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Abstract

Guideline scope to develop and deliver a tailored solution that will optimise the picked stock verification as part of the pre-delivery customer order fulfilment process

Scope overview for  
parts scan verification optimisation

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# Overview

The intent of this document is to provide a high-level overview of a tailored verification of picked goods using a ***barcode based sub-system*** integrated with the ePart database. A further intent of this document is to provide a supportive recording framework for the necessary iterative review of requirements that will result in a well refined scope of work from which detailed resource requirements, timelines and costing estimate can be defined.

The solution consideration intent should be to follow ***best practice*** methodologies and proposes that a fully web-based deployment methodology be followed with ***mobility platform deployment*** readiness.

This document is produced with a current understanding of requirement and will indicate some options that will need to be considered and appropriately documented as “considered and found to have merit” or “considered and to have less merit” with the positive / negative elements defined for completeness and future reference.

Most of the document content will be presented in a short / cryptic format and per review expanded on as the solution opportunities and scope “exposed” for further exploration.

# Background

The sub-process of interest starts when a “picker” completes the picking process where the accuracy of picked goods is to be verified by a team of “packer” staff. Due to the very manual nature of the process, a certain number of errors do occur on a regular basis with potentially significant impact on financial losses and poor customer experiences.

Justification around optimising the ***checking and verification***process is that the ***actual*** impact is somewhat unknown and relies almost exclusively on ***Customer*** feedback on ***short*** delivery or where (honest) customers announce ***goods received not ordered***.

***Non-conformance*** deliveries trigger various activities that aim to verify the non-conformances and where justified, activate corrective processes that include picking of the goods short delivered and attempting recovery where goods were (potentially) delivered to the wrong customer.

***This document indicatively provides a view of the costs, direct & indirect, and the impact of poor customer experience of non-conformance deliveries under the appropriate heading***

# Barcode Based Solution Consideration

## In-house barcode label printing

As part of the goods receiving verification process, the receiving department print barcoded labels for items received and affix printed labels to each of the items received. The original intent was to optimise the follow-on to receiving operational processes using barcode based identification and presents well for deployment in scoping the picking and post-picking verification requirements

In some instances due to product size, material type or bulk / high turnover items will not be labelled and will require a procedure to compliment the scoped for barcoded verification solution consideration.

# Barcode based Picking for Item Verification

The first opportunity to review is the ability is optimise the pricking process in a way that will ensure that picking accuracy is maximised to the point where checking can be eliminated.

The potential benefits of picking by barcode need to be considered in the following aspects:

## Picker scans bin and stock code

### Process

* Picker receives picking instruction using ***on-wrist*** electronic device with barcode scanning capability
* Picker is directed to a specific bin either visually and/or audibly.
* Picker scans bin and items to be picked as directed
* In some pre-defined instances
  + Supplier part identification barcode will be used for stock items not internally labelled and may be individual items as well as for pack quantities
  + Suppliers may supply stock using outer pack labels and inner items with a different barcode value for the same ePart stock code. The outer pack label will be pre-configured in ePart to identify inner pack quantities i.e. GUD filters come in packs of 12 filters; when scanning 1 outer pack label the quantity to customer will reflect 12 units on invoice.
* Active feedback to picker if incorrect bin or item scanned

### Benefits

* Optimal picking accuracy at source
* No checking required
* Technology support – on screen & voice - eliminating paper
* No need to return to picking control; drop picked job at despatch, confirm drop on device & auto upload of next pick job to device & start picking immediately.
* ROI over time – calculate printer capital + toner + paper saving to justify technology investment.
* No paper & no pen – hands-free
* Opportunity to advise warehouse of “items not found” in real-time to investigate whilst picker carries on picking current job. Warehouse staff advise where “found items” are located to direct picker to new location in real-time for picker to complete current job or re-activate job on hold for completion.
* Place pick job on hold from device in real time with reason by picker
* Eliminate pick jobs held back due to errors etc

### Operational impact

* To eliminate checking, picking by order is required which may lead to an increase in picker compliment
* Assess benefits of ”wave” picking (picking job consolidation) vs pick by order
* Review & define “carousel” impact etc. (This is no longer a requirement as the device has broken down and removed with no intent to replace)

### Safety considerations

* Audible devices needs to conform to safety requirements
* Ear pieces that are safety conformant are available and extensively used in 1st world counties such as UK, USA etc
* Single ear headsets with ambient sound bypass (forklift & announcement can be heard). Picker instructions are short / specific vs listening to headset music which is continuous.

## Supporting technology

### Mobile device

Picking using ***“on-arm”*** technology has become an industry norm and an expected deployment due to advancements in functionality and improved affordability.

* Mobile device and barcode scanner is strapped to picker forearm
* Picker is assigned an order to be picked automatically/manually
* System connectivity through strategic placement of WiFi node points for real-time database communication
* Device intelligence provides continued operations when out of WiFi range
* Map warehouse to optimise picker routing – sort by bin location & warehouse mapping
* Opportunity to delete items not found directly on device

### Picker Barcode scanning devices

* Integrated with “***on-arm***” mobile device
* Separate pocket style scanner connected to mobile device with blue-tooth; attached to picker wrist with lanyard
* Mobile device & separate scanner require battery charging

### Pick by order / wave picking

* Pick by order will eliminate collating wave style picking which eliminates order verification
* Wave picking using barcode based picking will require checking by order phase

# Retain current picking method – verify by barcode

## Operational requirements

* The current method of checking is done by a team that use the invoice to collate items picked per order. At the same time the stock items are visually checked between the invoice and the actual stock item, using the barcoded label.
* Mostly items that current do not have a barcoded label, are kept in the carousel. These items are picked based on the carousel bin that has the stock code identified on the bin face.
* After picking the items are inserted into a plastic bag and stock item code is written on by hand. An opportunity for optimisation is to print a bar coded label to identify the stock code.
  + As a variation, a barcode label with a ***unique*** reference can be printed, associating the particular item a specific picking job; this to overcome the possibility where the wrong bag / part is used during the checking process.
* The checker, on receipt of a picking job has to contend with the following operational requirement:
  + Collate picked items per invoice
  + Scan own identity barcode notifying the system that the checking process has started and started by which checker.
  + Scan invoice and then scan associated items to a pre-pack bin / container. No facility will be provided to enter a unit count; each items must be scanned & each scan will be a counter. However, if the checker made a scan error by scanning too many times, the item count must be reset for the specific items and re-scanned.
  + On scanning the carousel barcoded bag, translate the serial barcode to the related invoice.
  + For barcode labels that cannot be barcode scanned, the checker needs to be able to type the required stock code.
  + On scanning the invoice barcode, the tablet display (reserved for the specific checker) needs to list all the items & their item counts. As each item is scanned, the “too be scanned” count is reduced.
  + As soon as all items for a specific part has been scanned, the item is to be removed from the list such that when all items have been accounted for the display list will be “empty” other than items scanned not ordered. NOTE: all items must be scanned even if the list is clear so as to record all items picked not ordered.
  + Any items scanned not ordered must be added to the display to reflect exceptions
  + If all items are accounted for, the checking process is ***closed***and the packing process is commenced including the printing of parcel labels. The signal to indicate that all items have been scanned is initiated by scanning a reserved barcode used for this purpose.
  + If the ordered items list is incomplete (no more items to be scanned):
    - The checking process is abandoned, and the order passed into a “quarantine” state for the picker to correct.
    - On receipt of the “corrected” order, the checking process is started from scratch.
    - This process is repeated until the order is correctly processed or cancelled.
    - Each check attempt abandoned is recorded with a ***reason*** ***& description*** sufficient for a management assessment.
  + All items picked in excess needs to be recorded for management assessment.

## Technology support

This process is inherently requires the checker to be reasonably ***mobile*** thus the following should be considered as part of the infrastructure requirements:

* WiFi network that will allow ***untethered***  barcode scanning
* Display units for consideration
  + Consumer type Android tablets mounted between checker tables housed in a steel protective housing.
  + 2 Checkers (tables with checker space back to back) share a tablet where the display area is mapped in 2 sections.
  + If a checker is required to enter data (by exception), the soft tablet keyboard is used
  + Each tablet is connected to the main ePart database via the WiFi
* Barcode style & formats for consideration:
  + Supermarket stationary scanners that allow the checker to slide the items past a scanner periphery one item at a time, thus permitting item count to be verified.

However, this will not work well for large items such as engine blocks and this scanning option should be reconsidered before implementing

* + Cabled scanners

These present as a “standard” option but will hamper mobility moving from side to side on the checking table and should be a lesser solution implementation

* + Bluetooth / Wi-Fi scanners - untethered

This format should be the preferred method of scanning. These device types can connect wirelessly to the Android tablet mounted in close proximity. Scanners as follows:

* Ruggedized format: in this particular format a good measure of mobility will be possible; however, these devices tend to be “bulky” and would be difficult to operate in a fully “hands free” mode.
  + To recharge these devices come with a docking station
  + Comes at a premium price tag
* Pocket size format: when attached to the checker’s wrist using a lanyard, provides the checker full “hands free” capability. It must be noted:
  + These devices are protected against damage when used with a wrist attached lanyard
  + Rechargeable batteries need to be replaced periodically
  + Very affordable and could be classed as “consumable”

# Non-conformance - Financial Impact

The cost of having to manage non-conformance orders after delivery can be assessed in the following manner:

**Schedule 6.1** **reflects the assumptive per month cost to clear a customer non-conformance order including items to be replaced at cost including lost revenue (Gross Profit)**



NOTE: The non-conformance in schedule 6.1 does not reflect any recovery % as this will depend on the chosen solution implementation decided on later in the analysis & scoping process.

# Conformance – Customer Experience Impact

The impact of non-conformance customer order fulfilment is very subjective and difficult to predict. However, some format of conservative assumption must be made in that ***reliability in delivering the correct stock items will have a positive impact on being considered preferred supplier; especially where delivery of goods is time sensitive.***

By improving the reliability factor in delivering goods within conformance will not only yield savings as per schedule 6.1 but will also ensure that Engineparts gains a measure of business when time sensitive deliveries conform to expectation

**Schedule 7.1** **reflects the assumed business benefit by improving the customer experience due to reliability of accurate delivery of goods**



# Total Business Benefit Gain Potential

Again, the following schedule reflects an assumed business benefit which opinionatedly is considered to be reasonably conservative

**Schedule 8.1 reflects the total business benefit that could be gained should an appropriate investment be made towards equipping a changed picking and / or checking process**



Schedule 8.1 does not include the potential of staff compliment optimisation as a business benefit. During the further analysis process this may become better understood and could be included into the benefit schedules.

Furthermore, the assumptions are based on known events as reported by customers – no assumption has been made of customers NOT reporting events where goods of value was shipped incorrectly. To better understand this aspect of business benefit, it may be good to analyse cycle counts to draw some conclusion of such potential losses.

# Management Information

By design, the proposed solution should be web based and operate in real time.

A *standard* set of management information dashboards and reports should be provided for and provide a real-time view for the following:

* Sales orders released for items not found ….
* Picked orders with goods not in proper location ….
* ……

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# Technology and related benefits

To ensure a lowest possible TCO (total cost of ownership) the development tools that will be used are of a world class standard delivering the benefits of ***open source*** that comes with freedom of choice, detachment from licensing costs, annual renewal licensing and an unbeatable platform for support where hundreds of thousands of skilled people are on tap 24 by 7 to assist. However, MS SQL is well entrenched with a significant business investment and is to remain the hosting database.

# Investment schedule

The following investment schedule is ‘provisional” and will require a detailed review to confirm actual functionality and consequently cost.

**Schedule 1: Investment for the proposed solution provision”**



SAMPLE to be completed