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3 ways **Digital Twins** improve the component identification process of the

LDAR Program

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Background

Reducing volatile organic compounds (VOCs), or fugitive emissions, is a critical climate action policy in the United States. Did you know that, according to the Environmental Protection Agency (EPA), a typical refinery or chemical plant can emit 600-700 tons of VOCs per year? This is concerning given that VOCs affect climate change and our health. Therefore, the U.S. government developed policies to reduce methane emissions, including the creation of periodic Leak Detection and Repair (LDAR) programs. The LDAR programs help detect and mitigate fugitive emissions, reduce product losses, increase safety for workers and operators, and improve local air quality.

According to the EPA, the LDAR program consists of five steps: identification of components, leak definition, monitoring components, repairing components, and recordkeeping. Because having an accurate inventory of the regulated components reduces leaks going unidentified, the identification of components is considered to be one of the most important phases in the process.

This document provides insightful information on how Digital Twins create value to identifying components of the LDAR program, and how the LDAR team can use the Digital Twin as a competitive advantage and offer better results.

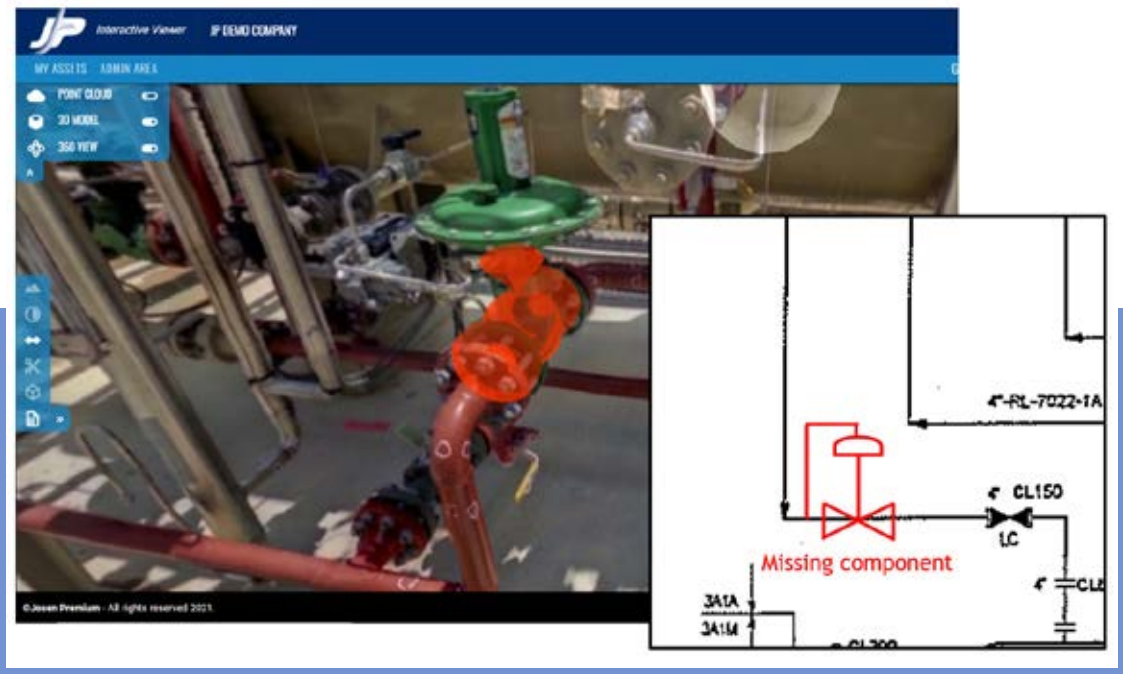
JP Global Digital solutions for the LDAR inspection process.

Review P&IDs faster without sending inspectors to the field

According to the EPA, one of the most common problems companies face in their LDAR program is incorrectly identifying all the regulated equipment components. Some of the steps during this process are: assigning a unique identification (ID) number to each regulated component, recording each regulated component and its unique ID in a log, and physically locating each regulated component in the facility, verifying its location on the piping and instrumentation diagrams (P&IDs), and updating the log if necessary.

But what if the P&IDs are not up-to-date? Due to day-to-day changes, keeping track of modifications in equipment and components is challenging . After some time, the plant's configuration and component tags might be different from those displayed in the existing documentation. If that is the case, inspectors solve these discrepancies by spending countless hours on the field. Inspectors need to verify each component, make annotations, and send the P&IDs for an update to the engineering team when necessary.

However, having a 3D digital replica, the Digital Twin, helps solve these problems more efficiently. The Digital Twin shows the exact condition of the assets coupled with photorealistic images, giving users a better understanding of the work needed to be done. Having a Digital Twin, along with an online navigation tool, will allow users to virtually inspect the plant, identify every component, compare them to the existing documentation, and make the changes accordingly without leaving the office. This new workflow would foster collaborative teamwork since different team members can simultaneously review different plant areas and update the P&IDs in a faster and more intuitive way, optimizing the process while reducing risk exposure. Along with Digital Twins, greater and quicker results are delivered, and your LDAR program becomes defendable and well supported when audited.



Updating P&IDs using the Digital Twin and Visualization tools.

Create an accurate LDAR inventory of the regulated components without leaving your office

When planning inspections, it is essential to have an accurate inventory checklist of every regulated component. Having this will allow inspectors to locate and monitor each component easily, so no leak goes unidentified. This is imperative since having leaking components would translate into high fines for the plant operator.

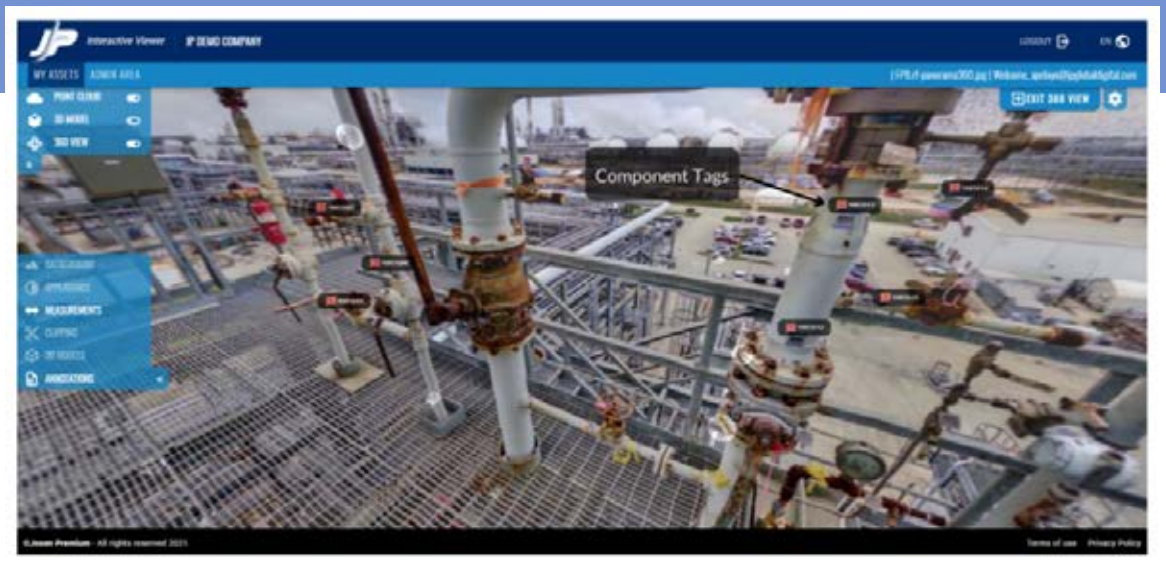
As stated by the EPA, “facilities can fail to identify regulated components when new processes are constructed, existing processes are modified” and exempt components are not properly documented. In addition to this, regulated components may go unidentified because they are not documented or shown in the P&IDs, such as small taps or flanges. Relying on inaccurate documents makes it hard for everyone since inspectors usually need to do field verification and physically locate and double-check every component to create an accurate and updated inventory, which tends to be painstaking and time-consuming.

So, what if inspectors no longer need to go to the field to validate each component? Without a doubt, it would be game-changing. As noticed, as easy as P&IDs can be outdated, so is the regulated component inventory, and this is another way the Digital Twin upgrades the game. A 3D digital replica of the assets, namely, a Digital Twin, will reduce risk exposure, man-hours, and potential costs associated with field trips.

Using a Digital Twin coupled with a web-based navigation tool brings countless benefits to this process, such as:

- Inspectors will be able to document from their offices by virtually walking through the facility and identifying each component.
- Several teams can work collaboratively anytime and anywhere on a virtual replica of the facility and create an accurate and precise inventory in a much faster and safer way.
- Regulated components will no longer be missed even if they are located in hard-to-reach and/or hazardous areas.

With the Digital Twin, inspectors will deliver faster and more accurate results, translating into a true competitive advantage.



Creating an LDAR inventory by virtually navigating the facility.

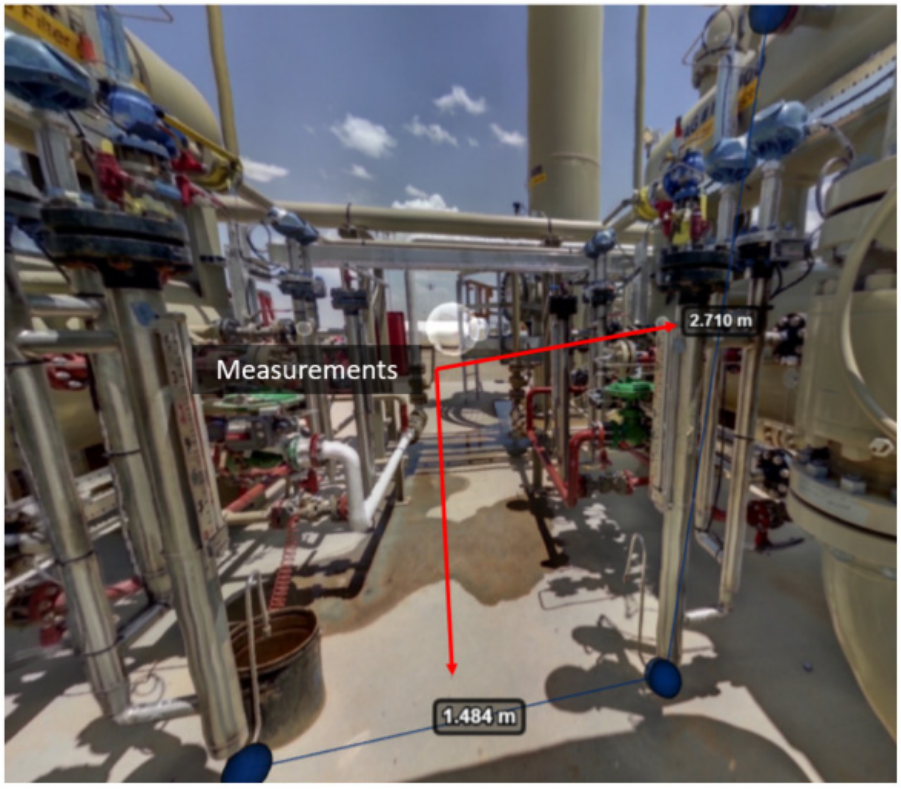
Optimize your inspection planning process-save time and money

Planning an LDAR inspection is not always easy. This process tends to get complicated and time-consuming depending on the information available to the inspectors. If everything goes as expected, inspectors are given updated P&IDs, process flow diagrams (PFDs), and isometrics. However, a broader understanding of the facility is needed.

It is often the case that inspectors run into a component that is in a hard-to-reach area while in the field and have to call in for resources required to complete the inspection. What a waste of time, right? This inconvenience not only happens in this case but also when a component is in an hazardous area. This increases the time spent and the safety risk on the field.

But, what if we can prevent these problems before going to the plant? With a Digital Twin, coupled with a navigation tool, inspectors can review the P&IDs, locate hard-to-reach areas and components, and efficiently create field routes while leveraging space, time and resources. A 3D digital replica will also allow inspectors to assess the equipment needed and its quantity, such as scaffolding and ladders, by taking measurements and calculating areas within the 3D digital replica of the plant.

Digital Twins can be leveraged to significantly improve the inspection planning process by providing inspectors with a complete view of the facility, thus enhancing workers' safety and increasing the inspection process's efficiency.



Measuring distance for scaffoldings and ladders colocation planning.

Final thoughts

Digital Twins are undoubtedly game-changing the terms of visual inspections for LDAR programs. The Digital Twin plays a major role by helping environmental personnel effectively identify each of the processes and regulated components faster and safer without even stepping a foot on the plant.

When integrating the Digital Twin with a web-based navigation tool, inspectors will be able to virtually walk through the plant, which will improve the inspection planning process and optimize the methods to review the P&IDs while reducing exposure time. Furthermore, several team members will be able to work simultaneously in the Digital Twin and perform LDAR tasks, such as highlighting P&IDs and creating an accurate inventory in a faster way while mitigating safety risks.

For more information about how to implement a Digital Twin on your inspection program,

visit our website: https://www.jpglobaldigital.com/solutions/ldar-solutions/

Visualizing components and their digital flags with the Digital Twin and JP Interactive Viewer.

References

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