

12th International Conference on Compressors and their Systems (Compressors 2021)

IOP Conference Series: Materials Science and Engineering
Volume 1180

London, United Kingdom
6 - 8 September 2021

ISBN: 978-1-7138-4640-6
ISSN: 1757-8981

Printed from e-media with permission by:

Curran Associates, Inc.
57 Morehouse Lane
Red Hook, NY 12571



Some format issues inherent in the e-media version may also appear in this print version.

This work is licensed under a Creative Commons Attribution 3.0 International Licence.
Licence details: <http://creativecommons.org/licenses/by/3.0/>.

No changes have been made to the content of these proceedings. There may be changes to pagination and minor adjustments for aesthetics.

Printed with permission by Curran Associates, Inc. (2022)

For permission requests, please contact the Institute of Physics
at the address below.

Institute of Physics
Dirac House, Temple Back
Bristol BS1 6BE UK

Phone: 44 1 17 929 7481
Fax: 44 1 17 920 0979

techtracking@iop.org

Additional copies of this publication are available from:

Curran Associates, Inc.
57 Morehouse Lane
Red Hook, NY 12571 USA
Phone: 845-758-0400
Fax: 845-758-2633
Email: curran@proceedings.com
Web: www.proceedings.com

TABLE OF CONTENTS

Foreword	
Peer review declaration	
Bi-Directional System Coupling for Conjugate Heat Transfer and Variable Leakage Gap CFD Analysis of Twin-Screw Compressors	1
<i>S Rane, A Kovačević, N Stošić, I K Smith</i>	
A Thermodynamic Chamber Modelling Approach for Oil Free and Oil Injected Twin Screw Compressors	11
<i>G Ramchandran, J Harrison</i>	
Special feature of a screw vacuum-compressor ‘chamber’ model development	21
<i>T N Mustafin, R R Yakupov, M S Khamidullin, I G Khisameev, V A Alyaev</i>	
Application of Path Homotopy in Twin Screw Compressor Rotor Profile Design	30
<i>Sumit Patil, Nikola Stosic, Ahmed Kovacevic, Ian Smith, Neeraj Asati</i>	
Numerical evaluation of an Oil free Screw Compressor’s Suction Port design using Ansys CFX and SCORG.....	40
<i>S Tankhiwale, A Dagwar, S Rane, A Kovacevic, A Birari, S Abdan, N Asati</i>	
Investigation of Screw Compressors for Low Pressure Ratio Applications	49
<i>Y Lu, A Kovacevic, M Read, D Buckney, Y Endo</i>	
Reducing rotors clearance - a way to increase the performance of a screw compressor	56
<i>M Nitulescu, C Slujitoru, V Petrescu, V Silivestru, G Fetea, S Tomescu</i>	
Design, Testing and Feasibility Analysis of an Oil-Free Twin Screw Compressor with In-Chamber Flash Cooling	66
<i>G Stupple</i>	
Modelling of inhomogeneous chamber states in rotary positive displacement vacuum pumps	75
<i>Heiko Pleskun, Timo Jünemann, Tobias Bode, A. Brümmer</i>	
Estimation of radial shaft seal, oil drag and windage loss in twin screw oil injected compressor	85
<i>S Abdan, N Stosic, A Kovacevic, I Smith, N Asati</i>	
Study on screw rotor thermal machining method of single screw compressor.....	93
<i>S Y Wang, Z L Wang, H W Shi, Z M Wang, M M Hao, J Wang</i>	
Numerical study of intake flow field inside the high-speed refrigeration scroll compressor with spiral suction channels in the motor rotor.....	103
<i>G X Bu, X R Li, X W Li, Y Zhang, W F Wu, X L Wang, X P Zhang</i>	
Simulation of the Deformation and Contact of Scrolls in the Scroll Compressor	113
<i>C Wang, S Zhang, J M Cheng, B W Lei, Y J Du, J H Wu</i>	
Optimization of the tip profile of orbiting scroll in an asymmetry suction chamber scroll compressor.....	122
<i>Sun Shuaihui, Wang Zhe, GUO Pengcheng, ZHANG bo, MAO Zhenkai</i>	

Flow computation inside a scroll compressor based on open-source code.....	131
<i>E Fadiga, N Casari, B Angel, A Picavet</i>	
Implementing the principles of operating processes schematization and of performance loss distribution when designing long-stroke reciprocating compressor stages.....	141
<i>Vladimir L. Yusha, Sergey S. Busarov, Nikolay Yu. Filkin, Maria A. Fedorova, Vladimir V. Denisenko, Alexander A. Goncharenko, Vyacheslav B. Shipov, Oleg G. Bessonov</i>	
Numerical-experimental investigation of liquid slugging in the suction muffler of a hermetic reciprocating compressor.....	152
<i>M Bianchi, C J Deschamps, T T Rodrigues, E E Paladino</i>	
Mechanical and deformation characteristics of rotary compressor discharge valve.....	162
<i>YS Hu, J Xu, O X Yang, J Gao, X Y Zhang, Y P Hu</i>	
Force assisted discharge valve for piston compressors.....	172
<i>L Dür, A Egger, M Lang, R Almbauer</i>	
Experimental analysis of reed valve movement for different reed valve designs tested in an impact fatigue test system	182
<i>Muhammad Waqas Tofique, Alexander Löf, Chris Millward</i>	
Simulation and Experiment Study on Dynamic Characteristic of Reed Valve of Reciprocating Compressor Based on Fluid-Structure Interaction Model	194
<i>Yanbin Wang, Bei Guo, Kai Ma, Yuhang Zhou</i>	
Development of the Universal Modelling Method mathematical model and the practice of its application	204
<i>Y.B. Galerkin, O.A. Solovyeva, A.A. Drozdov, V.B. Semenovskiy</i>	
Continuous Cooling Compressor for water refrigerant heat pump.....	219
<i>T. Shoyama, H. Sun, B. Kawano, M. Matsui</i>	
Modeling the loading factor characteristic of an industrial centrifugal compressor impeller.....	229
<i>Yu Galerkin, O Solovyeva, K Soldatova, A Nikiforov</i>	
Theory and practice of neural networks application to building mathematical model of centrifugal compressor vane diffusers	241
<i>Aleksandr Nikiforov, Andrei Rekovets, Yuri Galerkin, Evgeniy Petukhov, Aleksey Rekstn, Vasiliy Semenovsky, Olga Solovyeva</i>	
Numerical simulation and optimization of centrifugal compressor return channels: methods and results	251
<i>Y.B. Galerkin, L.N. Marenina, A.A. Drozdov, O.A. Solovyeva, K.V. Soldatova</i>	
2D transient analysis of suction process for coupled vane compressor	262
<i>W C Poh, B Elhadidi, K T Ooi</i>	
Geometric Optimisation of a Coupled Vane Compressor	270
<i>Q J Chen, K T Ooi</i>	
Dynamic modelling and experimental validation of Coupled Vane Compressor.....	278
<i>P Shakya, K T Ooi</i>	
Effects of Lubricating oil on the performance of a Four-Intersecting-Vane Rotary Expander	288
<i>A A Murthy, S Norris, A Subiantoro</i>	

Experimental Investigation on a Sliding-Vane Expander for Steam Applications..... <i>I Costanzo, S Murgia, G Valenti, F Fasani</i>	298
Optimal Designed Experiments for Reliable Model Calibration of a fixed-speed Scroll Compressor with R410A and R32 <i>Christian Vering, Daniel Stopp, Tim Klebig, Valerius Venzik, Dirk Miller</i>	307
Baseline testing of a variable-speed water-cooling Chiller according AHRI standard 550/590..... <i>A J Hoess, N P Salts, D Ziviani, J E Braun, E A Groll</i>	322
Application of LDV and PIV techniques for flow measurements in the suction port of a screw compressor..... <i>J. M. Nouri, D. Guerrato, N. Stosic, Y. Yan</i>	332
Research and Solution of Vibration Problem of an Air-cooled heat exchanger of Reciprocating Compressor..... <i>Junchao Ye, Xiaoling Yu, Shiyi Fan, Qian Lv, Xiaolin Wang</i>	340
Research on fault diagnosis and early warning of reciprocating compressor based on stacked convolutional autoencoder optimized by gradient differential evolution <i>H Li, XM Liu, ZW Mao, JJ Zhang</i>	351
Maxwell velocity slip and Smoluchowski temperature jump boundary condition for ANSYS CFX..... <i>T. Jünemann, H. Pleskun, A. Brümmer</i>	361
A numerical CFD simulation method using static grid based on momentum compensation for screw pumps <i>Di Yan, Qian Tang</i>	371
Modeling and comparison of different capacity modulation strategies with focus on seasonal performance..... <i>S Inampudi, F Botticella, S Elbel</i>	381
Theoretical Study on the Performance of Air Cooler in Cold Storage	391
<i>Lin Dong, Zhilong He</i>	
Development of accurate and widely applicable compressor performance maps	399
<i>Cheng-Yi Lee, Tao Cao, Yunho Hwang, Reinhard Radermacher, Scott Shaffer</i>	
Assessing the performance limits of a variable-speed residential heat pump system..... <i>John K. Brehm, David Augustine, Davide Ziviani, Eckhard A. Groll</i>	409
CFD Simulation and Experimental studying of a Dry Screw Vacuum Pump	420
<i>K Ma, B Guo, Y Zhou, Y B Wang</i>	
Theoretical study on the leakage characteristics of Disc-Seal Single Screw Pump used in oily sludge waste heat source absorption refrigeration system..... <i>Z L Wang, H W Shi, S Y Wang, Z M Wang, M M Hao, J Wang</i>	430
Design optimization and test of the novel FeTu ‘compander’, utilising organic fluids within a closed cycle for HVACR applications..... <i>J Subert, J P Fenton, K Hinchliffe, I M Arbon</i>	439
Development of a Reconfigurable Prototype Peristaltic Compressor	449
<i>M Islam, C Tubbs, C Bengs, C R Bradshaw</i>	

Research on motion and friction of rolling piston in rotary compressor	459
<i>J Xu, B Yu, O X Yang, S P Ding, H H Zhao</i>	
Comparison of Two Reverse-cycle Defrosting Methods for a R290 Split Room Air Conditioner	469
<i>Y J Du, J H Wu, C Wang, B W Lei</i>	
Theoretical and Experimental Study on Rotary Compressor with Double Vapor Injection and Its System	479
<i>H J Wei, J Xu, B Yu, O X Yang, S G He, H H Zhao, Y P Hu</i>	
Part load performance of single and two stage compressors — a comparative experimental study in a R410A chiller unit	489
<i>S Inampudi, F Botticella, S Elbel</i>	
Thermodynamic analysis of volume flow rate ratio on the performance of a NH ₃ /CO ₂ cascade refrigeration system.....	499
<i>Q C Yang, L Liu, G B Liu, Y Y Zhao, L S Li</i>	
A study into the impact of chloride ions on the make-up hydrogen compressors	508
<i>M Fouladivanda, M A Heidary</i>	
Thermodynamic analysis and optimization of a vapor injection organic Rankine cycle system for low-grade heat recovery	518
<i>D T Li, Z L He, L T Ji, Z W Xing</i>	
Analysis and Optimization of Over Compression for Rotary Cylinder Compressor Based on PV Test.....	528
<i>Y S Hu, H J Wei, J Xu, Z C Du, P L Zhang, L P Ren</i>	
Basic design procedure for an internally geared screw compressor	536
<i>Matthew Read</i>	
A study on the kinematics of a new Schukey-type rotary compressor	547
<i>B Cui, K Becker, U Lüdersen, M Gottschlich, S Kabelac</i>	
Design Improvements of Vane Bearing Compressor	557
<i>Y S Hu, H J Wei, J Xu, P K Wan, L P Ren, Z Fu</i>	
Current limits of CO ₂ compressors working in integrated mechanical subcooling cycles	567
<i>Laura Nebot-Andrés, Daniel Sánchez, Ramón Cabello, Daniel Calleja-Anta, Carlos Fossi, Rodrigo Llopis</i>	
Increasing Boiling Fluid Flowing Efficiency from Motive Nozzles of Two-Phase Ejectors	575
<i>Serhii Sharapov, Oleh Chekh, Danylo Husiev, Volodymyr Klymenko, Oleksiy Shaparenko</i>	
Simulation and optimisation of opened sewage concentration air cycle combined with the heat pump under actual weather conditions	590
<i>Y Zhang, T S Guo, W F Wu, C Y Li, X L Wang</i>	
Conjugate Heat Transfer Simulation and Cooling Optimization of the Flow inside a Screw Compressor.....	600
<i>J F Willie</i>	
Reducing the noise from the cavity by tuning the compressor's oil level	611
<i>Paulo Martins</i>	

CFD analysis on the effect of discharge port geometry of the hook and claw vacuum pumps 619
K Theofanidis, Y Lu, A Kovacevic

Lubricant Options for Screw Compressors Using Alternative Refrigerants..... 629
J Karnaz

Author Index