Question 35: What is your criteria for retiring a hydroprocessing reactor? What kind of failures have you seen? What are the inspection techniques you use and your frequency of inspection?

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As far as Inspection techniques and methods, the following should be employed. Application of these would be based on customer's inspection plan and/or Risk Based Inspection (RBI). Other things that would trigger examination would be thermal excursions or checking for in service cracking after 15 years. Reactors built before 1990 did not have the pedigree materials of reactors built after 1990 and should be subjected to volumetric weld seam examinations more frequently. Since this is done on the outside of the vessel it can be done during turnarounds and/or catalyst change outs.

1.Visual inspection

2.Hammer testing weld overlay/cladding for disbonding. Straight beam scans of areas for disbonding can be done, but hammer testing is cheaper and faster.

3.Thickness survey to satisfy API-510 requirements

4.Halogen free liquid penetrant materials – random inspection of weld overlay and ring joint grooves for cracking. Minimum dwell time for weld overlay should not be less than 30 minutes. Eddy current techniques may be employed, but UOP does not at this time have direct experience with this technique.

5.Wet magnetic particle examination technique using an AC yoke to check external nozzle welds for cracking

6.External volumetric ultrasonic angle beam examinations to check for in service cracking of weld seams and bottom head/skirt weld. Using laser technology to check inside diameter reactor for bulging.

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Reactor Vessel

Year

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