or damaged freight
  c. DMHU- Virtual Bin Location. Planners can see
  d. DMMY-Virtual Bin/Return location. Planners can see
  e. AWCH – At ChP for test
  f. AWDS- Drop Ship
  g. AWFH – Fh/Ply
  h. AWPP – Reflash
  i. AWRM- Customer Return
  j. AWSC – OE Scrap location
  k. CCOR- Wash Repack
  l. RECO- Overflow Repack
  m. SMVK – WIP Rp

Virtual Storage Bins:
  a. AWH DAMAGE
  b. SUSPECT – Freight that is sitting in the suspense area
  c. RCPTNOLABEL
  d. RCPTLABEL
  e. RETURN
  f. RPKFLOOR
  g. WALL – Old location for when no rack location available
  h. STORNO
  i. SHORTMFC- Freight came in short # of pieces
  j. QSWOPEN-QMC Area
  k. QSWMISSING-Freight Missing from QMC area
  l. MISSINGSMV – When Freight cannot be located, moved here in system
  m. REPACK
  n. PACK.BIN
  o. REPACKSHIP
  p. RPKFLOOR
### Storage Types:

<table>
<thead>
<tr>
<th>Storage Type</th>
<th>Storage type name</th>
</tr>
</thead>
<tbody>
<tr>
<td>818</td>
<td>No EDI</td>
</tr>
<tr>
<td>819</td>
<td>rcvng stgng wo/label</td>
</tr>
<tr>
<td>820</td>
<td>rcvng stgng w/label</td>
</tr>
<tr>
<td>821</td>
<td>high rack storage</td>
</tr>
<tr>
<td>823</td>
<td>open storage</td>
</tr>
<tr>
<td>824</td>
<td>High Rack - Capacity Mgd</td>
</tr>
<tr>
<td>825</td>
<td>FG Fixed Bin</td>
</tr>
<tr>
<td>850</td>
<td>Qm inspection</td>
</tr>
<tr>
<td>860</td>
<td>vendor returns</td>
</tr>
<tr>
<td>861</td>
<td>SLED requalification</td>
</tr>
<tr>
<td>870</td>
<td>Quality High Rack</td>
</tr>
<tr>
<td>871</td>
<td>Quality Floor Locs</td>
</tr>
<tr>
<td>872</td>
<td>Incoming Quality Hold</td>
</tr>
<tr>
<td>880</td>
<td>central blocked stock</td>
</tr>
<tr>
<td>890</td>
<td>internal transfer</td>
</tr>
<tr>
<td>899</td>
<td>FG</td>
</tr>
<tr>
<td>8DI</td>
<td>Direct shipment</td>
</tr>
<tr>
<td>8IB</td>
<td>customer returns</td>
</tr>
<tr>
<td>901</td>
<td>GR area for production</td>
</tr>
<tr>
<td>902</td>
<td>GR area external rcpts</td>
</tr>
<tr>
<td>904</td>
<td>Returns</td>
</tr>
<tr>
<td>910</td>
<td>GI Area General</td>
</tr>
<tr>
<td>911</td>
<td>GI area for cost center</td>
</tr>
<tr>
<td>912</td>
<td>GI area customer order</td>
</tr>
<tr>
<td>913</td>
<td>GI Area - Fixed Assets</td>
</tr>
<tr>
<td>914</td>
<td>GI area production orders</td>
</tr>
<tr>
<td>915</td>
<td>Fixed bin picking area</td>
</tr>
<tr>
<td>916</td>
<td>Shipping area deliveries</td>
</tr>
<tr>
<td>917</td>
<td>Quality assurance</td>
</tr>
<tr>
<td>918</td>
<td>Goods issue area contain</td>
</tr>
<tr>
<td>920</td>
<td>Stock transfers (plant)</td>
</tr>
<tr>
<td>921</td>
<td>Stock transfers (StLoc)</td>
</tr>
<tr>
<td>922</td>
<td>Posting change area</td>
</tr>
<tr>
<td>923</td>
<td>Packaging area</td>
</tr>
<tr>
<td>931</td>
<td>GI Area ASMUS</td>
</tr>
<tr>
<td>980</td>
<td>R3 --&gt; R2 cumulative</td>
</tr>
<tr>
<td>981</td>
<td>GR ar.in-hse.prod.(SFIFO)</td>
</tr>
</tbody>
</table>
Material Movement Types:

a. 107 – Goods in transit
b. 109 – Good receipt/arrived at warehouse
c. 311-Movement within the warehouse
d. 343-Movement within the warehouse
e. 601-Shipment out of the warehouse
f. 701-Inventory adjustment out
g. 702-inventory adjustment in (or reversal of 701)
h. 551 – Scrap adjustment out

Common Inventory SAP Transaction Codes (TC)

a. MM03 – Used for product information
   a. Planner
   b. Cost Centers (Costing 1 tab)
   c. Costing (Costing 2 tab)
b. /RB04/YC5_MMA26 – Current inventory levels in the warehouse
c. /RB04/2L3_MM011 – Material Master for SMV parts
d. MMBE- Inventory locations by Storage Location
e. /RB04/YL2_LX03 – Search tool
   a. Search by Bin
   b. Search by Material
   c. Search by SUID (LX03 TC by itself, does not allow for this)
   d. TOOL FOR:
      i. Finding SUID
      ii. Finding BATCH
      iii. Pulling “S” Block Report
      iv. Dead Stock Report
   e. Cannot search by Storage Locations, even though Quant Exists
f. LT27- See SUID history, Transfer Order (TO) history of part
   a. Can see the trail of how the SUID moved through the warehouse
   b. Good for researching Missing Pallets or qty discrepancies
g. **LT24** - Another SUID tool.
   a. Can search by part number
h. **MC.9 or MC.5** – Allows you to search by Storage Bin
   a. Limited on results
i. **MB51** – Show material movements
j. **/RB04/YT2_QCO** - Quality Cockpit – Able to search QMC by part number
   a. Research block stock
   b. See if QL issued to scrap