Tracking Components

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This poster outlines the findings during a 10-week, full-time summer internship at NASA's Stennis Space Center (SSC) in Mississippi. As an intern with RA10, the Project Management Division of Center Operations Directorate, I contributed to tasks related to the advancement of systems and operations across SSC. My main priority was to optimize the transportation process of work order kits delivered from the Michoud Assembly Facility (MAF) in New Orleans, Louisiana. An example work order kit would include instructions and materials to complete the replacement of a broken light switch. Unfortunately, kits that arrive at SSC often contain incorrect parts, which results in returning to MAF to get the necessary parts. Integrating a wireless tracking and identification system could improve this way of operating by providing a parts lists and kit location. This idea of using wireless technology will essentially cut costs, time and effort. The main objective for this summer is to develop options for affordable tracking and identification systems that can be used across the agency.

Introduction

NASA's Stennis Space Center (SSC) in Mississippi is currently in the process of consolidating their component shop with NASA's Michoud Assembly Facility (MAF) in New Orleans. It has been my goal to optimize the tracking of kits and components across SCC and MAF. A typical kit received from MAF is a work order kit. Once a work order is released, the necessary materials must be collected and kitted. It is important that all parts are accounted for during the kitting process to ensure the assigned task can be completed. Currently, the kit's data is manually entered into Maximo.

RFID

Radio Frequency Identification (**RFID**) is practical solution for tracking property. A wireless RFID tag includes a chip that stores information about the object to which it is attached. The tag is also equipped with an antenna that sends radio signals to an RFID reader, or transceiver. The reader shows desired output of the tag and sends information to a database. This is a great tool if there is a need for inventory location within a warehouse.

Tags (Transponders): read/write capabilities
- Active: contains a battery; broadcasts signal automatically
- Passive: no power source; only transmits signal to a reader
- ~ $1 – $4 per tag

Readers (Transceivers): mobile or fixed
- Reads 100s of tags at once
- Can read through containers
- Reads up to 15 feet away
- Interferences: metal and liquids

Barcodes/QR Codes

Barcoding is a common and affordable method of labeling property. A **barcode** is a machine-readable 1D code in the form of numbers and patterns of black and white parallel lines used to identify objects. A Quick Response Code, or **QR Code**, is a 2D (matrix) barcode that can hold more information than a 1D (linear) barcode. Both barcodes and QR Codes require human involvement and line of sight to scan the code. This is a sensible solution for labeling kits that are sent to SSC. To label the inventory, a barcode can be generated once a component arrives at MAF. This barcode will represent that specific component and the appropriate kit. Once a kit is scanned, it will update the location in a database.

Obstructed codes cannot be read
- 10% of barcode
- 30% of QR Code

EzMaxMobile Application: integrates with Maximo
- iOS, Android, Blackberry, Windows devices
- External Bluetooth enabled barcode scanners
- Push notifications – work orders

References:
Thom Rich, Kevin Stiede, Kenny McCormack

Objectives

- Track kits and components at MAF and SSC
- Replace manual data entry
- Reduce errors such as missing or incorrect parts
- Eliminate returning to MAF if a kit is missing a part
- Complete work orders faster
- Communicate in real time

Etching

Etching is the process of permanently marking a surface with a carved text or design. Laser etching occurs when the heat from a beam causes the surface of a material to melt. The depth is typically no more than 0.001 inches, which leaves a visible design that can be easily scanned. This is a useful process that can be applied to NASA's components, such as valves and pumps. Instead of an adhesive barcode or paper tag, a QR code could be engraved into a component when product and part identification is necessary.

Conclusion

There are serval approaches to track and identify objects. I recommend barcoding shipments from MAF since it's inexpensive and the barcodes will most likely be thrown away. If location of shipments are imperative, I suggest one RFID tag per shipment to know when it arrives at SSC. For components across the site, I would consider laser etching QR Codes since the codes cannot be removed during the component cleaning process. This is a great alternative to paper and aluminum tags.

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- https://commons.wikimedia.org/wiki/File:Barcode_scanner.png