Choosing the appropriate Digital Radiography (DR) technology for the inspection of aboveground, non-piggable pipelines.

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Abstract

Newly constructed pipelines are typically designed with pig-launchers and receivers and have been constructed to allow maintenance and inspection pigs to be utilized with relative ease. However, many wellhead lines, gathering lines, facility piping systems, and even transportation pipelines, were designed where pigging is not possible or feasible. Due to engineering or cost restraints, conversion of these pipelines to allow pigging may not be an option. These aboveground pipelines require alternative inspection techniques that are deployed externally.

Digital Radiography can be utilized for real-time imaging of these non-piggable pipelines. However, the wide range of products available on the marketplace can make the challenge of finding the appropriate technology daunting. There is no one technology or computerized/digital radiography technique that can be utilized on all diameters and thicknesses of pipelines. The physical characteristics of the pipeline to be inspected affect the outcome of the digital image. Restraints to be considered include what type of damage is being investigated; i.e. internal or external corrosion? What is the pipeline product? Is there laminar or turbulent flow? Is the pipeline susceptible to slugging flow? All of these factors affect the resulting digital image.

Equipment characteristics of digital imaging systems such as resolution, dynamic range, repetition rates, production rate (speed), scintillating crystal choice, and others, affect and determine the output capability of DR systems. To produce an acceptable image, both the pipeline characteristics and the characteristics of the imaging system have to be considered. This paper will provide an overview of the selection process utilized for determining which DR technologies are appropriate for a particular pipeline inspection.

Key Words: Digital Radiography (DR), non-piggable pipelines, Computed Radiography (CR), CCD, CMOS, a-Si, a-Se, CdWO$_4$, flat panels, linear arrays.