

ABSTRACT for The EA SMART™ Flag LDAR Data Project Management System

The following is an abstract of the EA SMART™ Flag System that is the basis of the patent application that is being submitted. The Application was submitted on June 4, 2007.

Prior Art:

Developing an LDAR tag inventory and associated database is a painstakingly difficult process that involves the effective management of complex regulations and intricate process conditions, in a method that is conducted by Technicians who are frequently either newly or quickly trained. These projects are typically done on a rush basis with both impending deadlines and tight budgets. The difficulty is compounded by the fact that even an inadequately trained Technician can appear to be doing an effective job and the mistakes that are possible may not be uncovered for months or years. The regulatory consequences for these sorts of mistakes can be dramatic. The most common quality errors are:

1. Items are not properly recorded in the database because the complex and intricate records marked on a flimsy piece of "Flagging tape" are difficult to read or because the documenting Technician is not diligent.
2. Components are not included in the program because entire sections of the plant are inadvertently missed and no one catches the oversight.
3. Components are not tagged because the tagging Technician is not properly trained to identify the components that should be included in the program.
4. Components are not tagged because the tagging Technician does not see them (they are overhead, obscured by some object or hidden under a grating, for instance.)
5. Components are not tagged because the tagging Technician simply does not want to access them (by climbing, for instance) so he "pretends" not to see them.
6. Tags are hung in the wrong position because the tagging Technician does not know how to properly hang the tags.
7. The documenting Technician can miss documenting components that were tagged for all of the same reasons: didn't look up, didn't want to climb, didn't identify obscure components, was not sure what needed to be tagged and documented, or the component was not recognizable etc.
8. The documenting Technician does not properly identify the compass direction when creating a location description for any of the components.

In each of these situations, it is widely recognized that the Lead, Experienced, Supervising Technician is typically competent to perform the work so as not to lead to any of these common errors (missed component, improper tagging or documentation, disorientation, etc). The problem is that the Lead Technician (we will call him the SMART™ Tech) is generally involved in setting up the project and then auditing and performing quality assurance work while the actual work is left to tagging and documenting Technicians who, not infrequently, have less training and expertise.

The current method leads to data projects in which the Lead Technician either hopes that the tagging and documenting Technicians are working effectively or he spends the bulk of his time attempting to find and correct errors.

The New Method

An LDAR data project system that utilizes a proprietary software program and intricate business method to ensure the most reliable and accurate tag inventory and database. The method works by enabling the most experienced and knowledgeable Technician (The SMART™ Tech) to establish the foundational aspect of the field identification, tagging and documentation process in such a manner that the tagging and documenting Technicians will fully benefit from the SMART™ Tech's knowledge and communication. This is done, first of all, by facilitating the SMART™ Tech's creation of the foundation of the database with respect to the 10 key informational streams necessary to generate an accurate and reliable LDAR database:

1. Process characteristics
2. Regulatory information
3. Associated equipment
4. Drawing documentation
5. Physical orientation
6. Number of major components
7. Overhead components
8. Obscure or hidden components
9. Mystery components
10. Safety considerations

The SMART™ Tech records each of these ten items for each SMART™ Flag that is hung. A SMART™ Flag is hung at each point in the process unit where any one of the variables among those 10 items changes. The information is referenced by a unique, numbered Flag that is installed in the field and associated with an identical index number in a Pocket PC. Each Flag is associated with the details of each of these 10 items.

The next Technician (the Tagging Technician) then, using a similar Pocket PC with the same database, locates each Flag, confirms or updates each of these knowledge items, hangs the appropriate tags on the components associated with the relevant Flag and records his input into the program. The program then analyzes this input against the expectations defined by the SMART™ Techs and either achieves confirmation or triggers a resolution of any discrepancies. This process also involves the Tagging Techs supplementing the list of original knowledge items with the following:

1. Clarification or correction to SMART™ provided items
2. Actual tags hung: quantity and sequence
3. Additional components identified
4. Any obscure or overhead components added
5. Additional safety issues noticed

Once this process is completed for all of the SMART™ Flags hung by the SMART™ Tech, the third Technician (the Documenting Tech) takes the same program and identifies the Flag, confirms or resolves each of the knowledge items and documents the components associated with each Flag. The Documenting Tech then inputs the results of the documenting process, the program analyzes this input against the expectations defined by the SMART™ Tech and the Tagging Tech and either achieves confirmation or triggers a resolution of any discrepancies.

In this way the most common errors in an LDAR data project can be either eliminated or substantially abated:

1. No more missed Flags
2. No more missed major pieces of equipment
3. No more mistakes by Documenting Techs among the 10 knowledge items being confirmed
4. No more missed components because they are out of sight
5. No more dis-orientation by Documenting Techs
6. No more legibility problems with what is written on Flags
7. No more confusion about mystery components

Step by step process

The Goal is to optimally convert the knowledge and expertise of the most experienced Technician (the SMART™ Tech) to the benefit of the Tagging and Documenting Technicians through a system that generates short feedback loops that are designed to confirm the Technicians' competence OR ensure timely feedback, training and learning.

Phase I: SMART™ Flag

1. Before going to the field, the SMART™ Tech takes the drawings and records all of the highlighted major pieces of equipment on a PDA.
2. Using drawings, the SMART™ Tech Flags lines. This ensures he does not accidentally create duplicate Flag IDs.
3. SMART™ Tech hangs a SMART™ Flag on a pump
4. Determines the following Technical parameters:
 - a. Reference number for this SMART™ Flag
 - b. Location of SMART™ Flag
 - c. Primary Reference Point (PRP)
 - d. Direction of PRP from landmark
 - e. Any item specified to be managed by the client to be associated with each component, such as
 - i. Unit
 - ii. Sub area
 - iii. Physical State
 - iv. Stream ID
 - v. Regulation
 - vi. Drawing number
 - vii. Line ID
 - viii. Major or Associated Equipment Type
 - ix. EPN Numbers
 - x. Major Equipment ID
 - xi. In/out
 - xii. Product Description
 - xiii. Process
 - f. Range for this Flag (to battery limits, to second level, to drain, etc.)
 - g. Number of valves for this Flag
 - h. Obscure components for this Flag (under vessel, behind building, etc)
 - i. Overhead components for this Flag
 - j. Mystery components for this Flag
 - k. Double orientation definition from this SMART™ Flag:
“___Landmark (control room, Tower 23, etc)___ is ___N, S, E, W_____ from here.” (x2)
 - l. Special safety considerations for this componentry
 - m. DTM threshold for this area
5. Updates the SMART™ File for that group of components
6. Goes to the next group of components
7. End of SMART™ Flagging: uploads data to desktop

Phase II: Tagging

1. Tagging Technician is assigned to tag a sub area or unit.
2. PDA is loaded with the entire SMART™ File for that project, unit and/or sub area.
3. Tagging Technician should be able to be assigned a sub area OR a range of SMART™ Flags.
4. Tagging Technician is given a tagging protocol TAAL to confirm that he knows what to do.
5. Tagging Technician taps on “FIND first SMART™ Flag.”
6. Techs taps on unit, sub area, FIRST SMART™ Flag and the system either takes him to the first one or allows him to select which one he wants to do first.
7. From that time, forward, the system will offer the next SMART™ Flag but the Tagging Technician may elect to do the SMART™ Flags in any order.
8. First screen shows: SMART™ Flag, unit, sub area, location and initial Primary Reference Point.
9. Confirmation Screen: Tagging Technician then reviews the SMART™ File:
 - a. Range of Flags
 - b. Number of valves
 - c. Overhead valves

- d. Obscure components with number and location
 - e. Mystery components
 - f. Takes the Orientation Challenge on both items (PDA displays Landmark1 and Technician clicks on N S E W. SMART™ program confirms or displays “The SMART™ Tech did not agree.” Then repeats the process for Landmark2. If they agree about both or the second, and the Tagging Tech understands and agrees then the Orientation has been confirmed. If not, then go to #8.)
 - g. Reviews Safety and Instruction notes from SMART™ Tech
10. If the Tagging Technician agrees with each of these, he taps on CONFIRM. If he does not, then he has to suspend his activity and consult with the SMART™ Tech.
 11. Once agreement has been reached, the Tagging Tech hangs the tags.
 12. He inputs the following:
 - a. first tag
 - b. last tag
 - c. any tags hung out of order or sequence, provide a list
 - d. any intervening tags that he does not hang
 - e. total valves tagged
 - f. Serviced overhead component? YES or NO
 - g. confirm or edit obscure entries made by SMART™ Tech
 - h. any obscure components that he tags that are not listed by SMART™ Tech
 - i. Clusters hung: range of tags, location of cluster (space for three of these per Flag). Has to ask for a reason why cluster was hung.
 - j. Create list of untagged components- number, location and reason
 - k. Must have table view listing all Flags the Tagging Technician has not yet hung tags for and another list showing the order of Flags he has hung tags for.
 13. SMART™ program compares 12e with 9b and confirms within 10%. If yes, then proceed. If not within 10%, then stop and consult with SMART™ Tech.
 14. Need to be able to identify feedback loops, let them be addressed and resolved or archived for later resolution. Discrepancies and feedback should not necessarily delay the work of the Tagging Technician.
 15. SMART™ program just keeps a list, sorted by SMART Flag™ of any outstanding feedback.
 16. SMART™ program uploaded and desktop program confirms that all SMART™ Flags were serviced.

Phase III: Documentation

1. Documenting Tech reviews and confirms SMART™ file
2. Takes Orientation Challenge
3. Addresses any obvious variances with SMART™ Tech
4. Begins with tag number specified by Tagging Tech
5. Documents Components
6. Must be able to add tags on missed components that are identifiable for feedback to Tagging Technician
7. Indicates “SMART™ Flag completed”
8. SMART™ compares documents with tagged
9. Confirms within range or Triggers Variance

Phase IV: SMART™ Reconciliation

1. SMART™ confirms:
 - a. All primary reference points documented
 - b. All SMART™ Flags completed