

Penilaian kelayakan pakai (FFS assessments) dengan metode remaining wall thickness pada piping system di flow section dan compression section fasilitas produksi lepas pantai M2 = Remaining wall thickness methods for FFS assessments of flow section and compression section piping system in M2 offshore oil platform

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Abstrak

Pada penelitian kali ini, dilakukan penilaian kelayakan, FFS Assessments, dari sepuluh jalur pipa, delapan di bagian compression section dan dua di flow section. Penilaian kelayakan dilakukan dengan melihat kemampuan pipa yang telah terkorosi dalam menahan tekanan. Data ketebalan yang didapat lewat metode ultrasonic testing akan dibandingkan dengan ketebalan nominal pipa pada desain untuk mendapatkan laju korosi. Dengan laju korosi maka akan dapat diperkirakan sisa usia pakai (remaining useful life, RUL) dari setiap jalur. Serangan korosi akan menyebabkan terjadinya penipisan dinding pipa yang menurunkan kekuatan pipa dalam menahan tekanan. Pipa yang nilai RUL-nya tidak mencapai interval inspeksi berikutnya harus diperiksa kekuatannya. Proses pemeriksaan kekuatan dilakukan dengan perangkat lunak RSTRENG.

Laju korosi rata-rata tertinggi terdapat pada jalur PG-0110-XD-20? di flow section (0.760 mmpy). Sementara dari hasil pengukuran nilai RLA masing-masing jalur didapatkan bahwa dua jalur di compression section yaitu PG-0105-D-10? dan PG-0123-D-2? memiliki nilai dibawah expected life (10 tahun). Sementara jalur pada flow section yaitu PG-0021-D-16? juga berada dibawah nilai expected life (1 tahun). Dari ketiga jalur yang memiliki nilai RUL dibawah nilai expected life yang dihitung nilai kekuatannya, didapatkan nilai MAOP dari dua buah jalur yaitu PG-0105-D-10? (922 psig) dan PG-0021-D-16? (924 psig) dibawah tekanan desain 1200 psig. Sementara satu jalur lagi PG-0123-D-2? mendapatkan nilai MAOP 1253 psig.

Dari hasil perhitungan MAOP dan analisa ketebalan, maka dua jalur yaitu PG-0105-D-10? dan PG-0021-D-16? disarankan untuk mengalami derating tekanan proses menjadi 922 psig dan 924 psig. Sementara jalur PG-0123-D-2? disarankan untuk mengalami perbaikan total (pergantian komponen).

Perhitungan RSTRENG harus dilakukan dengan memperhatikan kondisi profil dari korosi yang terjadi. Persamaan B31G konvensional adalah persamaan yang paling sederhana dan cenderung mengecilkan nilai kekuatan pipa, sementara persamaan 0.85 dL cenderung sejalan dengan effective area, namun terkadang berbeda saat terdapat satu cacat pitting yang jauh lebih dalam disbanding sekitarnya.

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On this research, FFS Assessments were done in ten piping systems, eight in compression section and a pair in flow section. These assessments were carried on by observing corroded pipes abilities in providing enough strength to prevents leakage. The results from thicknesses measurements by UT compared to nominal thickness to get the corrosion rate of every piping system. From those calculated corrosion rate, we

could predict the remaining useful life, RUL of each piping systems. For piping system which its calculated RUL is below the interval of next inspection should be checked for its strength by using RTSRENG software.

The results of this research told us that the corrosion rate in M2 offshore oil platform were ranged from medium to severe with highest average corrosion rate were occur in flow section PG-0110-XD-20? (0.760 mmpy). From remaining life assessment, it is known that there were three piping system which it calculated remaining life is below the expected life. Two of them are in compression section, PG-0105-D-10? and PG-0123-D-2? and the other one is PG-0021-D-16? which located in flow section. The calculation of those three remaining wall thickness strength which is carried on by RTSRENG software resulted in conclusion that two piping system PG-0105-D-10? (922 psig) and PG-0021-D-16? (924 psig) were inadequate to hold off design pressure of 1200 psig. The other piping system PG-0123-D-2? is predicted having MAOP of 1253 psig.

By combining the RSTRENG results and thickness analyses, it is concluded that two lines, PG-0105-D-10? and PG-0021-D-16? should be derated to new pressures which is equal to their RSTRENG MAOP calculation (922 and 924 psig), while the other line PG-0123-D-2? must be replaced.

This research also notice that before verifying the results of RSTRENG calculation, one should also take consideration of corrosion profile which occur. The conventional B31G were the simplest and tends to create result which underestimate the strength of pipe, while 0.85 dL result were usually close to the effective area, except when there?s an unique shape where there?s a deep pit with penetration much higher than its surrounding area.