

PROTOTYPE ROTARY REGENERATIVE ADSORPTION AIR CONDITIONING SYSTEM

Z. Tamainot-Telto* and R. E. Critoph

School of Engineering, University of Warwick, Coventry CV4 7AL - UK

ABSTRACT

The paper presents the cooling characteristics a prototype rotary regenerative adsorption air conditioning system that uses high performance multiple modules. This prototype (see **Figure 1**), designed for up to 1.5 kW cooling with a COP of about 0.90, has 32 modules built into cylindrical assembly that rotates slowly (typically from 0.05 rpm to 0.20 rpm). Each module is made of two finned stainless tubes (1/2"OD, 0.25 mm thickness and 1m long) and has three main sections: the generator with its finned tubes lined with about 2.7 mm layer of monolithic carbon made *in situ*; the receiver (evaporator-condenser) and the adiabatic section placed between the receiver and the generator in order to reduce the longitudinal conduction heat flow between them (see **Figure 2**). The module has an intrinsic cooling capacity of 50 W at typical conditions ($T_G=100^\circ\text{C}$, $T_c=30^\circ\text{C}$ and $T_E=15^\circ\text{C}$). This prototype has three independent air ducting channels for the generator, the evaporator and the condenser respectively. The cycle is highly regenerative since the heat rejected by each module is used to preheat the others. The machine is suitable for gas firing, but is electrically heated in order to demonstrate the concept of rotary module for continuous cooling production [1, 2].

When drafting this abstract, preliminary tests on the machine are ongoing.

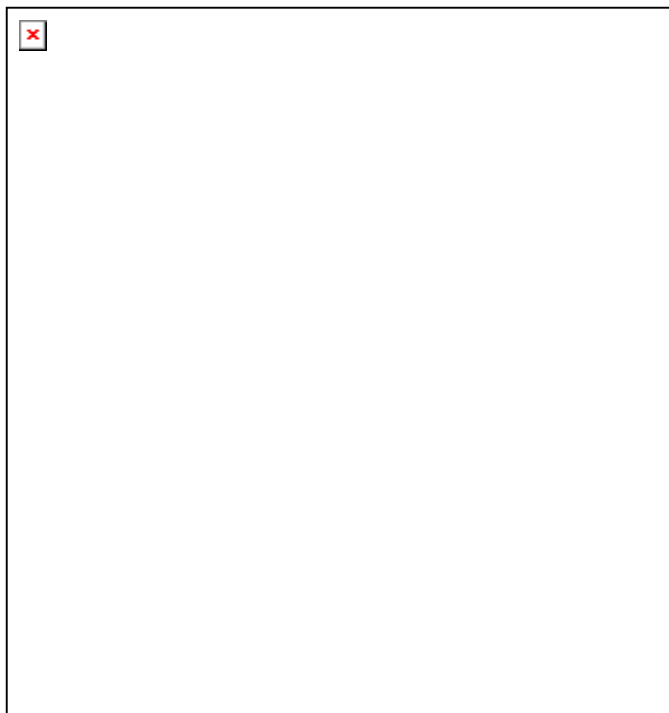


Figure 1: Warwick prototype rotary regenerative adsorption air conditioning unit

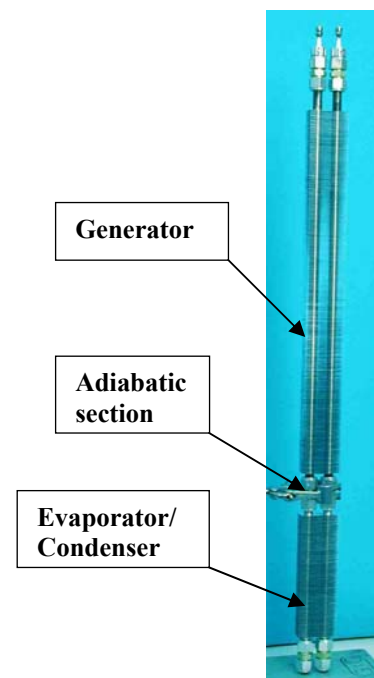


Figure 2: Module prototype

REFERENCES

- [1] B. Ebbeson, Sorption device, US Patent 5941093, 1999
- [2] R. E. Critoph, Thermal regenerative compressive device, WO Patent 0122010, 2001

* Corresponding author. Tel.: +44-24-7646528016; Fax: +44-24-76428922
E-mail: es2071@eng.warwick.ac.uk (Z. Tamainot-Telto)