Table of Contents

C-01: Scroll Compressors I

ID: 1627
Development Of An Integrated Solution For Multi Scroll Compressors With Wet Vapor Injection
Stephane Bertagnolio, Eric Winandy, Sonia Vazquez
Emerson Climate Technologies
Keywords: vapor injection, wet vapor injection, reversible heat pump

ID: 1425
Numerical Simulation of Unsteady Flow in a Scroll Compressor
Haiyang Gao
Simerics, Inc, United States of America
Keywords: Scroll, Compressor, CFD, Deforming Grid

ID: 1255
Seal Mechanism of Tip Seal in Scroll Compressor
Mitsuhiro Fukuta¹, Daisuke Ogi², Masaaki Motozawa¹, Tadashi Yanagisawa¹, Shigeki Iwanami³, Tadashi Hotta³
¹Shizuoka University, Japan; ²Graduate School of Engineering, Shizuoka University, Japan; ³Denso Corporation
Keywords: Scroll Compressor, Tip seal, Leakage

ID: 1200
Numerical Simulation Of Three-dimension Unsteady Flow In The Compression Chambers Of A Scroll Compressor
Shuanglai Liu, Xiaoli Kang, Caixia Shan, Yusheng Hu
Compressor and Motor Institute of Gree Electric Appliances, Inc. of Zhuhai, China, People’s Republic of
Keywords: scroll compressor, numerical simulation, unsteady flow, compression

ID: 1352
Development of Scroll Compressor for 16HP VRF System
Fumikazu Nagaoka, Masashi Myogahara, Taro Kato
Mitsubishi Electric Corporation, Japan
Keywords: Scroll, Compressor, VRF

ID: 1442
A Study on PWM Bypass Capacity Control of Scroll Compressors
Ryota Iijima, Masaki Koyama
Hitachi, Ltd., Japan
Keywords: Scroll Compressor, Capacity Control, Pulse Width Modulation
C-02: Novel Compressors I

Time: Monday, 14/Jul/2014: 1:00pm - 3:00pm • Location: 322

ID: 1669

Twenty Years of Compressor Innovation at NTU, Singapore
Kim Tiow Ooi
School of Mechanical and Aerospace Engineering, Nanyang Technological University, 50 Nanyang Avenue, Singapore 639798
Keywords: Innovation, compressor, piezo, electric, refrigeration

ID: 1134

Modelling and Simulation of the Dynamics of Cross Vane Expander-Compressor Unit for Vapour Compression Cycle
Ken Shaun Yap¹,², Kim Tiow Ooi¹, Anutosh Chakraborty¹
¹ Nanyang Technological University, Singapore, Singapore; ² TUM CREATE
Keywords: expander, compressor, refrigeration, energy recovery, performance improvement

ID: 1435

A Chiller Control Algorithm for Multiple Variable-speed Centrifugal Compressors
Piero Caballero¹, Chiang Shih¹, W. Turner Thornton², Joost J. Brasz²
¹ Florida State University, United States of America; ² Danfoss Turbocor, United States of America
Keywords: chiller, centrifugal compressor, variable speed

ID: 1177

Influence of Volumetric Displacement and Aspect Ratio on the Performance Metrics of the Rotating Spool Compressor
Craig R. Bradshaw¹, Greg Kemp¹, Joseph Orosz¹, Eckhard A. Groll²
¹ Torad Engineering, United States of America; ² Purdue University, United States of America
Keywords: spool compressor, geometry optimization, theoretical analysis

ID: 1178

Loss Analysis of Rotating Spool Compressor Based on High-Speed Pressure Measurements
Craig R. Bradshaw¹, Greg Kemp¹, Joseph Orosz¹, Eckhard A. Groll²
¹ Torad Engineering, United States of America; ² Purdue University, United States of America
Keywords: spool compressor, high-speed pressure measurement, port analysis

ID: 1489

Small-Scale and Oil-Free Turbocompressor for Refrigeration Applications
Jürg Schiffmann
Ecole Polytechnique Federale de Lausanne, Switzerland
Keywords: small-scale radial compressors, gas lubricated bearings
C-03: Scroll Compressors II

Energy Saving Potential in Existing Compressors
Roberto Cipollone, Diego Vittorini
University of L’Aquila, Italy
Keywords: compression, energy, saving, efficiency, cooling, oil injection, Organic Rankine Cycle

Experimental Pressure-Volume diagrams of scroll compressors
Alain Picavet, Pierre Ginies
Danfoss Commercial Compressors, France
Keywords: scroll pressure-volume diagram

The scroll compressor with internal cooling system – conception and CFD analysis
Józef Rak, Sławomir Pietrowicz, Zbigniew Gnutek
Wrocław University of Technology, Poland
Keywords: scroll compressor, internal cooling system

The Scroll Compressor With Internal Cooling System In Cryogenics Applications
Józef Rak, Sławomir Pietrowicz, Zbigniew Gnutek
Wrocław University of Technology, Poland
Keywords: scroll compressor, cryogenics application

Simulation study on the performance of an Injection Scroll Compressor in a Heat Pump for Electric Vehicles
Jongho Jung1, Dongwoo Kim1, Yongseok Jeon1, Yongchan Kim2
1Graduate School of Mechanical Engineering, Korea University, Korea, Republic of (South Korea); 2Department of Mechanical Engineering, Korea University, Korea, Republic of (South Korea)
Keywords: Scroll compressor, Vapor injection, Simulation

Gas Pulsation Control Using a Shunt Pulsation Trap
Paul Xiubao Huang1, Sean Yonkers1, David Hokey2
1Hi-Bar MC Tech, United States of America; 2GE Oil and Gas, United States of America
Keywords: compressor or engine, gas pulsation control, pulsation trap
C-04: Novel Compressors II

Time: Monday, 14/Jul/2014: 3:30pm - 5:30pm • Location: 322

ID: 1378
An update on the Performance and Operating Characteristics of a Novel Rotating Spool Compressor -  
Joseph Orosz, Craig R. Bradshaw, Greg Kemp, Eckhard A. Groll  
Torad Engineering, United States of America  
Keywords: spool compressor, performance, spool, novel, kemp,
C-05: Rotary Compressors

Time: Tuesday, 15/Jul/2014: 9:45am - 11:45am • Location: 314

ID: 1668

Oil-Less Swing Compressor Development

Jason James Hugenroth
Inventherm, Baton Rouge, Louisiana, USA

Keywords: Swing compressor, oil-less compressor, rotary compressor

ID: 1651

Performance Enhancement in Sliding Vane Rotary Compressors through a Sprayed Oil Injection Technology

Giuseppe Bianchi¹, Roberto Cipollone¹, Stefano Murgia², Giulio Contaldi²
¹ University of L’Aquila, Italy; ² Ing. Enea Mattei S.p.A., Vimodrone (Milan), Italy

Keywords: sliding vane compressor, rotary compressor, pressure swirl nozzle, oil spray injection, indicator diagram

ID: 1214

The Mechanism Discuss of Periodic Sound in Rolling Piston Compressor under Low Operating Frequency in Air-conditioner System

Huanhuan Gu, Rongting Zhang, Yusheng Hu
Gree Electric Appliance, Inc. of Zhuhai, China, People’s Republic of

Keywords: rolling piston compressor, periodic sound, resonator

ID: 1226

Rotary Compressor With The Stationary Crankshaft

Nelik Dreiman
Retiered Tecumseh Products Co, United States of America

Keywords: novel rotary compressor, suction, discharge

ID: 1350

Development of a miniature Twin Rotary Compressor

Jeong-Bae Lee, Ui-Yoon Lee, Jin-Ah Chung, Un-Seop Lee
Samsung Electronics, Korea, Republic of (South Korea)

Keywords: Rotary Compressor, Vibration, Twin Compressor, Miniature, Torque Control

ID: 1215

A Novel Structure of High Efficiency Rotary Compressor

Linbo Lv, Liping Ren, Jia Xu, Yusheng Hu
Gree Electric Appliances, Inc. of Zhuhai, China, People’s Republic of

Keywords: a novel structure, frictional loss, leakage loss
C-06: Dynamic Compressors

**Time:** Tuesday, 15/Jul/2014: 9:45am - 11:45am • **Location:** 322

**ID:** 1329

**Increasing the Stable Operating Range of a Fixed-Geometry Variable-Speed Centrifugal Compressor**

Joost J. Brasz
Danfoss Turbocor Compressors, United States of America

**Keywords:** centrifugal compressor, range extension, variable speed, chillers

**ID:** 1498

**Using Magnetic Bearing Orbit Information to Maximize Centrifugal Compressor Efficiency at Off-Design Conditions**

W. Turner Thornton, Joost J. Brasz
Danfoss Turbocor, United States of America

**Keywords:** Oil-Free Centrifugal Capacity Control

**ID:** 1123

**Non Adiabatic Centrifugal Compressor Gas Dynamic Performance Definition**

Kristina Soldatova
Sankt-Peterburg State Polytechnical University, Russian Federation

**Keywords:** turbocharger compressor performances, centrifugal compressors

**ID:** 1165

**Supersonic Axial Compressor Stage Simplified Analysis**

Kristina Soldatova1, Yuri Galerkin2
1 Sankt-Peterburg State Polytechnical University, Russian Federation; 2 Sankt-Peterburg State Polytechnical University, Russian Federation

**Keywords:** centrifugal compressors, modelling performances, Supersonic Axial Compressor Stage

**ID:** 1225

**Centrifugal Compressor Performance Deviations with Various Refrigerants, Impeller Sizes and Shaft Speeds**

Yuanjie Wu, Chris Thilges
Ingersoll Rand - Trane, United States of America

**Keywords:** Performance prediction, Centrifugal compressor

**ID:** 1393

**Performance Analysis of Centrifugal Compressor under Multiple Working Conditions Based on Time-weighted Average**

Yuanyang Zhao, Jun Xiao, Liansheng Li, Qichao Yang, Guangbin Liu, Le Wang, Bin Tang
State key laboratory of compressor technology, Hefei General Machinery Research Institute, Hefei 210031, P. R. China, People's Republic of

**Keywords:** Compressor, Time-weighted average, Multiple working conditions, Performance
C-07: Waste Heat Recovery

Time: Tuesday, 15/Jul/2014: 1:30pm - 3:30pm • Location: 314

ID: 1470

Geothermal ORC Systems Using Large Screw Expanders
Tim R. Biederman, Joost J. Brasz
cyrq, United States of America

Keywords: orc, screw expander, screw compressor, turbine, low-temperature

ID: 1451

Experimental Campaign and Modeling of a Low-capacity Waste Heat Recovery System Based on a Single Screw Expander
Adriano Desideri¹, Martijn van den Broek², Sergei Gusev², Vincent Lemort¹, Sylvain Quoilin¹
¹ University of Liège, Belgium; ²University of Ghent, Belgium

Keywords: Validation, Single screw expander

ID: 1609

The Benefit of Variable-Speed Turbine Operation for Low Temperature Thermal Energy Power Recovery
Joost J. Brasz
Syracuse University CASE Incubation Center

Keywords: Organic Rankine Cycle, variable speed, radial inflow turbine,

ID: 1272

Liquid-Flooded Ericsson Power Cycle
Nelson A. James, James E. Braun, Eckhard A. Groll, W. Travis Horton
Purdue University, United States of America

Keywords: Power Generation, Flooded Compression, Flooded Expansion

ID: 1604

Experimental Investigation Of An ORC System For A Micro-Solar Power Plant
Rémi Dickes, Olivier Dumont, Sébastien Declaye, Sylvain Quoilin, Ian Bell, Vincent Lemort
University of Liège, Belgium

Keywords: ORC, scroll expander
C-08: Compressor Modeling I

Simulation of a Refrigeration Compressor evaluating accuracy of results with variation in 3D component discretization

Sidnei Jose De Oliveira¹, Marcelo Real¹, Dan Marsh²
¹Tecumseh Products Co, United States of America; ²Gamma Technologies, United States of America

Keywords: discretization, simulation, compressor, refrigeration

ID: 1137

PD Compression: A Quasi-Static or Dynamic Process?
Paul Xiubao Huang
Hi-Bar MC Tech, United States of America

Keywords: PD-compression, quasi-static, dynamic, shock-tube

ID: 1153

Development And Validation Of Integrated Design Framework For Compressor System Model
Parag Mantri, Aditya Bhakta, Srinivas Mallampalli, Greg Hahn, Srujan Kusumba
GE, India

Keywords: Integrated Model, MATLAB/SIMULINK, Compressor, Multi-physics, Dynamics & Controls, Valves

ID: 1152

An Improved Analytical Model for Efficiency Estimation in Design Optimization Studies of a Refrigerator Compressor
Aditya Bhakta, Parag Mantri, Bhaskar Tamma
GE, India

Keywords: compressor, compressor loss, valve, valve dynamics, gas-spring, resonant frequency, energy efficiency

ID: 1131

A Numerical Simulation of Fluid-Structure Interaction for Refrigerator Compressors Suction and Exhaust System Performance Analysis
Shoufei Wu, Zonghuai Wang
Jiaxiqera Compressor Co., Ltd., China, People's Republic of

Keywords: Refrigerator compressor, Fluid-structure interaction

ID: 1124

Influence of approaches in CFD Solvers on Performance Prediction in Screw Compressors
Ahmed Kovacevic¹, Sham Rane¹, Nikola Stosic¹, Yu Jiang², Sam Lowry², Michal Furmanczyk²
¹City University London, United Kingdom; ²Simerics, Inc, United States of America

Keywords: Twin Screw Compressor, CFD, Deforming Grid
C-09: Noise & Vibration

Time: Tuesday, 15/Jul/2014: 4:00pm - 6:00pm • Location: 314

ID: 1133

Diesel-Driven Compressor Torque Pulse Measurement in a Transport Refrigeration Unit
Young Chan Ma¹, Cody Kleinboehl², Lars Sjoholm³, David Secrist⁴
¹Ingersoll Rand / Thermo King, United States of America; ²Ingersoll Rand / Thermo King, United States of America; ³Ingersoll Rand / Thermo King, United States of America; ⁴Ingersoll Rand / Thermo King, United States of America

Keywords: Diesel-Driven Compressor, Torque Pulse, Transport Refrigeration Unit (TRU)

ID: 1146

Muffler Design for a Refrigerator Compressor
Vamshidhar Done¹, Venkatesham Balide², Bhaskar Tamma¹, Kunal Soni¹, Subhrabajit Dey¹, Shruti Angadi¹, Vishal G P²
¹General Electric Global Research Center, Bangalore, India; ²Department of Mechanical Engineering, IIT Hyderabad, India

Keywords: compressor, muffler, pressure drop, noise, transmission loss

ID: 1199

Analysis And Experimental Validation Of Structure-Borne Noise From Acoustic Enclosure Of Compressor
Satish Konderao Deshmukh¹, Onkar Sunil Madhekar²
¹Kirloskar Pneumatic Company Limited, India; ²Sinhgad College Of Engineering, Pune, India

Keywords: Green’s functions, vibrational response, structure – borne noise,

ID: 1216

Theoretical Analysis of Revolving Vane Compressor Vibrations
Kuan Thai Aw, Kim Tiow Ooi
Nanyang Technological University, Singapore

Keywords: Vibration, Rotary compressor, Lagrange, Modelling

ID: 1307

Acoustic Improvements for a New Generation of Variable Speed Compressor
Carlos Eduardo Vendrami, Claudio de Pellegrini, Marcos Akira Hattori, Douglas Climaco
Embraco - Research & Development, Brazil

Keywords: variable speed, acoustic optimization, paths

ID: 1320

Noise Characteristics Improvements for a New Generation of Variable Capacity Compressor using Linear Motor Technology
Claudio de Pellegrini¹, Alexandre Schroeder¹, Otavio Santini¹, Carlos Eduardo Vendrami¹, Arcanjo Lenzi², Olavo Silva²
¹Embraco - Research and Development, Brazil; ²Federal University of Santa Catarina, Brazil

Keywords: Linear Compressor, Noise, Transient Noise
Methods of fluid properties for compressible refrigerant CFD analysis
Scott Branch
Ingersoll Rand - Trane, United States of America
Keywords: CFD, NIST, Peng Robinson, Scroll Compressor

Comparison and Validation of Semi-empirical Compressor Models for Cycle Simulation Application
Stefan Posch¹, Erwin Berger¹, Martin Heimel¹, Raimund Almbauer¹, Axel Stupnik², Hans-Peter Schögler²
¹Graz University of Technology, Austria; ²ACC – Austria GmbH, Fürstenfeld
Keywords: Transient state, Reciprocating compressor, Transient state

Numerical Investigation Of The Leakage Flows In Twin Screw Compressor Rotors
Maria Pascu, David Buckney, Manoj Helyanthuduwage, Graeme Cook
Howden Compressors Ltd, United Kingdom
Keywords: screw compressors, CFD, leakage flows, tip seal

Fatigue Prediction of the Discharge Pipe in Reciprocating Compressor
Jung-Hyun Kim, Dae-II Kwon, Jeong-Bae Lee, Jong-Soo Noh, Seong-Woo Park, Un-Seop Lee
Samsung Electronics, Korea, Republic of (South Korea)
Keywords: Reciprocating, Compressor, Fatigue, Line, Discharge, Tube

A Semi-Empirical Prediction Model for the Discharge Line Temperature of Hermetic Compressors
David Myszka¹, Chen Guan¹, Andrew Murray¹, Thomas Hodapp²
¹University of Dayton, United States of America; ²Emerson Climate Technologies
Keywords: Discharge Temperature, Compressor Performance

Discharge Tube Design For Reciprocating Compressor – How To Do It Right The First Time And Quickly
Marcos Giovani Droga de Bortoli, Fabio Medeiros de Lima, Julio Cesar Silva
Embraco, Brazil
Keywords: discharge tube, reciprocating compressor, finite element method, DFSS, robust design
ID: 1563
Source Identification and In Situ Quantification of Oil-Refrigerant Mist Generation by Discharge Valve Opening Process
Augusto Jose Pereira Zimmermann1, Predrag S. Hrnjak1,2
1University of Illinois at Urbana-Champaign, United States of America; 2CTS, Urbana, IL, USA
Keywords: Reed valve, Oil, Droplet generation, Flow visualization

ID: 1569
Visualization of the Opening Process of a Discharge Reed Valve in the Presence of Oil
Augusto Jose Pereira Zimmermann1, Predrag S. Hrnjak1,2
1University of Illinois at Urbana-Champaign, United States of America; 2CTS, Urbana-IL, USA
Keywords: Reed valve, Oil film, Breakup pattern, Mist generation, Visualization

ID: 1665
Optimization of EHL Lubrication Performance in Thrust Slide-Bearings of Scroll Compressors
Noriaki Ishii1, Tekuma Tsuji2, Keiko Anami3, Charles W. Knisely4, Katsunori Kurihara1, Tatsuya Oku2, Kiyoshi Sawai5, Hirofumi Yoshida5, Hiroaki Nakai6
1Osaka Electro-Communication University, Japan; 2Mayekawa MFG. Co., Ltd.; 3Ashikaga Institute of Technology, Japan; 4Bucknell University, USA; 5Hiroshima Institute of Technology, Japan; 6Appliances Company, Panasonic Corporation
Keywords: Frictional Coefficient, EHL, Optimization, Thrust Slide-Bearing, Scroll Compressor

ID: 1248
Numerical and Experimental Examination for Oil Pump System Using a Simplified Uncoupled Simulation Model
Mauricio Pereira Tada, Thiago Hoffmann, Paulo Rogério Carrara Couto, Adilson Luiz Manke, Marcos Giovani Dropa de Bortoli
Embraco, Brazil
Keywords: VCC reciprocating compressors, helical oil pump, oil supply system, low speed

ID: 1354
Experimental Study About An Amount Of Oil Charge On Electric Driven Scroll Compressor For Electric Vehicle
Donglim Nam1, Poyoung Lee1, Geonho Lee2, Yunki Kwon2, Jinho Lee3
1Doowon Heavy Industrial, Korea, Republic of (South Korea); 2Doowon Technical University College, Republic of (South Korea); 3Yonsei University, Republic of (South Korea)
Keywords: Scroll Compressor, oil

ID: 1110
Hydrodynamic Lubrication Analysis of Eccentric Bearing in Rotary Compressor
Xingbiao Zhou, Bo Jiang, Shuangjian Liang
Guangdong Meizhi Compressor Co. Ltd., China, People’s Republic of
Keywords: rotary compressor, eccentric bearing, trajectory, numerically simulation

ID: 1288
Selection of a refrigeration oil for the R32 refrigerant and evaluation of the compressor reliability
Masaru Tanaka, Hideki Matsuura, Shigeharu Taira, Akinori Nakai
DAIKIN INDUSTRIES, LTD., Japan
Keywords: GWP, R32
**C-12: Reciprocating Compressors**

_ID: 1181_

**Influence of Shell Volume on Pressure Pulsations in a Hermetic Reciprocating Compressor**
Keith Adam Novak  
Ingersoll Rand - Trane, United States of America  
Keywords: Reciprocating, compressor, pressure, pulsation, impedance

_ID: 1162_

**Influence of Cylinder Bore Volume on Pressure Pulsations in a Hermetic Reciprocating Compressor**
Keith Adam Novak  
Ingersoll Rand - Trane, United States of America  
Keywords: Reciprocating, Compressor, Pressure, Pulsation, Impedance

_ID: 1151_

**Friction Model Development for a reciprocating compressor**
Parag Mantri, Bhavesh Kachhia, Bhaskar Tamma, Aditya Bhakta  
GE, India  
Keywords: compressor, friction, minimum oil film thickness, pressure distribution, parametric study

_ID: 1163_

**Flexible-body Dynamics Simulation of Crankshaft Torsional Vibration System**
Junming Cheng¹, Zhan Liu², Binyan Yu³, Qin Tan⁴, Quanke Feng⁵  
¹School of Energy and Power Engineering, Xi'an Jiaotong University, Xi'an, P.R.China; ²School of Energy and Power Engineering, Xi'an Jiaotong University, Xi'an, P.R.China; ³School of Energy and Power Engineering, Xi'an Jiaotong University, Xi'an, P.R.China; ⁴School of Energy and Power Engineering, Xi'an Jiaotong University, Xi'an, P.R.China; ⁵School of Energy and Power Engineering, Xi'an Jiaotong University, Xi'an, P.R.China  
Keywords: reciprocating compressors, crankshaft torsional vibration, natural frequency, ADAMS, flexible multibody dynamics theory

_ID: 1267_

**Numerical Investigation of the Gas Leakage through the Piston-Cylinder Clearance of Reciprocating Compressors**
Sérgio Koerich Lohn, Evandro Luiz Lange Pereira  
Embraco, Brazil  
Keywords: gas leakage, reciprocating compressor, piston-cylinder clearance

_ID: 1367_

**Development of a Lumped-Parameter Model for Hermetic Reciprocating Compressor with Thermal-Electrical Coupling**
Thiago Dutra, Cesar J. Deschamps  
POLO/ Federal University of Santa Catarina, Brazil  
Keywords: comprehensive model, induction motor, reciprocating compressor

_ID: 1479_

**Optimization Rotor Hole to Reduce Force in Cold Pressing Rotor into Crankshaft**
Chengguo Chu, Jun Luo, Shoufei Wu, Xiaoli Liu  
Jiaxipera Compressor Co., Ltd., China, People's Republic of  
Keywords: rotor crankshaft cold press
C-13: Compressor Modeling III

**Time:** Wednesday, 16/Jul/2014: 9:45am - 12:00pm • **Location:** 322

**ID:** 1662

**Numerical Analysis of Suction Mufflers**

Joaquim Rigola¹, Joan López¹, Giorgos Papakokkinos¹, Oriol Lehmkuhl², Assensi Oliva¹

¹Heat and Mass Transfer Technological Center – Universitat Politècnica de Catalunya, Terrassa (Barcelona), Spain; ²Termo Fluids S.L., Sabadell (Barcelona), Spain

**Keywords:** Suction mufflers, CFD, Turbulence

**ID:** 1659

**Fluid-Structure Interaction of a Reed Type Valve Subjected to Piston Displacement**

Olga Estruch¹, Oriol Lehmkuhl¹,², Joaquim Rigola¹, Carles David Pérez-Segarra¹

¹Heat and Mass Transfer Technological Center – Polytechnic University of Catalonia, Terrassa (Barcelona), Spain; ²Termo Fluids S.L., Sabadell (Barcelona), Spain

**Keywords:** Reed valve, fluid-structure interaction, radial basis function, large-eddy simulation, modal analysis

**ID:** 1412

**Predicting the Suction Gas Superheating in Reciprocating Compressors**

Jonatas Ferreira Lacerda¹, Celso Kenzo Takemori²

¹Tecumseh Products Company, Brazil; ²Vibroacústica Development and Research, Brazil

**Keywords:** suction gas superheating, transient flow, compressor efficiency

**ID:** 1589

**Equivalent Linkages of Compressor Mechanisms**

Hubert Bukac

Little Dynamics, Inc., United States of America

**Keywords:** Dynamics

**ID:** 1548

**3-D Transient CFD Model For A Rolling Piston Compressor With A Dynamic Reed Valve**

Hui Ding, Haiyang Gao

Simerics Inc., United States of America

**Keywords:** Rolling Piston Compressor, Reed Valve, Valve Dynamics, CFD.

**ID:** 1336

**Investigation Of Compressor Heat Dispersion Model**

Da Shi, Hong Tao, Min Yang

Shanghai Hitachi Electronic Appliances, China, People's Republic of

**Keywords:** Compressor heat dispersion; Discharge temperature; Convection heat transfer; Radiation heat transfer

**ID:** 1274

**Tubulence Modelling Evaluation for Reciprocating Compressor Simulation**

Tadeu Tonheiro Rodrigues

Embraco - Research and Development, Brazil

**Keywords:** Turbulence, RANS, LES, Fluid-Structure Interation, Reciprocating Compressor
Hydrodynamic-Pressure-Induced Elastic Deformation of Thrust Slide-Bearings in Scroll Compressors and Oil Film Pressure Increase Due to Oil Envelopment

Noriki Ishii¹, Takuma Tsuji², Keiko Anami³, Charles W. Knisely⁴, Tatsuya Oku², Koichi Nokiyama¹, Kiyoshi Sawai⁵, Hirofumi Yoshida⁶, Hiroaki Nakai⁶

¹Osaka Electro-Communication University, Japan; ²Mayekawa MFG. Co., Ltd.; ³Ashikaga Institute of Technology, Japan; ⁴Bucknell University, USA; ⁵Hiroshima Institute of Technology, Japan; ⁶Appliances Company, Panasonic Corporation

Keywords: Oil Envelopment, Oil Film Pressure, EHL, Thrust Slide-Bearing, Scroll Compressor

Effect of Lubricant-Refrigerant Mixture Properties on Compressor Efficiencies

Scott S. Wujek¹, Chad D. Bowers¹, Paul Okarma¹, Roberto A. Urrego², Edward T. Hessell², Travis L. Benanti²

¹Creative Thermal Solutions; ²Chemtura Corporation

Keywords: Efficiency, lubricant, compressor, oil, carbon dioxide

Mixed Lubrication Analysis of Vane Sliding Surface in Rotary Compressor Mechanisms

Yasutaka Ito¹, Hitoshi Hattori¹, Kazuhiko Miura²

¹Corporate Research & Development Center, Toshiba Corporation, Japan; ²Toshiba Carrier Corporation

Keywords: rotary compressor, mixed lubrication, vane, rolling piston, friction, lubricating characteristic

Investigation On Premature Failure Of the Self-lubricated Piston Rings in Oil-free Compressor

Jinfeng Chen, Bin Zhao, Jianmei Feng, Xueyuan Peng

Xi'an Jiaotong University, China, People's Republic of

Keywords: Oil-free compressor; The FEM simulation; Self-lubricating piston ring; Pressure distribution; The friction heat

Oil Management Solutions For Manifolding Scroll Compressors For Refrigeration Systems

Ying Dong¹, Leping Zhang², Serdar Suindykov³, Kang Zheng⁴, Peng Liu⁵

¹Danfoss, China, People's Republic of; ²Danfoss, China, People's Republic of; ³Danfoss, China, People's Republic of; ⁴Danfoss, China, People's Republic of; ⁵Danfoss, China, People's Republic of

Keywords: Manifolding, Active Solution, Passive Solution, Oil Balance, Vibration

An Investigation on the Bearing Design and Friction Characteristics of a Hermetic Reciprocating Compressor

Ahmet Refik Ozdemir¹, Erhan Kasapoğlu², Bilgin Hacıoğlu², Mustafa Duyar³

¹Arçelik A.S. Research and Development Center, Istanbul, Turkey; ²Arçelik A.S. Compressor Plant, Eskisehir, Turkey; ³Anova Mühendislik, Istanbul, Turkey

Keywords: Reciprocating compressor, Bearing, Mechanical Loss, Friction, Coefficient of performance (COP)
C-15: Expanders

**Time:** Wednesday, 16/Jul/2014: 1:00pm - 3:00pm • **Location:** 314

**ID:** 1446

**Analysis of a Rotating Spool Expander for Organic Rankine Cycles in Heat Recovery Applications**

Abhinav Krishna¹, Craig R. Bradshaw², Eckhard A. Groll¹

¹Purdue University, United States of America; ²Torad Engineering LLC, Alpharetta, GA

**Keywords:** Expander, Spool Expander, Spool Compressor, Organic Rankine Cycle, Waste Heat Recovery

**ID:** 1538

**Multi-Variable Optimisation Of Wet Vapour Organic Rankine Cycles With Twin-Screw Expanders**

Matthew Read, Ian Smith, Nikola Stosic

City University London, United Kingdom

**Keywords:** Expander, waste heat, ORC, optimisation

**ID:** 1506

**Comprehensive Model of a Single-screw Expander for ORC-Systems**

Davide Ziviani¹, Ian Bell², Martijn van den Broek¹, Michel De Paepe¹

¹Ghent University, Belgium; ²University of Liege

**Keywords:** Single-screw expander, ORC, modeling

**ID:** 1129

**Introduction of the Novel Cross Vane Expander-Compressor Unit for Vapour Compression Cycle**

Ken Shaun Yap¹,², Kim Tiow Ooi¹, Anutosh Chakraborty¹

¹Nanyang Technological University, Singapore, Singapore; ²TUM CREATE

**Keywords:** expander, compressor, refrigeration, energy recovery, performance improvement

**ID:** 1478

**Analysis of a Twin Screw Expander for ORC Systems using Computational Fluid Dynamics with a Real Gas Model**

Iva Papes, Joris Degroote, Jan Vierendeels

Ghent University, Belgium

**Keywords:** twin screw, expander, R245fa, Redlich-Kwong, ORC

**ID:** 1449

**Application-Oriented Design and Theoretical Investigation of a Screw-Type Steam Expander**

Manuel Grieb, Andreas Bruemmer

TU Dortmund University, Germany

**Keywords:** Screw Type steam expander, screw expander design, application oriented design, chamber model simulation
C-16: Compressor Modeling IV

Time: Wednesday, 16/Jul/2014: 1:00pm - 3:00pm  •  Location: 322

ID: 1300
Accounting for Local Thermal Distortions in a Chamber Model for Twin Screw Compressors
David Buckney¹, Ahmed Kovacevic², Nikola Stosic²
¹Howden Compressors Ltd., United Kingdom; ²City University London, Centre for Positive Displacement Compressor Technology, London, UK
Keywords: twin-screw, compressor, modelling, thermal distortion

ID: 1237
Investigation Of The Parameters Affecting Crankshaft And Rotor Interference Fit
Nazim Arda Eyyuboğlu
Arçelik A.Ş. Compressor Plant, Turkey
Keywords: compressor, interference fit, crankshaft, rotor

ID: 1374
A NTU-Based Model to Estimate Suction Superheating In Scroll Compressors
Marco C. Diniz, Cesar J. Deschamps
POLO / UFSC, Brazil
Keywords: Scroll compressor, suction superheating, NTU method

ID: 1372
A Neural Network to Predict the Temperature Distribution in Hermetic Refrigeration Compressors
Ernane Silva, Marco C. Diniz, Cesar J. Deschamps
POLO / UFSC, Brazil
Keywords: Neural network, reciprocating compressor, temperature field.

ID: 1414
Wave Propagation in a Radial Duct with Mean Swirling Flow
Yujun Leng, Sanford Fleeter
Purdue University, West Lafayette, United States of America
Keywords: centrifugal compressor, impeller wake vane interaction, radial waves, pressure waves, aeromechnics

ID: 1701
Implementation of Sobol's Method of Global Sensitivity Analysis to a Compressor Simulation Model
Nasir Bilal
Purdue University, United States of America
Keywords: sensitivity analysis, reciprocating compressor, gas pulsation, suction manifold
C-17: Alternative Refrigerants

**Time:** Wednesday, 16/Jul/2014: 3:30pm - 5:30pm • **Location:** 310

**ID:** 1390

**Lower GWP Refrigerants Compared to R404A for Economizer Style Compressors**

Lars Sjoholm¹, Cody Kleinboehl³, Young Chan Ma²  
¹Ingersoll Rand / Thermo King, United States of America; ²Ingersoll Rand / Thermo King, United States of America; ³Ingersoll Rand / Thermo King, United States of America

**Keywords:** GWP, R404A, Screw compressor, Scroll compressor, Economizer, Transport refrigeration

**ID:** 1491

**Solution Properties Of Polyol Ester Lubricants Designed For Use With R-32 And Related Low GWP Refrigerant Blends**

Roberto Arturo Urrego Leon, Travis L. Benanti, Edward T. Hessell  
Chemtura Corporation, United States of America

**Keywords:** Lubricant, Refrigerant, Viscosity

**ID:** 1595

**Evaluation of methods to decrease the discharge temperature of R32 scroll compressor**

Baolong Wang¹, Minghong Yang¹, Philippe Dewitte², Leping Zhang³, Wenxing Shi¹  
¹Department of Building and Science, Tsinghua University, Beijing, 100084, China; ²Danfoss Commercial Compressor, BP331-ZI de Reyrieux Trevoux Cedex, F-01603, France; ³Danfoss (Tianjin) Ltd, Commercial Scroll Compressor, Tianjin, China

**Keywords:** R32, Refrigerant injection, Scroll compressor, Discharge temperature, Operating envelop

**ID:** 1482

**Effects of Low Suction Temperature on the Boil-off Gas compressor**

Bin Zhao, Bin Du, Xueyuan Peng, Jianmei Feng  
Xi'an JiaoTong University, China, People's Republic of

**Keywords:** LNG, Boil-off gas compressor, Temperature field, Thermal stress, Suction coefficient

**ID:** 1289

**Research and Development of R290 Less Oil Rotary Compressor**

Bin Gao, Canyu Qian, Zhenhua Chen, Shuangjian Liang  
Guangdong Meizhi Compressor Co., Ltd., China

**Keywords:** Less oil rotary compressor, R290 (propane), refrigerant charge amount

**ID:** 1286

**Development of High Efficiency Swing Compressor for R32 Refrigerant**

Yuichi Yamamoto, Takehiro Kanayama, Kenichi Yuasa, Hideki Matsuura  
DAIKIN INDUSTRIES,LTD., Japan

**Keywords:** R32, R410A, Discharge temperature
C-18: Screw Compressors

Time: Wednesday, 16/Jul/2014: 3:30pm - 5:30pm • Location: 314
ID: 1409

The Selection Of Screw Rotor Geometry With Compressor Speed As A Design Variable
Matt Cambio, Gordy Powell
Ingersoll Rand, United States of America
Keywords: Screw, Rotor, Design, Speed

ID: 1476

Modelling and Experimental Investigation of Unsteady Behaviour of a Screw Compressor Plant
Ekatarina Chukanova, Nikola Stosic, Ahmed Kovacevic
City University London, United Kingdom
Keywords: Compressor plant, Unsteady behaviour, Dynamics, Experiment, Modelling

ID: 1353

Study of Multiphase Flow at the Suction of Screw Compressor
Mohammad Arjeneh, Ahmed Kovacevic, Manolis Gavaises, Sham Rane
City University London, United Kingdom
Keywords: multiphase flow, screw compressor, high speed visualisation, CFD

ID: 1335

Experimental Studies of The Multi-cylinders Compound Profile Meshing Pair
Rui Huang, Ting Li, Jian Li, Feilong Liu, Quanke Feng
Xi'an Jiaotong University, China, People's Republic of
Keywords: Single Screw Compressor, Meshing pair profile, Multi-cylinders compound profile, Prototype performance

ID: 1667

Non-contacting Seals in Screw Compressors
Michael Beinert, Jan Hauser
GHH RAND Schraubenkompressoren GmbH - Ingersoll Rand Industrial Technologies, Germany
Keywords: oil-free compressors, contactless seals, dry-running, screw compressors

ID: 1138

Experiment Study of a Water Injected Twin Screw Compressor for Mechanical Vapor Compression System
Jiubing Shen, Hao Tang, Zhen Zhang, Ziwen Xing
Xi'an Jiaotong University, China, People's Republic of
Keywords: water injected twin screw compressor, mechanical vapor compression, p-V diagram, efficiency, design guidances
C-19: Compressor Modeling V

Time: Wednesday, 16/Jul/2014: 3:30pm - 5:30pm • Location: 322

1. ID: 1702
   Global Sensitivity Analysis of a Multi-Cylinder Automotive Reciprocating Compressor
   Nasir Bilal
   Purdue University, United States of America
   Keywords: global sensitivity analysis, reciprocating compressor, gas pulsation, suction manifold,

2. ID: 1703
   Design Optimization of the Suction Manifold of a Reciprocating Compressor Using Sensitivity Analysis
   Nasir Bilal
   Purdue University, United States of America
   Keywords: gas pulsation, design optimization, reciprocating compressor, sensitivity analysis, suction manifold.

3. ID: 1424
   Investigation of Flow Losses Through Discharge Line of Household Type Refrigerator Compressors
   Ismail Yesilaydin¹, L. Berrin Erbay², Cemil Inan³
   ¹Arcelik A.S. Refrigerator & Compressor Plants, Turkey; ²Eskisehir Osmangazi University, Turkey
   Keywords: Reciprocating compressor, Thermodynamic losses, Pressure drop

4. ID: 1197
   New Version of the Universal Modeling for Centrifugal Compressor Gas Dynamic Design
   Kristina Soldatova¹, Galerkin Yuri², Drozdov Aleksandr³
   ¹Sankt-Peterburg State Polytechnical University, Russian Federation; ²Sankt-Peterburg State Polytechnical University, Russian Federation; ³Sankt-Peterburg State Polytechnical University, Russian Federation
   Keywords: compressor design, loss model, performance prediction, test data, model stages, flow rate coefficient, work coefficient

5. ID: 1211
   The Finite Element Analysis of the Deflection of the Crankshaft of Rotary Compressor
   Lingchao Kong, Liping Ren, Jia Xu, Yusheng Hu
   Gree Electric Appliances, Inc. of Zhuhai, China, People's Republic of
   Keywords: deflection, crankshaft, rotary compressor, finite element method, displacement sensor

6. ID: 1302
   Modeling of Rolling-Piston Compressors with Special Attention to the Suction and Discharge Processes
   Ricardo D. Brancher, Cesar J. Deschamps
   Federal University of Santa Catarina, Brazil
   Keywords: Rolling-piston compressor, effective flow and force areas, simulation model.
C-20: Efficiency Enhancements

Time: Thursday, 17/Jul/2014: 9:45am - 12:00pm • Location: 314

ID: 1219
On The Strategies Towards Isothermal Gas Compression And Expansion
Mahbod Heidari, Sylvain Lemofouet, Alfred Rufer
LEI, EPFL, Switzerland
Keywords: Isothermal, Heat transfer, Compressor, Expander, Energy Efficiency.

ID: 1168
Compressor Efficiency Improvement By Reducing Heat Transfer
Sophie Colmek
Tecumseh Europe, France
Keywords: improve, cooling capacity, heat transfer, Ashby, material

ID: 1469
Volumetric Efficiency Improvement by Overflow in Rolling Piston Compressor
Wen Wang, Gensheng Huang, Yilin Zhang
Shanghai Jiao Tong University, China, People's Republic of
Keywords: Rolling piston compressor, overflow, volumetric efficiency

ID: 1649
An Experimental Study of a Multi-port Vapor Injected Scroll Compressor
Yuanpei Song, Bin Yang, Eckhard A. Groll, James E. Braun, W. Travis Horton
Purdue University, West Lafayette, IN, US
Keywords: vapor injection, scroll compressor, experiments, multi-port

ID: 1346
Performance Improvement of a High Side Scroll Compressor by Thrust Surface Oil Groove
Hyun-Jin Kim¹, Yong-Hee Kim¹, Young-Sung Lee¹, Un-Seop Lee², Jeong-Bae Lee², Yang-Hee Cho²
¹Incheon National University, Korea, Republic of (South Korea); ²Compressor R&D Group, Comp. & Motor Team, Digital Appliances, Samsung Electronics Co. Ltd
Keywords: Scroll compressor, Thrust surface, Oil groove, EER improvement

ID: 1434
Development of Rotary Compressor for High-efficiency CO2 Heat-pump Hot-Water Supply System
Takeshi Chinen, Hisataka Kato, Masaya Ichihara, Hiroyuki Mizuno
Toshiba Carrier Corporation, Japan
Keywords: rotary compressor, CO2, energy efficiency, sound analysis, sound particle velocity

ID: 1262
Theoretical and Experimental Research on The Optimal Displacement Ratio of Rotary Two-Stage Inverter Compressor With Vapor Injection
Huifang Luo, Lingao Lu, Huijun Wei, Ouxiang Yang, Xumin Zhao
Gree Electric Appliances, Inc. of Zhuhai, China, People's Republic of
Keywords: the optimal displacement ratio, rotary two-stage inverter compressor, vapor injection
Experimental Analysis of the Fluid Structure Interaction in a Suction Valve Model
José Luiz Gasche, Danilo Martins Arantes, Thiago Andreotti
Unesp-Ilha Solteira
Keywords: Hermetic Compressor, Suction Valve, Fluid Structure Interaction, Reed Valve

Efficiency Improvement of Rotary Compressor by Improving the Discharge path through Simulation
Siva Rama Krishna Bolloju, Vamsi Tiruveedhula, Naveen Munnangi, Koteswara Rao Vaddadi, Pratap Reddy M
Tecumseh Products India Private Limited, India
Keywords: Rotary Compressor, Discharge Path, Efficiency Improvement

An Approach Towards Reed Valve Geometry Design
Sandeep Dhar, Bhaskar Tamma, Aditya Bhakta, Murali Krishna
GE Global Research Bangalore, India
Keywords: reed valves, finite element method, geometrical properties

Effective Flow And Force Areas Of Discharge Valve in A Rotary Compressor
Qin Tan, Zhan Liu, Junming Cheng, Quanke Feng
Xi'an Jiaotong University, China, People's Republic of
Keywords: Effective flow and force areas, Discharge valve, Rotary compressor

Dynamic Performance of Valve in Reciprocating Compressor Used Stepless Capacity Regulation System
Guangbin Liu, Yuanyang Zhao, Le Wang, Qichao Yang, Bin Tang, Liansheng Li
State key laboratory for compressor technology, Hefei General Machinery Research Institute, People's Republic of China
Keywords: Stepless; Capacity regulation; Dynamic

Selection of Flapper Valve Steel for High Efficient Compressor
Mathias Hareland1, Anders Hoe1, Stefan Jonsson2, David Liang2, Guocai Chai1,3
Keywords: Flapper valve steel, Compressor, High efficiency, Fatigue, damping capacity
C-22: Testing & Evaluation

Time: Thursday, 17/Jul/2014: 1:00pm - 3:00pm • Location: 314

ID: 1549

Modeling of a Hot Gas Bypass Test Block for Centrifugal Compressors

Paul D. Gessler, Margaret M. Mathison, Anthony J. Bowman

Marquette University, United States of America

Keywords: Modeling, Hot Gas Bypass, Centrifugal Compressor, Load Stand

ID: 1539

Design of a Compressor Load Stand Capable of Supplying Two-Phase Refrigerant at Two Intermediate Pressures

Rui Gu, Margaret M. Mathison

Marquette University, United States of America

Keywords: Positive displacement compressor, load stand, refrigerant injection

ID: 1650

Assessing the Quality of Experimental Data with Gaussian Processes: Example with an Injection Scroll Compressor

Sylvain Quoilin1, Jessica Schrouff2

1 Energy Systems Research Unit B49, University of Liège, Campus du Sart Tilmans, B-4000 Liège, Belgique; 2 Cyclotron Research Centre B30, University of Liège, Campus du Sart Tilmans B-4000 Liège, Belgique

Keywords: injection compressor; scroll; machine learning; Gaussian Processes; experimental

ID: 1130

Study on Gravity Independence of Compressor Performance for Space-borne Vapor Compression Heat Pump

Xia Chen, Yuting Wu, Gang Liu, Rui Ma, Chongfang Ma

Key Laboratory of Enhanced Heat Transfer and Energy Conservation, Ministry of Education of China, Key Laboratory of Heat Transfer and Energy Conversion, Beijing Municipality, Beijing University of Technology, Beijing 100124, China

Keywords: gravity independence, compressor, space-borne, heat pump, performance

ID: 1290

Performance Measurement of Revolving Vane Compressor

Kok Ming Tan1, Wei Chong Choo1, Michael Chee1, Ken Law1, Ismall Iswan1, Kim Tiow Ooi2

1 SANDEN INTERNATIONAL SINGAPORE PTE LTD, SINGAPORE; 2 NANYANG TECHNOLOGICAL UNIVERSITY, SINGAPORE

Keywords: rotary, novel, experiment, performance, design

ID: 1376

Experimental Analysis of Refrigerant Flow in Small Clearances

Ernane Silva, Marcos Rojas-Cárdenas, Cesar J. Deschamps

POLO/UFSC, Brazil

Keywords: microchannel, leakage, clearance
C-23: Valves II
Time: Thursday, 17/Jul/2014: 1:00pm - 3:00pm • Location: 206
ID: 1315
A Comparative Study Of Different Numerical Models For Flapper Valve Motion
Joerg Mayer, Preben Bjerre, Fabian Brune
Secop GmbH, Germany
Keywords: valve movement, fluid structure interaction

ID: 1426
Numerical Simulation on the Opening Delay of a Discharge Reed Valve in Compressors
Fumitaka Yoshizumi¹, Yasuhiro Kondoh¹, Takahiro Moroi², Shinji Tamano³, Yohei Morinishi³
¹Toyota Central R&D Labs., Inc.; ²Toyota Industries Co.; ³Nagoya Institute of Technology
Keywords: Valve, Coupling Problem, Elastic Deformation, Oil Film, Cavitation

ID: 1464
Prediction of Refrigerant Leakage for Discharge Valve System in A Rolling Piston Rotary Compressor
Byung Chae Min, Ki Youl Noh, Jang Sik Yang, Gyun Min Choi, Duck Jool Kim
Pusan National University, Korea, Republic of (South Korea)
Keywords: Rolling Piston Rotary Compressor, Discharge Valve, Flow Coefficient, Energy Efficiency Ratio

ID: 1324
Correlation Between the Fluid Structure Interaction Method and Experimental Analysis of Bending Stress of a Variable Capacity Compressor Suction Valve
Julio Cesar Silva¹, Eduardo Arceno²
¹Embraco - Research and Development, Brazil; ²Embraco - Research and Development, Brazil
Keywords: Valve, Fluid, Structure, interaction, Stress