

Accepted Manuscript

Thermoacoustic cooler to meet medical storage needs of rural communities in developing countries – high pressure system

Patcharin Saechan, Artur J Jaworski

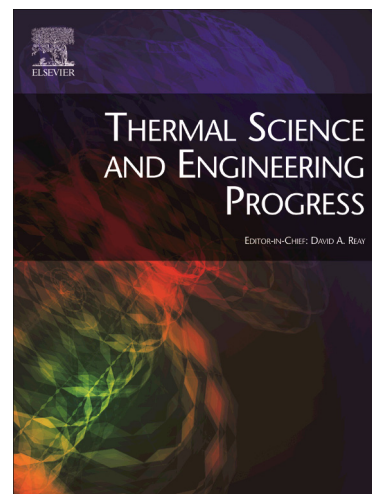
PII: S2451-9049(18)30435-9
DOI: <https://doi.org/10.1016/j.tsep.2018.07.010>
Reference: TSEP 204

To appear in: *Thermal Science and Engineering Progress*

Received Date: 22 June 2018
Revised Date: 19 July 2018
Accepted Date: 20 July 2018

Please cite this article as: P. Saechan, A.J. Jaworski, Thermoacoustic cooler to meet medical storage needs of rural communities in developing countries – high pressure system, *Thermal Science and Engineering Progress* (2018), doi: <https://doi.org/10.1016/j.tsep.2018.07.010>

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.



Thermoacoustic cooler to meet medical storage needs of rural communities in developing countries – high pressure system

Patcharin Saechan¹ and Artur J Jaworski^{2,*}

¹ Department of Mechanical & Aerospace Engineering, Faculty of Engineering, King Mongkut's University of Technology North Bangkok, Bangkok, 10800, Thailand

² School of Computing and Engineering, University of Huddersfield, Huddersfield HD1 3DH, United Kingdom

* Corresponding author; Email a.jaworski@hud.ac.uk; Tel. +44 (0) 148 447 2965

Abstract

Development of a thermoacoustic cooler driven by a thermoacoustic engine is presented. The engine is of standing wave type and is coupled to a coaxial travelling wave cooler. This is to test the principles of building a linear thermoacoustic engine-cooler coupling that would be easy to make and thus lend itself to the deployment in rural communities of developing countries. These often lack electrical grid connection but require refrigeration capabilities for storing vital medical supplies. Such function could be provided by using waste heat from everyday cooking (biomass combustion) to drive the proposed device. In the presented laboratory demonstrator, the heat input is mimicked by resistive heating (varied from 1.75 to 2.5 kW), the acoustic resonator is made from 6-inch diameter stainless steel pipe with the total device length of about 3.7 m, and the working gas is air at the mean pressure of 10 bar. The system is modelled using DeltaEC and its performance verified experimentally. The lowest temperature, obtained at zero cooling load, is -19.7 C, while the cooling load of 120 W can be applied at the cooling temperature of $+8$ C, which is one of the criteria for storing medical supplies. The maximum COPR is 5.94%.

Keywords: Thermoacoustic cooler; Coaxial; Travelling wave; Thermoacoustic engine; Standing wave; Engine-cooler coupling; Rural communities; Developing countries

Download English Version:

<https://daneshyari.com/en/article/8918632>

Download Persian Version:

<https://daneshyari.com/article/8918632>

[Daneshyari.com](https://daneshyari.com)