

LEMBAR
HASIL PENILAIAN SEJAWAT SEBIDANG ATAU PEER REVIEW
KARYA ILMIAH : PROSIDING

Judul Artikel : Effectivity of Heat Exchanger Using Coolant Fluid
 Nama Penulis : **HartoTanujaya**
 Jumlah Penulis : 1 (satu)
 Status Pengusul : Penulis Tunggal
 Identitas Prosiding : a. Judul Prosiding: 2nd International Conference on Engineering of Tarumanagara (ICET)
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 e. Terindex di : -

Kategori Publikasi *Prosiding* Ilmiah *Prosiding* Internasional
 (beri (√) pada kategori yang tepat) *Prosiding* Nasional
 Prosiding Terindex Scopus

Hasil Penilaian *Peer Review*

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Kecukupan & kemutakhiran data/informasi dan metodologi (30%)	90% x 30% x 15			4,05
Kelengkapan unsur & kualitas penerbit (30%)	90% x 30% x 15			4,05
Nilai <i>peer</i> Maksimal (100%)	15			13,50
Kontribusi Pengusul; (nilai akhir <i>peer</i> x bobot penulis pertama = 13,50 x 100% = 13,50)				13,50
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Jakarta, 10.12. 2019
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 Jabatan/Pangkat/Bidang Ilmu: Professor/IVC/Teknik Mesin
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<p>KOMENTAR PEER REVIEW</p>	<p>1. Tentang kelengkapan dan kesesuaian unsur:</p> <p>Artikel dengan judul Effectivity of Heat Exchanger Using Coolant Fluid, ditulis secara benar sesuai dengan standar penulisan artikel ilmiah yang memuat pendahuluan, metode/peralatan yang digunakan, pengambilan data dan data, analisa dan kesimpulan.</p> <p>2. Tentang ruang lingkup dan kedalaman pembahasan:</p> <p>Artikel tersebut membahas mengenai alat penukar kalor dengan menggunakan cairan coolant, dibahas secara spesifik dan mudah dipahami.</p> <p>3. Kecukupan dan kemutakhiran data/informasi dan metodologi;</p> <p>Metodologi terstruktur dan jelas, data dan referensi yang diambil up to date.</p> <p>4. Kelengkapan unsur dan kualitas penerbit:</p> <p>Kepanitiaan, reviewer makalah dan penyelenggara seminar jelas dan terdokumentasi. Artikel didalam prosiding ber ISBN/ISSN dan dapat dibaca melalui daring.</p> <p>5. Indikasi Plagiasi:</p> <p>Artikel dengan judul Effectivity of Heat Exchanger Using Coolant Fluid yang dipresentasikan di 2nd International Conference on Engineering of Tarumanagara (ICET 2015), pada tanggal October 22-23, 2015 di Jakarta, dan diselenggarakan oleh Fakultas Teknik, Universitas Tarumanagara, dapat dibaca secara daring dan tidak ditemukan indikasi plagiasi dengan tingkat kesamaan menggunakan software Turnitin sebesar 22 %. https://linter.untar.ac.id/dokportofolio/forumilmiah/28b00383ca42466c6449acd9d67cb54a.pdf</p> <p>6. Kesesuaian Bidang Ilmu:</p> <p>Artikel tersebut membahas tentang alat penukar kalor dan ada Linieritas keilmuan dengan pengusul.</p>
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Jakarta, 18.12 2019
 Penilai I



(Prof. Dr. Ir. Agustinus Purna Irawan)
 NIDN/NIP : 0328087102 / 10398021
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	<i>Prosiding</i> Internasional	<i>Prosiding</i> Nasional	<i>Prosiding</i> Terindex	
Kelengkapan dan kesesuaian unsur isi <i>prosiding</i> (10%)	1.5			1,35
Ruang lingkup dan kedalaman pembahasan (30%)	4.5			4,185
Kecukupan & kemutakhiran data/informasi dan metodologi (30%)	4.5			4,185
Kelengkapan unsur & kualitas penerbit (30%)	4.5			4,185
Total = 100%	15			13,905
Kontribusi Pengusul; (nilai akhir <i>peer</i> x penulis pertama = 13,905 x 100% = 13,905)				13,905
Komentar/Usulan <i>Peer Review</i> :	1. Tentang kelengkapan dan kesesuaian unsur: 2. Tentang ruang lingkup dan kedalaman pembahasan; 3. Kecukupan dan kemutakhiran data/informasi dan metodologi; 4. Kelengkapan unsur dan kualitas penerbit: 5. Indikasi Plagiasi: 6. Kesesuaian Bidang Ilmu: <i>Terlampir</i>			

Jakarta, 14-11-2019
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 (Dr. Ir. M. Sobron Yamin L., M.Sc.)
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 Unit Kerja: Fakultas Teknik – Universitas Tarumanagara

<p>KOMENTAR PEER REVIEW</p>	<p>1. Tentang kelengkapan dan kesesuaian unsur:</p> <p>Artikel Effectivity of Heat Exchanger Using Coolant Fluid, sesuai dengan kaidah penulisan artikel ilmiah yang meliputi pendahuluan, metode/alat, data dan analisa serta kesimpulan.</p> <p>2. Tentang ruang lingkup dan kedalaman pembahasan:</p> <p>Ruang lingkup pembahasan artikel tersebut tentang alat penukar kalor atau heat exchanger dengan menggunakan cairan pendingin coolant, dengan kedalaman pembahasan yang spesifik.</p> <p>3. Kecukupan dan kemutakhiran data/informasi dan metodologi;</p> <p>Data yang diambil dan digunakan untuk analisa dan referensi tergolong baru dan mutakhir, dengan susunan metodologi yang baik.</p> <p>4. Kelengkapan unsur dan kualitas penerbit:</p> <p>Penerbit dan penyelenggara seminar bergerak dalam dunia pendidikan dan sering mengadakan acara seminar/konferensi berskala nasional/internasional. Editor/ketua panitia dan reviewer untuk makalah tersusun jelas. Prosiding ber ISBN/ISSN dan dapat dilihat secara online.</p> <p>5. Indikasi Plagiasi:</p> <p>Artikel Effectivity of Heat Exchanger Using Coolant Fluid yang dipresentasikan pada tanggal 22-23 October 2015 di 2nd International Conference on Engineering of Tarumanagara (ICET 2015) di Jakarta dan diselenggarakan oleh Fakultas Teknik, Universitas Tarumanagara, dapat dibaca secara daring dan tidak ditemukan indikasi plagiasi</p> <p>https://linter.untar.ac.id/dokportofolio/forumilmiah/28b00383ca42466c6449acd9d67cb54a.pdf</p> <p>6. Kesesuaian Bidang Ilmu:</p> <p>Artikel Effectivity of Heat Exchanger Using Coolant Fluid dengan pembahasan tentang perpindahan kalor pada alat penukar kalor sesuai dan linier dengan bidang ilmu pengusul.</p>
-------------------------------------	---

Jakarta,
Penilai II

14-11-2019



(Dr. Ir. M. Sobron Yamin L., M.Sc.)
NIDN/NIP : 0114056705 / 10311009
Jabatan/Pangkat/Bidang Ilmu: Lektor Kepala/IV/Teknik Mesin
Unit Kerja: Fakultas Teknik – Universitas Tarumanagara

2nd International Conference on Engineering of Tarumanagara (ICET 2015)
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EFFECTIVITY OF HEAT EXCHANGER USING COOLANT FLUID

Harto Tarujaya

Department of Mechanical Engineering, Faculty of Engineering, Tarumanagara University, Jakarta
e-mail: hartotar@gmail.com ; hartot@tj.uta.ac.id

Abstract

In industry, heat exchanger usually used in the manufacturing process. This research will use shell and tube heat exchanger (SHTC) with coolant fluid and water. Experimental data for analysis are temperature of the fluid and flowrate. Purpose of this research to analyze the effectivity of the heat exchanger and convection heat transfer coefficient in the system. Theoretical and experimental method are used in this research. The result show the heat effectivity is 90% at shell flowrate of 2.1 l/min and tube flowrate of 5.1 l/min.

Keywords: coolant, temperature, effectivity, convection heat transfer coefficient

INTRODUCTION

Heat exchanger is equipment to transfer heat between one or more type of fluid in the different temperature. The type fluids that can be used in the heat exchanger are gas or liquid. In industrial, heat exchanger usually is used in the manufacturing process, refrigeration, air conditioning, power station, chemical plant, and petrochemical plant. The simple sample of the heat exchanger contribution is found in the radiator coils at automobile and condenser/evaporator air conditioning at the home appliances.

There are many type of the heat exchanger. In industry application usually are used the double pipe heat exchanger, shell and tube heat exchanger, and plate heat exchanger. The double pipe heat exchanger is the simplest one. The shell and tube heat exchanger consist of series of tubes. Usually shell and tube heat exchanger is used for high pressure application in industry with pressure and temperature more than 30 bar and 260 °C respectively.

Effectiveness of heat exchanger is depend on the surface area effective heat transfer, pressure drop, number of tubes, pipe length, pipe diameter, and number of baffles. This research will use shell and tube heat exchanger using cooling fluid. Many researchers have been studied to increase the effectiveness of the heat exchanger. Siman Wang, etc (2008) has been modified a baffle seal in the shell side to increase the performance of the heat exchanger of 25%. Other researchers have also been examined the shell and tube heat exchanger with spiral tube modification to decrease the pressure drop (Xuesheng Wang, etc, 2004).

In this study, the effectiveness of the heat exchanger will be calculated and analyzed with experimental testing. The results can be used as a reference to design the heat exchanger with a larger scale. The purpose of the research are calculate the convection heat transfer coefficient, area of heat transfer, and effectiveness of the heat exchanger.

MATERIAL AND METHOD

Heat exchanger type shell and tube is used in this experimental research, using coolant and water fluids. The experiment is conducted in the heat and mass transfer's

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AE-04	Survey on the Fulfillment of the Construction Requirements for Non-Engineered Houses in North Sumatra <i>Darwin</i>	1
AE-05	Reveal Knowledge Pacitan Rural Java Architecture <i>Triyuniastuti, HB Satrio Wibowo, Sukirman</i>	1
AE-06	Uniqueness Omah Dudur Dawa Architecture <i>Satrio HB Wibowo, Sudaryono, E. Pradipto</i>	1
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AE-09	Adaptation to Climate Change as the Controller of Disaster Vulnerability in Coastal Settlements in Mempawah Hilir, West Kalimantan <i>Ry Nurhidayati</i>	1
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Paper ID	Title/Author/Authors	PP
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1
EFFECTIVITY OF HEAT EXCHANGER USING COOLANT FLUID

Harto Tanujaya

Department of Mechanical Engineering, Faculty of Engineering, Tarumanagara University, Jakarta

e-mail: hartotan@gmail.com ; hartot@ft.untar.ac.id

Abstract

In industry, heat exchanger usually used in the manufacturing process. This research will use shell and tube heat exchanger (STHC) with coolant fluid and water. Experimental data for analysis are temperature of the fluid and flowrate. Purpose of this research to analyze the effectivity of the heat exchanger and convection heat transfer coefficient in the system. Theoretical and experimental method are used in this research. The result show the best effectivity is 80% at shell flowrate of 2 L/min and tube flowrate of 5 L/min.

Keywords: coolant, temperature, effectivity, convection heat transfer coefficient

INTRODUCTION

Heat exchanger is equipment to transfer heat between one or more type of fluid in the different temperature. The type fluids that can be used in the heat exchanger are gas or liquid. In industrial, heat exchanger usually is used in the manufacturing process, refrigeration, air conditioning, power station, chemical plant, and petrochemical plant. The simple sample of the heat exchanger contribution is found in the radiator coils at automobile and condenser/evaporator air conditioning at the home appliances.

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In this study, the effectiveness of the heat exchanger will be calculated and analyzed with experimental testing. The results can be used as a reference to design the heat exchanger with a larger scale. The purpose of the research are calculate the convection heat transfer coefficient, area of heat transfer, and effectiveness of the heat exchanger.

MATERIAL AND METHOD

Heat exchanger type shell and tube is used in this experimental research, using coolant and water fluids. The experiment is conducted in the heat and mass transfer's laboratory located in the Mechanical Engineering Department, Tarumanagara University.

Diameter of the shell is 110 mm using flexiglass (acrylic) material. Inner and outer diameter of tube are 12.7 mm and 10.9 mm, respectively. Tubes consist of 20 tubes with total length of 700 mm. Type of the baffle using single segmental with 8 baffles and 20%

cutting. The type of the pump using 2 centrifugal pump to circulate the coolant and water fluid.

The experiment is investigated with flowrate variation of 2, 3, and 4 L/min respectively for both fluid. The properties of the fluids as shown in table 1.

Table 1. Properties of coolant and water

Fluid	Specific heat (kJ/kg.C)	Density (kg/m ³)
Water (32-49 ⁰ C)	4174	1000
Coolant	3818	1040

A installation diagram of the system is shown in Figure 1.

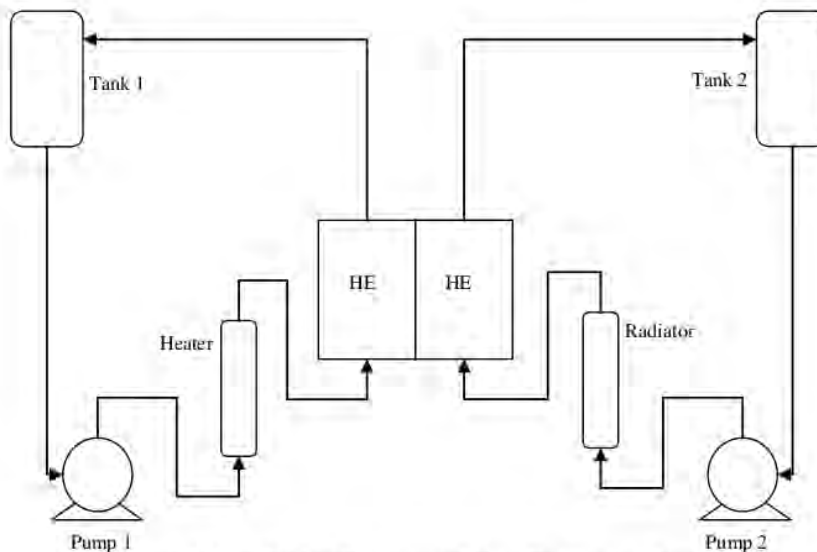


Figure 1. Installation Diagram of Heat Exchanger System

RESULTS AND DISCUSSION

In this experiment, we investigate the effectiveness of the heat exchanger. Temperature, convection heat transfer coefficient, and effectiveness of each condition are record and evaluation. Results of the experimental can be shown at the below figure.

Figure 2 show the graph of overall convection of heat transfer coefficient (U). The graph shows that the highest U is shown at the hot and cold fluid of 4 and 5 L/min, respectively. The highest and lowest U are 1270 W/m²°C and 743 W/m²°C, respectively.

Figure 3 show the graph of effectiveness and NTU of the system. The highest and lowest effectiveness are 80% and 60%, respectively.

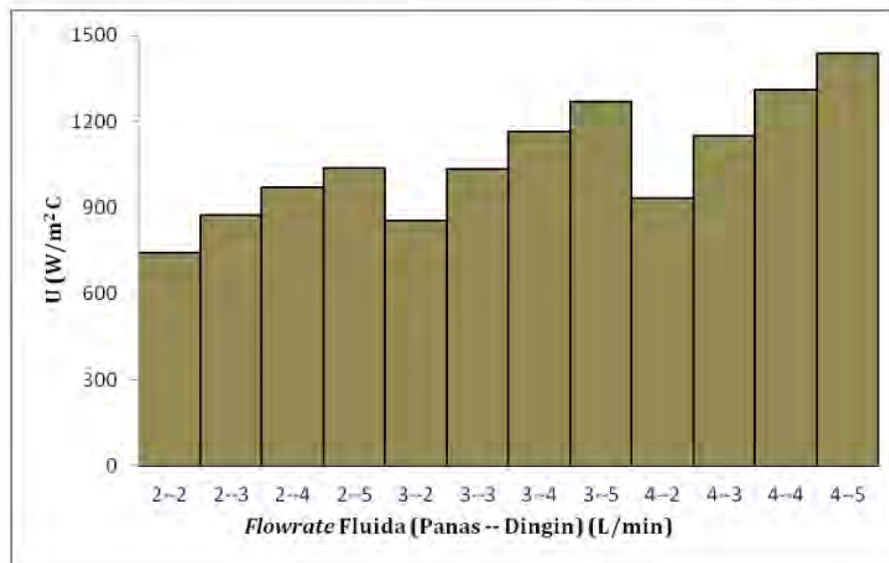


Figure 2. Over All Heat Transfer Coefficient

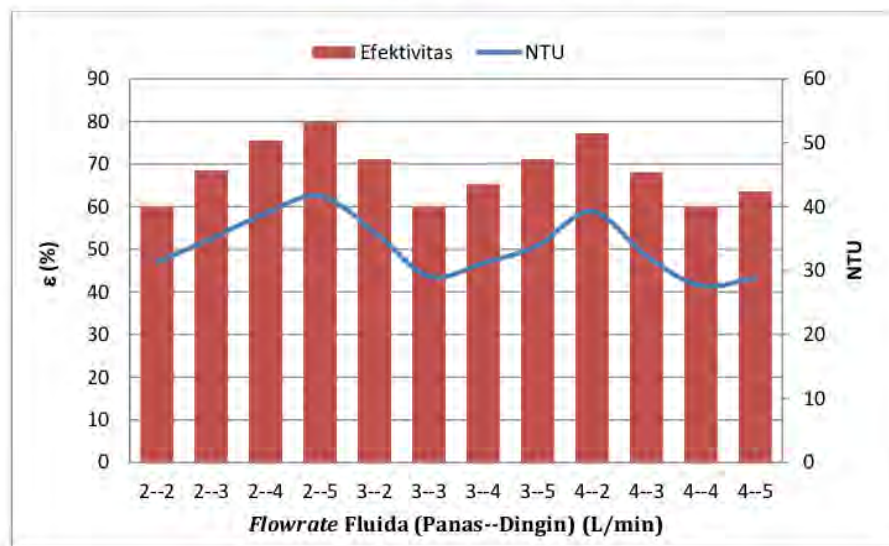


Figure 3. Effectiveness and NTU

CONCLUSIONS

The highest U for the hot and cold fluid are 4 and 5 L/min, respectively. The highest and lowest U are $1270 \text{ W/m}^2 \text{ } ^\circ\text{C}$ and $743 \text{ W/m}^2 \text{ } ^\circ\text{C}$. The highest effectiveness is occurred at 80% at the flowrate hot and cold of 2 and 5 L/min. The lowest effectiveness is occurred at 60% at the flowrate hot and cold of 3 and 4 L/min.

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