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DESIGN, MANUFACTURE AND PERFORMANCE EVALUATION OF A WASTE HEAT RECOVERY UNIT IN A GASIFICATION PLANT

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Abstract content
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The term waste heat refers to unused thermal energy that is generated as a product or by-product of a process. Some waste heat sources include, hot gasification gas cooled during gas cleaning, hot combustion or flue gas dumped to the environment, hot equipment surfaces and heated products from industrial processes. The act of recovering and re-using rejected heat is known as waste heat recovery. Waste heat recovery offers a number of benefits such as reduction in the demand of primary fuel source, efficiency enhancement and reduction in CO₂ emissions. Some waste heat losses are unavoidable, however much could be recovered by use of more efficient equipment or waste heat recovery unit.

In this study, heat contained in syngas resulting from gasification of wood that is ordinarily wasted at the gas scrubber during syngas cleaning is recovered with the use of cyclone heat exchanger. A cyclone heat exchanger similar to a double pipe heat exchanger was designed and manufactured. The theoretical model for the heat transfer in the cyclone heat exchanger is presented. The effect of control parameters such as mass flow rates and temperatures of hot and cold fluid on the performance indicators were evaluated. More also the influence of flow configuration that is counter flow and parallel flow on performance parameters are considered. The final paper will present the obtained result.

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YES

Level for award (Hons, MSc, PhD, N/A)?

PhD

Main supervisor (name and email) and his / her institution

Prof Sampson Mamphweli

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