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3D Optical Imaging Techniques

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Document History

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Figures

Foreword

3D corrosion measurement techniques described in this report can be performed in the field, laboratory, plant environment, or other related facilities. Corrosion measurements are obtained under widely varying field conditions and plant environments. This report provides the user with the background needed to make testing decisions in the field or laboratory based on the technical facts available at the time of publication.

The latest 3D tool corrosion measurement techniques provided in this report were compiled from information submitted by committee members and subject matter experts. Variations or other techniques not included can be equally effective.

Paragraph B6.3.4 of NACE SP0502, referenced in the U.S. Code of Federal Regulations (CFR) Title 49 Part 192,[1] defines acceptable methods for assessing corrosion metal loss. At the time of the publication of NACE SP0502, 3D optical imaging tools for corrosion depth measurements were not readily available. During the past several years, advancements in 3D optical imaging technologies have resulted in several 3D optical imaging tools that can be used to measure corrosion depths; many of the newer tools combine the measurement result with software to automatically calculate the remaining strength of damaged infrastructure per 49 CFR Part 192 and NACE SP0502.

This technical report will focus on the 3D optical imaging technologies and the application of these technologies to the assessment of corrosion anomalies. These include:

1. Laser scanning 3D Tools
2. Structured Light 3D Tools.

White light field imaging tools are commonly used in other industries and 3D optical imaging using time-of-flight (TOF) techniques will not be discussed. White light field imaging is no longer used in non-destructive testing (NDT) and TOF is unable to meet the accuracy and resolution requirements needed for measuring corrosion anomalies.

> AMPP technical reports are intended to convey technical information or state-of-the-art knowledge regarding corrosion. In many cases, they discuss specific applications of corrosion mitigation technology, whether considered successful or not. Statements used to convey this information are factual and are provided to the reader as input and guidance for consideration when applying this technology in the future. However, these statements are not intended to be recommendations for general application of this technology and must not be construed as such.

Scope

This technical report provides descriptions of the corrosion pitting measurement techniques used on underground and aboveground piping, tanks, and vessels using 3D optical imaging tools. This report includes those corrosion measurement techniques that relate to the ASME B31.8, API 579, or special conditions in NACE SP0502.

Rationale

This technical report is intended for use by corrosion control personnel concerned with corrosion defects of buried, underground, or submerged pipelines, tank systems or similar structures, including those used to contain oil, gas, and water.