

3rd International Symposium on the

Large Scale Applications of Heat Pumps

Oxford, England : 25-27 March 1987

CONTENTS

PAPER	PAGE
 DISTRICT AND BUILDING HEATING I	
A1 Experiences from performance testing of large heat pumps P.O. Fahlen and K.O. Lagerkvist, National Testing Institute, Sweden	1
A2 Application of heat pumps based on heat in a corrugated cardboard factory A.C. Gillet - Atelier D S.C., Belgium	11
A3 A large absorption heat pump T. Berntsson, M. Wlmby and P.A. Franck, Chalmers University of Technology, Sweden	21
 PROCESS APPLICATIONS I	
B1 Review of five industrial heat pump demonstration projects A.W. Deakin, E.T.S.U., and R. Gluckman, March Consulting Group, U.K.	25
B2 Heat pump assisted water purification systems M.A.R. Eisa, R. Best and F.A. Holland, University of Salford, U.K.	35
B3 Performance of and operational experience with a large scale heat transformer P.F. Jansen, Delamine BV, J.W. Wormgoor, TNO Apeldoorn, Holland	45
B4 Performance characteristics of a water-water heat pump using nonazeotropic mixtures S. Devotta, V.R. Patwardhan and V.S. Patwardhan, National Chemical Laboratory, India	51
 PROCESS APPLICATIONS II	
C1 The preliminary design of an industrial heat pump waste heat recovery system by an interactive computer program. F.R. Steward, D. Karman and S. Sunderarajan, University of New Brunswick, Canada	57
C2 An absorption cycle heat pump for drying applications in Canadian industry W.K. Snelson, National Research Council and J.B. Codrington, Acres International Ltd, Canada	69
C3 Integration of natural gas engine driven vapor recompression heat pumps into industrial processes D.S. Severson, Gas Research Institute, U.S.A.	77
 THE FUTURE OF LARGE HEAT PUMPS I	
D1 Industrial heat pumps: new insights on their integration in total sites S.M. Ranade, E. Hindmarsh and D. Boland, Tensa Services, U.S.A.	83
D2 Heat pump applications at BP refinery in Gothenburg T. Berntsson and M. Brun, Chalmers University of Technology, Sweden	99

COMPRESSORS AND CONTROLS

- | | | |
|----|---|-----|
| E1 | High temperature heat pumps using a liquid ring compressor and water as a refrigerant
B. Gromoll, Siemens Research Laboratories, F.R. Germany | 105 |
| E2 | A linear electrodynamic compressor for oil free heat pumps
P.B. Bailey, Oxford University, U.K. | 113 |
| E3 | Development and test of a high speed centrifugal compressor for mechanical vapour compression
F. Banquet, Electricite de France, and J.M. Merigoux, Alsthom-Rateau, France | 119 |

DISTRICT AND BUILDING HEATING II

- | | | |
|----|--|-----|
| F1 | District heating of commercial buildings by using waste heat sources of an industrial process
H. Kling, Sulzer-Escher Wyss GmbH, F.R. Germany | 241 |
| F2 | Large capacity heat pump using vacuum ice production as heat source
F.V. Boldvig and K. Andersen, A/S Thomas Ths. Sabroe & Co, Denmark | 127 |
| F3 | Central heating and cooling plant for year-round air conditioning and hot water using solar assisted heat pump
E. Alalz, Cobra, S.A., Spain | 131 |
| F4 | The ground coupled heat pump with a multiple well system as heat source for heating of apartment buildings
M. Larsson and L. Spante, Swedish State Power Board; R. Osterberg, SwedPower, Sweden | 135 |

ABSORPTION SYSTEMS 1

- | | | |
|----|---|-----|
| G1 | Behaviour of absorbers with falling films of salt solutions in heat pumps applications
M. Pflugl and F. Moser, Technical University of Graz, Austria | 141 |
| G2 | Economic criteria for application of single stage or double stage absorption heat transformers
W. Kern, Technical University of Munich, F.R. Germany | 149 |
| G3 | Part-load behaviour of an absorption heat transformer
P. Riesch, J. Scharfe, F. Ziegler, J. Volkl and G. Alefeld, Technical University of Munich, F.R. Germany | 155 |
| G4 | Solid-gas chemical heat pumps in the range 150°-500° C - research method and expected performances
M. Lebrun, S. Mauran and B. Spinner, CNRS-IMP, France | 161 |

THE FUTURE OF LARGE HEAT PUMPS II

- | | | |
|----|--|-----|
| H1 | Heat pump research carried out by the European Communities
P. Zegers, Commission of European Communities, Belgium | 169 |
| H2 | A review of research and development activities on industrial heat pumps by a Canadian electric utility
J.T. Strack, Ontario Hydro Research, Canada | 177 |
| H3 | Super heat pump energy accumulation system, Japan's new R & D project on high performance heat storable heat pump system
T. Shimura, New Energy Development Organisation, Japan | 237 |

ABSORPTION SYSTEMS II

- | | | |
|----|--|-----|
| J1 | The development of absorption cycle heat pumps applied to industrial process heat recovery
M.A. Osei-Bonsu and R.S. Treece, Newcastle upon Tyne Polytechnic, U.K. | 197 |
| J2 | The dynamic thermal modelling and capacity control of the absorption cycle heat pump
C.P. Underwood, Newcastle upon Tyne Polytechnic, U.K. | 185 |
| J3 | Dynamic behaviour of a distillation column with internal heating by the bottoms product
D. Butz and K. Stephan, University of Stuttgart, F.R. Germany | 205 |

POSTER DISPLAY

- | | | |
|----|--|-----|
| P1 | Design and optimization of a high temperature cascaded heat pump at 155° C
Q.S. Yuan, J.C. Blaise and C. Missirian, Electricite de France, France | 213 |
| P2 | The potential of electrically enhanced evaporators
P.H.G. Allen, The City University and P. Cooper, Polytechnic of Central London, UK | 221 |
| P3 | An assessment of heat pump timber driers
P.G. Baines, C.G. Carrington and I.R. Cox-Smith, University of Otago, New Zealand | 233 |