



WHITE PAPER

Improved Inspections by a Digital End-To-End Workflow

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 **DIMATE**

Introduction

In recent years, there have been significant developments in the digitalization of plant inspections. Non-destructive testing (NDT) imaging is often already digital and an inspection data management software (IDMS) is also in use; however, there are still digital gaps in the process between the different inspection subsystems, test devices, and service contractors. This leads to numerous manual (mis)entries as well as poor integrity of NDT data when feeding asset performance systems and important information are not available to stakeholders in the inspection process.

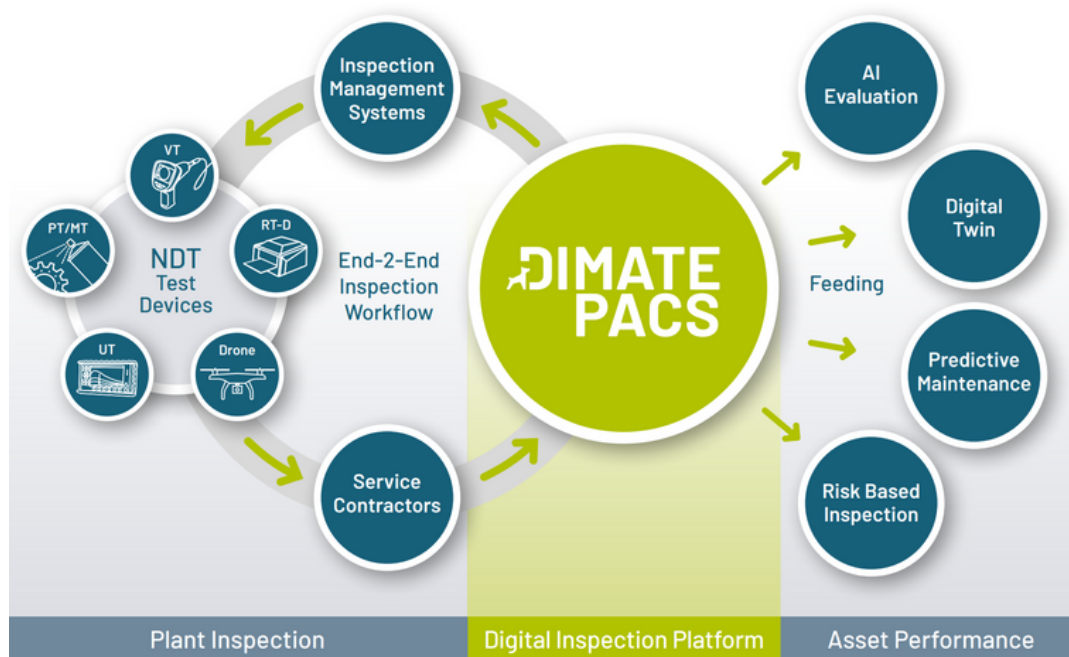
With DIMATE's refinery customer BP in Rotterdam, the Netherlands, we were able to implement a completely digital end-to-end workflow within their "Improved Inspections" project.

The mission was to fill all those gaps between the enterprise resource management (ERP), the inspection service contractors, and the risk based inspection (RBI) system.

From Business Case to Best Practice

In October 2020, BP had started a digitalization journey with a contextual inquiry of their NDT practices, performed by I&E Intelligent Operations. In early 2021, this evolved into a business case with the aim to fully digitalize NDT processes and to optimize the management of NDT data at the different refinery sites. In cooperation with DIMATE, the plant operator initiated a proof of concept on the realization of a completely digital inspection process, which was implemented by a multidisciplinary team consisting of people responsible for plant inspection, information technology (IT), and project management.

In the first step, the system requirements from the end user's perspective, the so-called user stories, were defined focusing on the end-to-end workflow of the NDT process and integrating maintenance, plant inspection, and NDT service contractors.



A first iteration of scrum sprints provided proof that the implementation of the DIMATE PACS solution can enable all user stories. The new digital end-to-end workflow offered the following capabilities:

- Management of pipe wall thickness readings from images, feeding into RBI.
- Transmitting NDT order and isometry data from the RBI to all parts of the plant.
- Online access to all NDT data sets, including historic image data, enabling the inspector to assess corrosion development over a period by comparing images.
- More efficient management of residual pipe wall thickness readings due to automated processes replacing manual Excel loads.
- Higher level of maturity with regard to cooperation with and integration of NDT service contractors, shared data responsibility and governance, and increased data integrity in RBI thickness monitoring.
- Development of a platform for future inspection methodologies, such as drone-based images and GPS-based data analysis by AI.

Introducing the IT-Standard “DICONDE”

The migration of existing radiographic images from the NDT systems of the service contractors was another significant milestone in the project. The successful migration optimized data analysis as both current and historical data, such as wall thickness measurements in radiographs of pipelines, can be compared, and trends identified.

The prerequisite for consistent NDT data management between the refinery operator and the NDT service contractors with different NDT inspection systems was the introduction of the IT standard DICONDE (Digital Imaging and Communication in Non-Destructive Evaluation).

DICONDE standardizes and structures test data and is the basis for secure data communication in the network.

Go-Live

The transition from pilot to standard operation meant that service contractors as well as the plant inspection department had to adopt new ways in digital test data evaluation and supervision as well as in handling digital radiography systems. The transition was facilitated by quick reference cards that explained key steps. Since the middle of February 2022, the improved inspection project transferred to regular operation. The acceptance by the inspection team as well as the service contractors is vast, which is partly due to the good management of the project team.



Conclusion

The implementation of a digital end-to-end workflow, incorporating digital NDT and data analysis functions, has significantly improved decision-making during on-stream inspections and stressful turnaround periods. Turnaround planning has been optimized, and workload reduced. Experts from the inspection team anticipate that the fully digital workflow will save \$300K annually in on-stream inspections and \$2,000K per turnaround.

Our refinery customer has rated the project as highly successful, and as a result, the DIMATE PACS will be rolled out to all other sites.

References

1. American Society for Testing and Materials (ASTM), Standard Practice for Digital Imaging and Communication in Non-Destructive Evaluation (DICONDE), <https://www.astm.org/e2339-21.html>



Highlights

\$2,000K savings per turnaround

\$300K savings annually in on-stream inspections

improved decision-making and reduced workload

optimized turnaround planning



DIMATE GmbH is an innovative IT company dedicated to driving business transformation through the digitization and improvement of inspection processes. From test data acquisition to smart evaluation, management and archiving – we cover the entire inspection process.

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