TAGGING COMPONENTS IN THE TEST COMPLEX AREA

By Sarah Gomez

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RA10: Design and Construction Project Management
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- Working on autonomous underwater vehicles for international RoboSub competition
- FIRST Robotics Competition Alumni
- Hope to be working on robotics or spacecraft after I graduate
• Why tag components differently?
  • Various methods are in place to tag different components, but not every component is tracked
  • Variance in method can make it difficult to obtain component information and identify discrepancies
  • Time and resources are spent on component localization and verification

• Previous work of RA10 interns:
  • Researching more efficient asset tracking methods
  • Investigating cost effective ways to localize components
  • Past interns identified using QR codes as a potential solution
• Consolidate component information by planning the integration of QR codes
  • Research best method for tagging components in B2 Test Stand area

• Further investigate current efforts for tracking components
  • Research current NASA projects with similar tracking efforts
  • Look at possible funding that can be secured for the project
WHY QR CODES?

• QR Codes can hold more information than a barcode
  • Accepts up to 30% damage and still readable
  • Does not require separate device to be scanned
    • QR Codes can be read via phone or tablet

• Compare to RFID technology:
  • Less expensive and more reliable than RFID tags
  • Does not get affected with metal surrounding a component
• Tagging
  • Researched types of label printers and tags that could be used in addition to previous work of interns
    • Etching metal tags, etching on part itself, sticker labels
  • Investigated tagging methods that don’t rely on Wi-fi
  • Looked into other technology (Bluetooth Low Energy beacons)
  • Also researched integration of GIS with QR codes

• NASA Standards
  • Identified NASA standards for using Data Matrixes for component identification, similar to how QR codes are used

• Current Practices
  • Identified current tracking methods: paper tags, metal tags, RFID tags, barcode stickers, Data Matrix engravings
  • Some components like valves are not tagged
Various practices used to track components:
• Met with S3 PDLM team that was working on securing funding for tagging (secured 9/26/18)
  • Used Mi-fi device as a proof-of-concept for tagging and scanning without Wi-fi
• Updated the [SSC Component Scanning wiki page](#) with research of tags, printers, and NASA standards
• Trained on how to use laser etching machine (located at Component Processing Facility (CPF)) and generate QR codes
• Created metal QR code tags and tagged B2 and E3 Test Stand areas
• Identified and updated components on DDMS Windchill, including default pictures of components, as well as their serial number (SN), and locator number (LN)
Created 29 metal tags with QR codes for B2 Test Stand Liquid Oxygen Replenish Pump area
- 13 tags were not applied due to component missing or being installed at a later time

Also tagged ~15 items at E3 Test Stand area
• Tagging process for metal tags:
  • Identify serial number (SN) of part
  • Create QR code on laser etching software using the SN
  • Laser etch metal tag with generated QR code
  • Identify component in the field using its locator number
  • Attach its corresponding tag and link the QR code number to the part instance on DDMS
General process for scanning:
- QR code is scanned and device is brought to DDMS part instance page
- User can then navigate DDMS page to view different component information
- If no QR code is linked to a part instance, then user can apply one and link it to the instance

Current tagging efforts are led by S3 PDLM team (Wendy Holladay, Kenneth McCormick)
Recommended tagging plan:

• Laser etching QR codes into metal tags temporarily whenever possible

• Once label printer gets ordered, tag QR codes with sticker labels depending on size and shape of component
  • Multiple labels can be used if needed to scan easily
  • The rest of the components can keep metal QR code tag

• Link QR codes to Windchill DDMS after QR code is printed/etched and physically tagging it as quickly as possible

• Send group teams to tag existing components frequently
Recommended future endeavors:

• Obtaining laser etching machine
  • Current laser etching machine is at CPF, which will be moved by March

• Continue tagging test complex area
  • Getting locator numbers of other components to continue efforts
  • Collaborate with technicians for locators to tag components in place that are hard to reach without proper equipment

• Integration of localization with QR code tags on components, along with Maximo data
REFERENCES

• “Component Scanning” Wiki page
• “Equipment Tracking Final Overview and Recommendations” by Jonathan Britt
• “Accessing Windchill Component Data via Scanning Tagged Components” by Tom Lipski
• “Tracking Part Kits” by Shelby Meredith
### SPECIAL THANKS

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And all of NASA RA10 and SSC!

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