

**OPTIMASI PERFORMA *HIGH PRESSURE HEATER* (HPH)
DENGAN PENDEKATAN VARIASI DIAMETER LUAR TUBE
(STUDI KASUS DI UPK TARAHAN)**

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ABSTRAK

Penelitian ini membahas mengenai bagaimana cara untuk mengoptimalkan performa dari *high pressure heater* (HPH) di unit 3 UPK Tarahan. Unit 3 di UPK Tarahan memiliki 5 *feedwater heater* yang meliputi 1 *dearator*, 2 *low pressure heater* (LPH) dan 2 *high pressure heater* (HPH). Pada penelitian ini menggunakan HPH 5, dimana terjadi penipisan didalam *tube* dan berakibat kebocoran. Langkah efektif yang dilakukan adalah dengan menyumbat ujung *tube* yang bocor. Akan tetapi, dengan adanya sumbatan tersebut akan menghambat proses *heat transfer* pada *shell and tube*. Analisis termal dilakukan berdasarkan hukum termodinamika dan perpindahan panas (*heat transfer*). Diameter *shell*, banyaknya *baffle*, ketebalan *tube*, properties fluida *shell and tube* sudah ditentukan. Sedangkan diameter luar *tube* dan banyaknya *tube* divariasikan untuk mendapatkan nilai koefisien perpindahan panas maksimum dengan batasan *pressure drop* sesuai pada standarnya. Perhitungan dilakukan untuk mendapatkan dimensi optimum *shell and tube* pada HPH 5. Setelah itu, dilakukan perhitungan kinerja (performa) dengan memvariasikan banyaknya *tube*. Hasil dari perhitungan ini yaitu diameter luar *tube* sebesar 19,05mm, diameter dalam *tube* 14,83mm, diameter *shell* 1m, panjang total *tube* 9,47m dan banyaknya *tube* 491 buah. *Pressure drop* disisi *shell* sebesar 0,3794 kg/cm² dan sisi *tube* sebesar 0,261 kg/cm². Kinerja (performa) HPH 5 dengan banyaknya *tube* minimum sebesar 373 buah dimana nilai *effectiveness* sebesar 0,819.

Kata Kunci: *high pressure heater*, parameter fluida kerja, *pressure drop*.

OPTIMIZATION OF HIGH PRESSURE HEATER (HPH) PERFORMANCE WITH VARIATION OUTSIDE TUBE DIAMETER APPROACH (CASE STUDY AT UPK TARAHAH)

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ABSTRACT

This study discusses how to optimize the performance of the high pressure heater (HPH) at unit 3 UPK Tarahan. Unit 3 at UPK Tarahan has 5 feedwater heaters which include 1 dearator, 2 low pressure heaters (LPH) and 2 high pressure heaters (HPH). At this study using HPH 5, where there is thinning on the tube and results in leakage. The effective step taken is to plug the leaking tube end. However, the presence of this blockage will hinder the heat transfer process in the shell and tube. Thermal analysis is carried out based on the laws of thermodynamics and heat transfer. Shell diameter, number of baffles, tube thickness, shell and tube fluid properties have been determined. While the outer diameter of the tube and the number of tubes were varied to get the maximum heat transfer coefficient with the pressure drop limit according to the standard. Calculations were carried out to obtain the optimum dimensions of shell and tube in HPH 5. After that, the performance calculation was carried out by varying the number of tubes. The results of this calculation are the outer diameter of the tube is 19.05mm, the inner diameter of the tube is 14.83mm, the shell diameter is 1m, the total length of the tube is 9.47m and the number of tubes is 491 pieces. The pressure drop on the shell side is 0.3794 kg/cm² and the tube side is 0.261 kg/cm². Performance (performance) of HPH 5 with a minimum number of tubes of 373 units where the effectiveness value is 0.819.

Keywords: *high pressure heater, working fluid parameters, pressure drop.*