

Asset Tracking for Petroleum Industry

Any Greenfield project would entail significant investments in infrastructure and processes to meet aggressive deadlines which are attendant to a project of large scales. Time plays a crucial role and the cost of not meeting the deadlines can increase the cost prohibitively. The cost parameters could include financial cost escalation and increased time to market which could be the death knell of the project. This paper highlights the integration of RFID & GPS system.

► Problem Areas

As any engineer would testify, in case of erecting and commissioning of plants, spools play a critical role. A spool is a cylindrical metal pipe of various shapes and sizes which are mated to other spools to form the conduits for the various chemicals to be processed in the plants. For a typical large sized project, the number of spools could run into hundreds of thousands in sheer numbers. Each spool is unique and cannot be replaced by another spool even with slightly different attributes. Though the intrinsic financial value of the spool could be low, if one has to conduct a VED (Vital, Essential, Desirable) analysis, this would be easily classified as a vital element. The spools are typically manufactured in a fabrication shop and then shipped to different staging areas where they await shipment to the relevant construction zones. Since each staging area would have several thousand of spools, the staging area personnel would be required to quickly identify the spool and then ship it. Since each spool is unique, it is imperative that the correct spool is quickly identified and then shipped to the correct location. In case of the spool not being located quickly, a new fabrication request is issued which results in inefficiencies and cost escalations.

► Earlier Scenario

Barcode technologies have existed for some time and have matured to a large extent. The spools are tagged with barcode which consist of the unique spool ID. The barcode tagging process happens at the planning stage, then it moves on to the workshop shop floor, further to NDT (non-destructive testing) the spools are moved to the staging areas and from there to the erection sites based on site request.

► Limitations of Barcode

Barcodes have some intrinsic limitations which inhibit attaining optimal effectiveness. Some of the limitations are:

- Barcodes are printed on paper, which get easily damaged / deteriorated in the staging areas. The staging areas are typically exposed to the elements due to it being an open area
- Barcodes require human intervention to identify the correct spool and does not give an indication on where the spool is physically located
- Search capabilities are pretty low in solution using barcodes

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► Implemented Solution

An integrated solution using UHF *Gen2* RFID tags, UHF RFID readers and GPS/GPRS devices along with existing Barcode technology can address this requirement quite effectively.

All spools are tagged with *Gen2* RFID tags prior to shipping at staging area. Each tag has a unique id (UID) conforming to the EPC standards. Subsequent to the tag being attached to a particular spool, the spool data is fed into the database (spool id, workshop id, staging area shipped to, final erection location etc). The tags are insulated properly conforming to the standards.

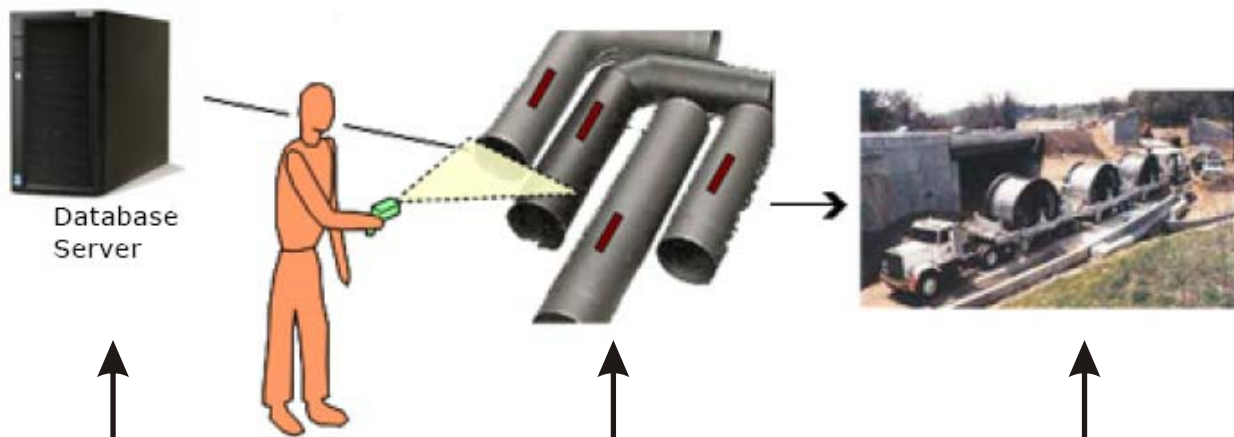
The spools are then stacked in the various staging areas, zoned in the back end GIS system. The staging area personnel use an integrated RFID reader integrated with a GPS/GPRS device. When a read command is initiated by personnel (by pressing read button/trigger), the spool id is padded onto the geographical location co-ordinates acquired by the GPS device and transmitted by the GPRS device to the back end server. The server query the backend GIS system to resolve the zone and transmit the data back to the integrated device and displayed to the user.

The user now knows which zone the spool is located in and backend database is also now updated with zone id. When a search is initiated, the user references the backend database to identify which zone the spool is located. The user then goes to the zone and reads the tags on the spools which then alert the user when the required spool is located. Similarly when the spool is shipped out, the tag is read and a shipment pass is initiated by the GPS/GPRS device to update the database to the new status.

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Benefits

RFID based Spool Tagging at Workshop



1. Workshop person reads the tags and write the ID on RFID spool
2. Update the information on database server
3. RFID tagged spools are ready to dispatch to lay down area

1. After Spool tagging the spools are loaded on fleet
2. Fleet will carry the spools to lay down area

1. Each fleet will be tagged by RFID tag
2. Operator will read all the spool tags and update the server
3. A dispatch note will be issued
4. Update the information on database server

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Benefits

RFID / GPS / GPRS based Asset Tracking at Laydown Area



Each laydown area is divided in zones and blocks.



1. Each laydown area person will carry RFID handheld terminal integrated with GPS / GPRS unit.
2. Operator will read the RFID tags and relate the GPS coordinates.
3. Send the information to central server.

- The solution can be easily integrated into the GIS system
- Read rates and location accuracies are significantly enhanced
- Usage of passive tags reduces cost considerably
- Reduced reader density diminishes the cost of implementation
- Audit trails are set to identify quality issues
- Downstream maintenance is enabled post commissioning since these tags can be retained