

Robotized Dye Penetrant Testing system for complex geometry & internal piping

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There are often inspection challenges regarding attenuation, geometry or limitation due to obstacle of testing certain material. In many cases, advanced techniques based on UT from outside of the pipe are used to detect and size defects. In the nuclear industry of Sweden, many UT procedures have been developed and qualified to inspect pipes and components. For certain pipe systems and welds connecting valves, it has been limitations regarding inspection scope over the years. It has almost been impossible to fulfill 100% testing. A new solution of equipment has been developed to apply mechanized Dye Penetrant testing from the inside of the pipe to solve this problem. This equipment is based on predefined trajectory that is unique for each inspection area. New trajectories can be generated and tested offline in a specialized software before it is 3D printed for the application. The equipment is placed on a dismounted valve to reach the inspection area. This new generation of manipulator is currently in use for periodic in-service inspection at the Swedish BWR sites in Forsmark and Oskarshamn. The system is qualified by the Swedish Qualification Body and fulfilling the requirements in Sweden and ENIQ. This flexible solution is applicable to different type of valves and pipes. It can be applied on very small valve openings and long distances from the mounting. The Dye penetrant technique is verified for each inspection area regarding dye, cleaning and evaluator application systems, small camera systems and obstacles etc. This system can also be used for full inner surface DPI inspection of the pipe surface.