Novel Compact Fin and Tube Heat Exchanger Made of Reinforced Composite Plate Fins

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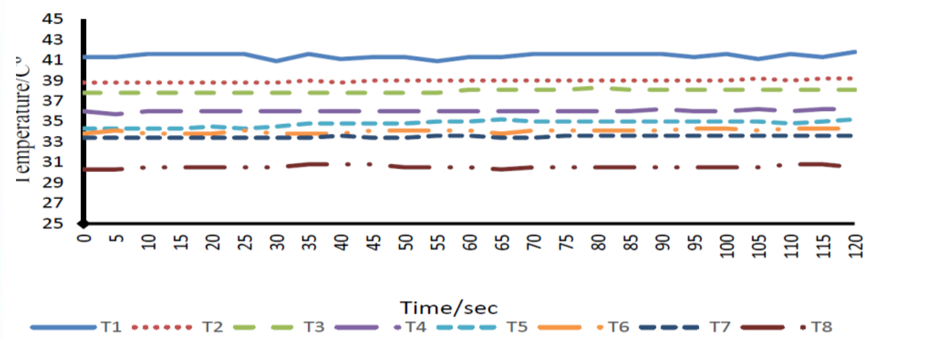
Research Background

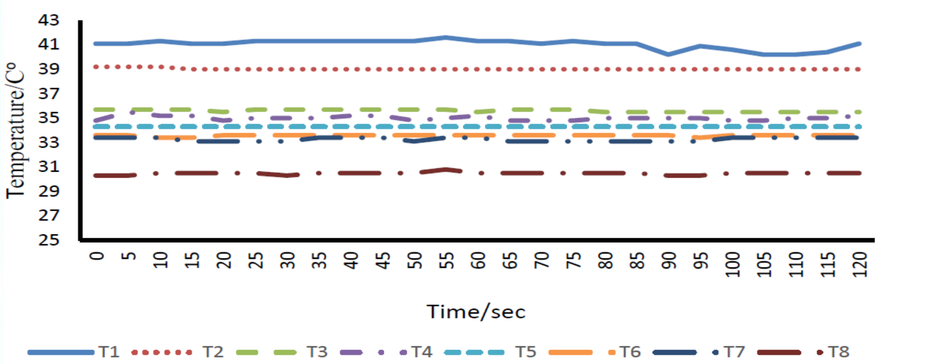
Most fin and tube heat exchangers are affected by external factors over time, leading to a decrease in their efficiency. Among the most important reasons for this problem are the materials used in the manufacture of the heat exchanger. Heat exchangers are made of materials with high conductivity and are able to withstand the harsh conditions, but most of these materials are affected by corrosion such as iron, or the occurrence of electrochemical reactions that form layers with heat resistance at the surface of the material such as aluminium and copper, which negatively affects the performance of the heat exchanger. In addition, these materials have heavy weights that are difficult to use in small applications, and sometimes their prices are high for use in projects with a limited budget. To solve aforementioned problems, it possible to be a good option to use materials which have high corrosive resistance and light weight, few research work have suggested to use polymer as a material to product the heat exchanger, due to its characteristics which may limit the problems those occur in iron, copper and aluminium.

Novelty of the Reaserch

Due to their lightweight and ease of manufacturing, fibre-reinforced composites are replacing metals in many heat exchanger applications. However, their heat transfer dissipation performance is not investigated in detail. This project aims to study experimentally the heat transfer performance of fins made from fibre reinforced composites in compact heat exchangers.



. Variation of Temperature with Time at Various Thermocouple Locations for The Air Velocity of 2.3 m/s



4. Variation of Temperature with Time at Various Thermocouple Locations for The Air Velocity of 3.2 m/s

Temperature position	Temperature C				
	1.8 m/s	2.3 m/s	2.6 m/s	2.8 m/s	3.2 m/s
T1	41.3	41.8	41.6	40	41.1
T2	38.5	39.2	39.5	39.2	39
T3	37.8	38.1	38.3	38.1	35.5
T4	36	36.2	36.2	36	35.2
T5	34.3	35.2	35	35	34.3
T6	33.6	34.3	34.3	33.3	33.6
T7	33.4	33.6	33.6	34.3	33.4
T8	30.3	30.5	30.5	30.5	30.5

Publication

Heat Transfer Analysis in Compact Heat Exchanger with Fiber Reinforced Plate, IPCME,2021

Experimental setup with meaurment

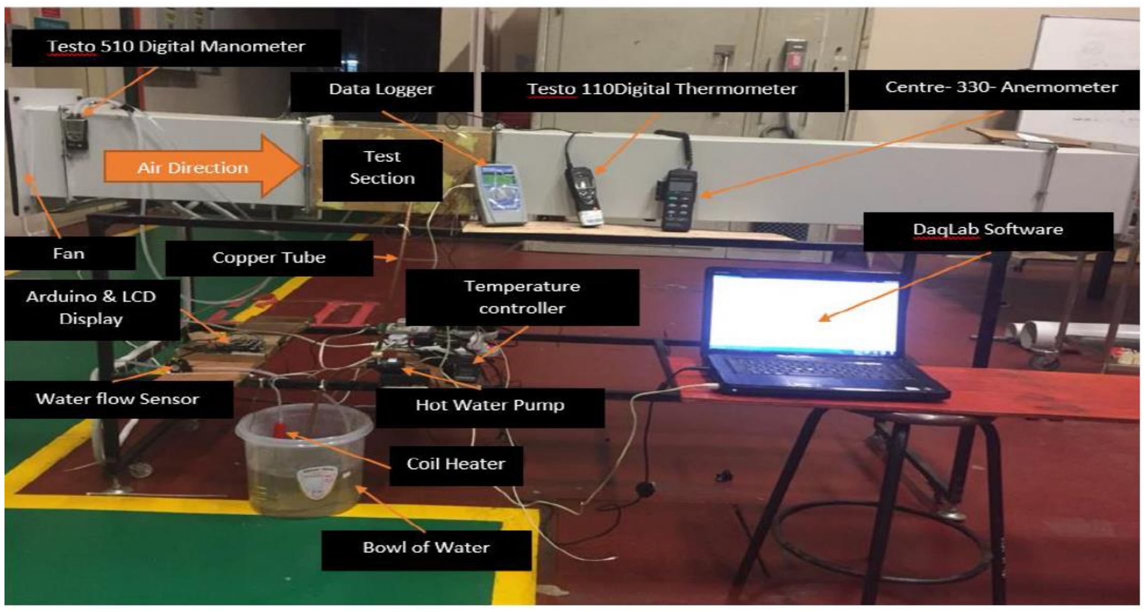
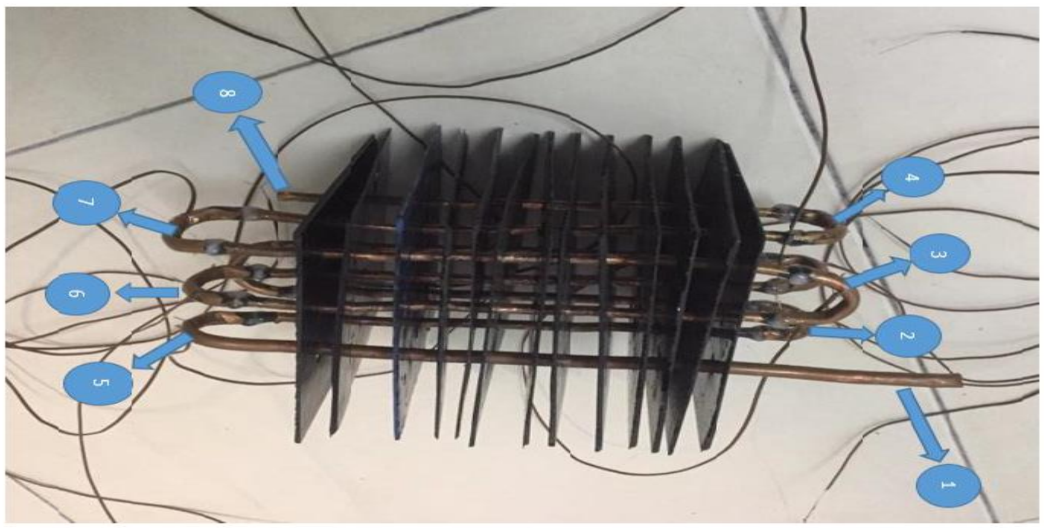
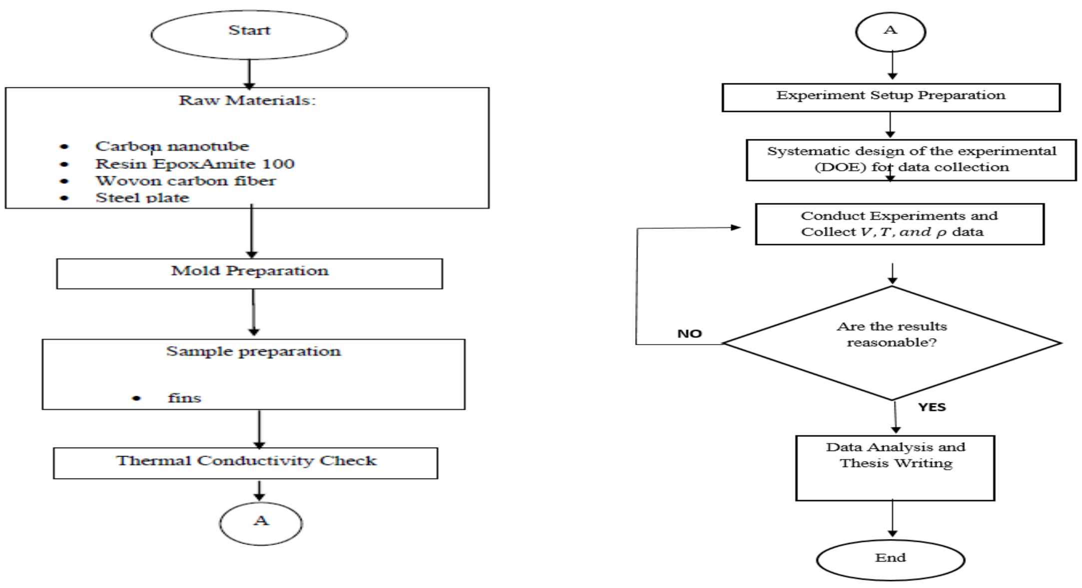
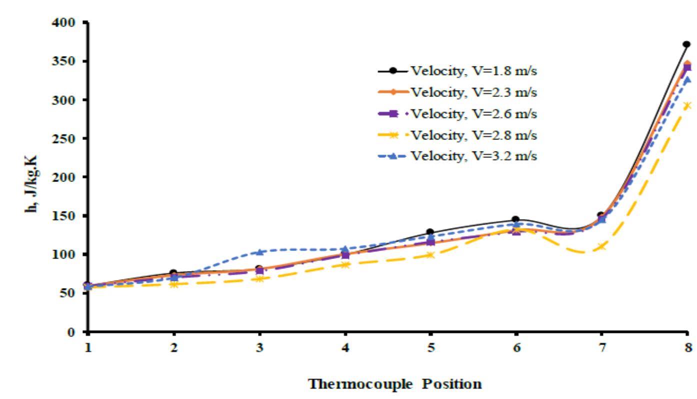


Figure 2. Test Section and the 8 Positions of K-type



Methodology And Results





Heat Transfer Coefficient Variation of the Air-Side with Thermocouple Positions

Collaboration/Industrial Partner

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