

MANUFACTURING'S SPARE INVENTORY PROCESS

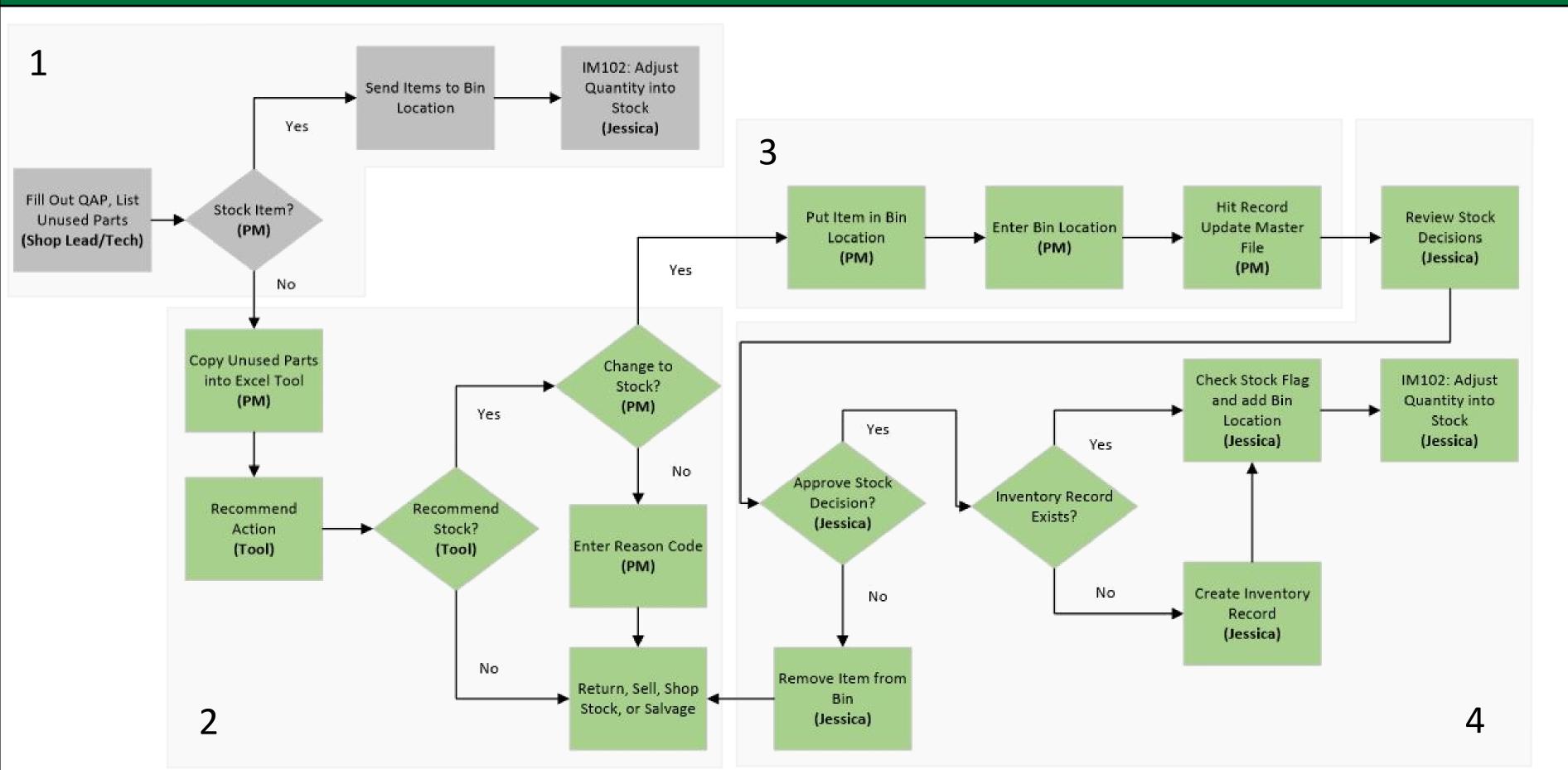
The WILLIAM STATES LEE COLLEGE *of* ENGINEERING

Faculty Mentor: Dr. Simon Hsiang

Problem

- Manufacturing process does not include any steps for tracking non-stock part usage
- Non-stock parts are often retained but not systematically added to inventory or scrapped
- Some parts are ordered multiple times because of the lack of item visibility
- Create a solution to manage non-stock inventory
- Implement a physical storage layout
- parts

Process Change



Zone 1

- . Current state process for stock items
- Items are sent to the bin location on record by Project Manager (PM)
- Quantity is updated in inventory record by Production Controller (PC)

Zone 2

- Filling out the excel tool (PM)
- Tool recommends an action based on usage statistics and adjustable parameters
- PM chooses an action from a drop down menu (Stock, Return, Scrap, Shop Stock)

Zone 3

- . Record decisions/locations within excel tool
- . Physically place items in new bin location (PM)
- . Unused Parts Log and Stock Listing are created

Zone 4

- . Where applicable, inventory record is created and quantity is adjusted into inventory record
- Birds eye view will allow management to quickly check that items are visible in inventory system

Department 18 Results **Inventory Reduction** Inventory On-hand - Items with projected on-hand time greater than two years scrapped Time Study - 30 samples, 5 trials per 6 subjects, 5 items per trial - 150 total items tested Improved Process **Original Process** Average — 48.6 seconds Average — 10.9 seconds Std. Dev — 15.6 seconds Std. Dev - 2.5 seconds

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Objective

- Design a data-driven tool to help the company add
- items to inventory and track movement of non-stock

. PM decisions are reviewed (PC)

- **66.7%** reduction in holding cost
- Overall Change in Cycle Count Time **68.0%** reduction in average picking time 84.2% reduction in standard deviation

| | Department | 18 | | | |
|-----------------|------------------|-------|---------|------|-------------|
| | Action: | Stock | Return* | Sell | SS/Salvage^ |
| | Total Cost: | >0 | >20 | >100 | <10 |
| | On Hand (days): | <180 | >180 | >180 | >365 |
| | Next Use (days): | <180 | >180 | >180 | >365 |
| User Input Form | | | | | ł |

| User input cel | ls in blue | | | | | | | | | |
|-------------------|------------|---------------------|----------------------|---------------|----------------------|-----------------------|-----------|-------------------------------|-----------------------------------|--|
| Enter Initials: | JA | | | Refresh Query | | | | | Record | |
| Enter Department: | 18 | | | Kerresh Query | | | | | | |
| ltem Number | Quantity | Work Order Usage | Direct/Sale Usage | Cost Each | Usage Freq (Days) | Action Recommended | Decision? | Reason Code (if necessary) | Bin Location (If stock chosen) | |
| 798732704 | 5 | 11 | 14 | \$9.90 | 29 | Stock | Stock | | 18TDA07 | |
| 900054201 | 10 | 0 | 0 | \$5.09 | 100 | Stock | Stock | | 18TDA03 | |
| 900062599 | 12 | 4 | 90 | \$77.72 | 8 | Stock | Salvage | Damage | | |
| 900078860 | 17 | 153 | 0 | \$6.03 | 5 | Stock | Stock | | 18TDA09 | |
| 900082003 | 3 | 0 | 30 | \$2.44 | 24 | Stock | Stock | | 18TDA02 | |
| 798732704 | 5 | 11 | 14 | \$9.90 | 29 | Stock | Stock | | | |
| 900054201 | 2 | 0 | 0 | \$5.09 | 100 | Stock | Stock | | | |
| 900054205 | 6 | 0 | 0 | \$6.79 | 1000 | Shop Stock/Salvage | Salvage | | | |
| 900062599 | 1 | 4 | 90 | \$77.72 | 8 | Stock | Stock | | | |
| 900078860 | 3 | 153 | 0 | \$6.03 | 5 | Stock | Return | Eligible for Return | | |
| | | | | | | | | | | |

Unused Parts Log

| epartment | Initials | Item Number | Quantity | Work Order Usage | Direct/Sale Usage | Overall Usage | Cost Each | Days On Hand | Next Use (days) | Action Recommended | Decision? | Reason Code (if necessary) | Bin Location (If stock chosen) | DateEntered |
|-----------|----------|-------------|----------|------------------|-------------------|---------------|-----------|--------------|-----------------|--------------------|-----------|-------------------------------|-----------------------------------|-------------|
| 18 | JA | 798732704 | 5 | 11 | 14 | 25 | \$9.90 | 146 | 29 | Stock | Return | | | 2/5/19 19:2 |
| 18 | JA | 900054201 | 10 | 0 | 0 | 0 | \$5.09 | 1000 | 100 | Stock | Stock | | 18TDA04 | 2/5/19 19:2 |
| 18 | JA | 900062599 | 12 | 4 | 90 | 94 | \$77.72 | 93 | 8 | Stock | Sell | Not Eligible for Return | | 2/5/19 19:2 |
| 18 | JA | 900078860 | 17 | 153 | 0 | 153 | \$6.03 | 81 | 5 | Stock | Return | | | 2/5/19 19:2 |
| 18 | JA | 900082003 | 3 | 0 | 30 | 30 | \$2.44 | 73 | 24 | Stock | Stock | | 18TDA07 | 2/5/19 19:2 |
| 18 | JA | 798732704 | 5 | 11 | 14 | 25 | \$9.90 | 146 | 29 | Stock | Stock | | 18TDA03 | 2/5/19 19:2 |
| 18 | JA | 900054201 | 10 | 0 | 0 | 0 | \$5.09 | 1000 | 100 | Stock | Stock | | 18TDB03 | 2/5/19 19:2 |
| 18 | JA | 900054205 | 1 | 0 | 0 | 0 | \$6.79 | 1000 | 1000 | Shop Stock/Salvage | Stock | | 18TDA09 | 2/5/19 19:2 |
| 18 | JA | 900062599 | 12 | 4 | 90 | 94 | \$77.72 | 93 | 8 | Stock | Stock | | 18TDA02 | 2/5/19 19: |
| 18 | JA | 900078860 | 17 | 153 | 0 | 153 | \$6.03 | 81 | 5 | Stock | Sell | | | 2/5/19 19: |

- . The log can be used for root cause analysis

18 TD A 06

- Department 18
- Location ID TD
- Level / Row A
- Position / Column 06

Failures All bin locations full Query won't refresh VBA stops working Query returns incorrect data Excel tool makes poor decisions

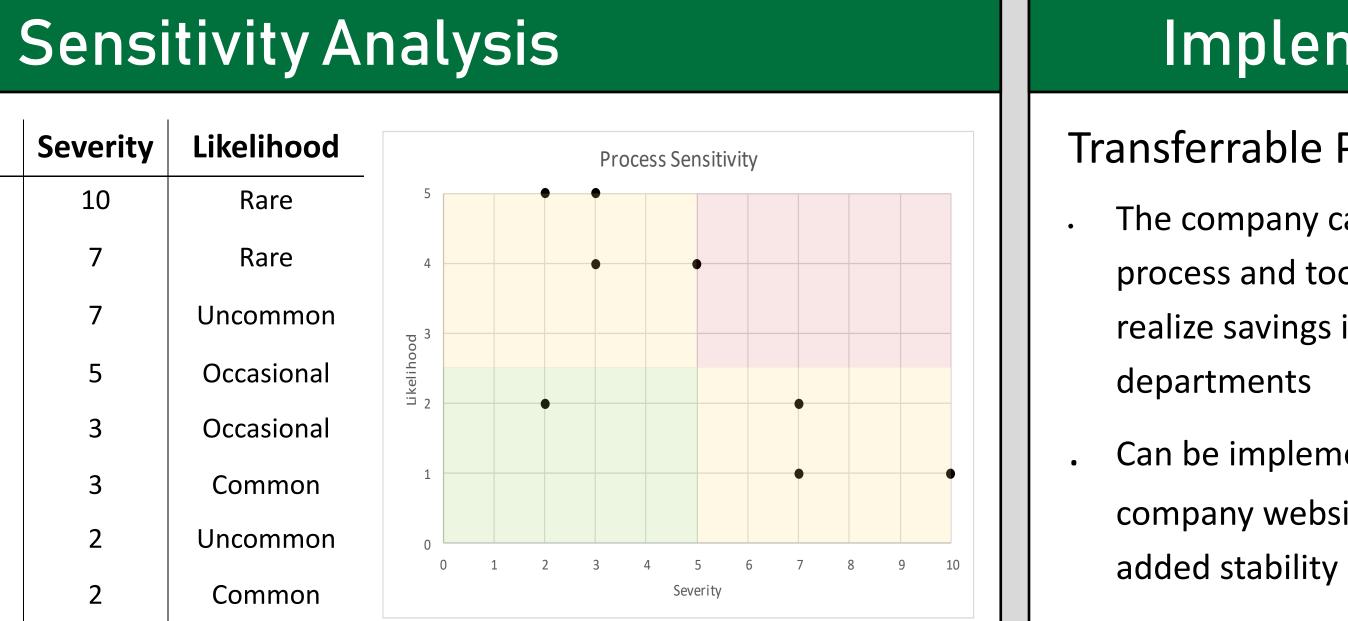
- Incorrect item/bin entered Location size too small
- Incorrect cycle counts

ExcelTool

. The Unused Parts Log is a historical record of every part/line entered into the above form . This document will also contain relevant information such as vendor and project size

Inventory Dashboard

| Bin Location | Size | Item Assigned | Quantity | Value | Date Assigned | Last Counted | Utili | zatio | n: | | 3% | | |
|---------------------|--------------|---------------|----------|---------|---------------|--------------|-------|--------|--------|-----|------|-----|----|
| 18TDA01 | 4.25x4.25x4" | | | | | | Emp | oty Lo | catio | ns: | 72 | | |
| 18TDA02 | 4.25x4.25x4" | | | | | | Inve | ntory | / Valu | le: | \$82 | | |
| 18TDA03 | 4.25x4.25x4" | | | | | | | | | | | | |
| 18TDA04 | 4.25x4.25x4" | | | | | | | | | Тор | Dra | wer | |
| 18TDA05 | 4.25x4.25x4" | | | | | | G01 | G02 | G03 | G04 | G05 | G06 | G |
| 18TDA06 | 4.25x4.25x4" | 900186036 | 6 | \$10.38 | 3/27/19 | 3/27/19 | F01 | F02 | F03 | F04 | F05 | F06 | FC |
| 18TDA07 | 4.25x4.25x4" | | | | | | E01 | E02 | E03 | E04 | E05 | E06 | EC |
| 18TDA08 | 4.25x4.25x4" | | | | | | D01 | D02 | D03 | D04 | D05 | D06 | DC |
| 18TDA09 | 4.25x4.25x4" | | | | | | C01 | C02 | C03 | C04 | C05 | C06 | СС |
| 18TDB01 | 4.25x4.25x4" | | | | | | B01 | B02 | B03 | B04 | B05 | B06 | BC |
| 18TDB02 | 4.25x4.25x4" | | | | | | A01 | A02 | A03 | A04 | A05 | A06 | AC |
| 18TDB03 | 4.25x4.25x4" | | | | | | | | | | | | |
| 18TDB04 | 4.25x4.25x4" | | | | | | | | Bot | tom | Drav | wer | |
| 18TDB05 | 4.25x4.25x4" | | | | | | | 04 | | ~~ | | ~~ | |
| 18TDB06 | 4.25x4.25x4" | 753030234 | 1 | \$71.33 | 3/27/19 | 3/27/19 | | 01 | | 02 | | 03 | |
| 18TDB07 | 4.25x4.25x4" | | | | | | | 01 | | 22 | | 00 | |
| 18TDB08 | 4.25x4.25x4" | | | | | | В | 01 | B | 02 | B | 03 | |
| 18TDB09 | 4.25x4.25x4" | | | | | | | 01 | | 00 | | | |
| 18TDC01 | 4.25x4.25x4" | | | | | | A | 01 | A | 02 | | A | 03 |
| 18TDC02 | 4.25x4.25x4" | | | | | | | | | | | | |
| 18TDC03 | 4.25x4.25x4" | | | | | | | | | | | | |







Industry Supporters: Bob Decker & Jamie Smith

- Item numbers and quantities are entered
- "Refresh" button is pressed:
- Work order usage, Direct/Sales history Item information gathered
- Days on hand, next use, each and total costs calculated
- Action recommended based on frequency and cost (from parameters):
- Stock, Return, Sell, Salvage, Shop Stock
- Decision chosen from list, if stock assign bin location
- "Record" button is pressed:
 - Two outputs created: Stock listing, Unused Parts Log

Stock Listing

| Item Number | Quantity | Overall usage | Cost each | Recommended Action | Action | Bin Location |
|-------------|----------|---------------|-----------|--------------------|--------|---------------------|
| 798728218 | 3 | 0 | \$70.70 | Return else Sell | Return | |
| 798732704 | 5 | 25 | \$9.90 | Stock | Stock | |
| 798740595 | 5 | 1 | \$77.59 | Return else Sell | Sell | |
| 900046393 | 5 | 1265 | \$16.63 | Stock | Return | |
| 900054201 | 10 | 0 | \$5.09 | Stock | Stock | |
| 900054205 | 1 | 0 | \$6.79 | Shop Stock/Salvage | Stock | |
| 900062599 | 12 | 94 | \$77.72 | Stock | Stock | |
| 900078860 | 17 | 153 | \$6.03 | Stock | Stock | |
| 900082003 | 3 | 30 | \$2.44 | Stock | Stock | |
| 900054201 | 1 | 0 | \$5.09 | Shop Stock/Salvage | Sell | |

- . The Stock Listing assists management in changing items' classification from non-stock to stock
- . This page will be cleared periodically by management
- . Items listed will be assigned a bin location and quantity in the inventory system

G07 G08 G0 -07 F08 F0 -07 E08 E0 007 D08 D09 C07 C08 C09 B07 B08 B09 A07 A08 A09 C04 B04

- Displays current inventory levels and provides a birds-eye view of bin locations
- . Color coded empty or full
- Query driven
- Will alert user to items that have been idle longer than pre-specified limit

Implementation Plan & Scalability

Transferrable Process

- The company can use the process and tool provided to realize savings in other
- Can be implemented within company website, Apogee for

Department 22

Held Non-stock Inventory

\$46,600

Unique / Total Items

525 / 7833

Increase from Department 18

428%