Hussam Jouhara et al., J Aeronaut Aerospace Eng 2014, 3:2
http://dx.doi.org/10.4172/2168-9792.S1.005

OMICS Group Conferences
Accelerating Scientific Discovery

2nd International Conference and Exhibition on
Mechanical & Aerospace Engineering
September 08-10, 2014 Hilton Philadelphia Airport, USA

A technical, environmental and economic assessment of a thermosyphon based gas to air waste heat recovery system

Hussam Jouhara, Andrew Holgate and **Mark Boocock**
Econotherm Ltd., UK

At no point in human evolution have energy sources and supplies been under such intense pressure and scrutiny. As the world attempts to balance increasing demand (caused by population growth and industrial expansion in developing nations) with environmental responsibility and mitigation of climate change, the need for energy conservation remains a paramount imperative. However, recent advances in shale gas extraction have served only to flood the market with cheap fossil hydrocarbon energy which is taking away the imperative for major industrialists to seek and implement energy conservation initiatives.Recent technological advances in the manufacturing processes and production of gravity assisted, wickless thermosyphons (heat pipes) have resulted in significant improvements in both quality and cost of industrial heat pipe heat exchangers. This in turn has broadened the potential for their usage in industrial waste heat recovery applications enabling industries to tackle waste heat sources such as aggressive, high temperature, dirty (high particulate) exhausts that have thus far deemed to be unrecoverable. This paper presents a case study examining in detail one such thermosyphon heat exchanger system and assesses the efficiency of such units, their environmental impact in terms of reductions of CO2 emissions and the economic impact in terms of cost versus benefit with the intention of identifying the optimal combination of desirable outcomes in the design of such heat exchangers in the future. In this case study a 12 MW air pre-heater unit utilised on the exhaust of a steel mill furnace is analysed. The exhaust conditions are high volume, high temperature, highly abrasive and corrosive and are typical of countless metals processing facilities around the world. The thermal efficiency and performance of the unit have been assessed and the commercial benefit to the investor is calculated based on the prevailing and projected energy cost criteria over the design lifetime of the unit. From the performance and cost charts derived from this study conclusions can be drawn determining the optimal design balancing investment versus performance.

Biography

Hussam Jouhara is currently Technical Director for Econotherm (UK) Ltd. Having been awarded his PhD from Manchester University in 2004 he subsequently achieved Chartered Engineer status in the UK and Ireland. He is also a visiting Lecturer of building services engineering in Brunel University. Before making the transition into the private sector he worked as a researcher and an academic in universities and research institutes in the UK, Ireland and France. His extensive thermodynamic expertise is also called upon by the international Atomic Energy Agency as expert witness in the field of novel heat transfer systems for desalination applications. Publications include more than 50 papers and articles presented in international conferences and leading academic journals; six filed patents in the area of efficient heat exchangers and solar systems; co-authorship of one book titled "building services engineering for energy efficient buildings" published in 2013 By Taylor and Francis and many Open University-style books in the UK. His main research interest are in the fields of single and two phase heat transfer, heat pipes, heat exchangers, regenerators and building services.

hussam.jouhara@econotherm.eu