# Pengembangan Software untuk Studi Kelayakan Tekno-Ekonomi dari Heat Pipe Heat Exchanger (HPHE) dengan Metode Payback Period = Software Development for Techno-Econonomic Feasibility Study of Heat Pipe Heat Exchanger (HPHE) using Payback Period Method

Ardi Rakhmat Ismail, author



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Abstrak

Biaya investasi HPHE dapat diestimasikan melalui direct cost yaitu biaya material dari komponen-komponen yang dibutuhkan seperti heat pipe dan fin ditambah dengan beberapa estimasi biaya lainnya seperti labor cost, overhead cost dan operating profit. Pemasangan HPHE di dalam sistem HVAC dimana seratus persen udara luar dibutuhkan seperti Clean Room dapat mengurangi konsumsi energi listrik melalui pemanfaatan waste heat recovery dengan proses pre-cooling yaitu pendinginan tambahan ke udara luar sebelum memasuki cooling coil. Besarnya biaya listrik yang dihemat oleh HPHE kemudian dapat dihitung berdasarkan nilai pre-cooling, coefficient of performance, waktu pemakaian dan tarif biaya listrik. Software studi kelayakan tekno-ekonomi dikembangkan dengan metode payback period yaitu metode dengan cara membandingkan biaya investasi HPHE dan biaya penghematan listrik untuk mengetahui periode tercepat dimana biaya investasi sudah tertutup oleh biaya penghematan dan mengetahui bagaimana pengaruh input spesifikasi, dimensi dan kondisi operasional HPHE terhadap periode tersebut. Nilai pre-cooling didapatkan dari penelitian yang telah dilakukan sebelumnya dengan nilai masing-masing 30, 35, 40 , 45 dan 1,5 m/s, 2,5 m/s, 3,0 m/s dimana 3, 6 dan 9 baris heat pipe digunakan. Hasil perhitungan payback period oleh software studi kelayakan tekno-ekonomi HPHE dari beberapa input yang berbeda kemudian akan diperlihatkan.
.....HPHE investment costs can be estimated through direct costs, namely the material costs of the required components such as heat pipes and fins plus several other estimated costs such as labor costs, overhead costs and operating profit. The installation of HPHE in the HVAC system where one hundred percent of outside air is needed, such as a Clean Room, can reduce electrical energy consumption through the use of waste heat recovery with a pre-cooling process, namely additional cooling to the outside air before entering the cooling coil. The amount of electricity costs saved by HPHE can then be calculated based on the pre-cooling value, the coefficient of performance, usage time and electricity cost rates. Techno-economic feasibility study software was developed with the payback period method, namely a method by comparing the investment costs of HPHE and the cost of saving electricity to find out the fastest period in which the investment costs have been covered by the cost savings and to find out how the input specifications, dimensions and operational conditions of the HPHE will affect that period. The pre-cooling value is obtained from research that has been done previously with the respective values of 30 , 35 , 40 , 45  and 1.5 m / s, 2.5 m / s, 3.0 m / s where 3 , 6 and 9 rows of heat pipe are used. The results of the calculation of the payback period by the techno-economic feasibility study software of HPHE from several different inputs will then be shown.