

Welcome in Slovakia Virtual 10th IIR conference 2021

Few words about the history and the conference on compressors background

Peter Tomlein
Conference secretary

1

Welcome on virtual 10th IIR conference on Compressors and Refrigerants Moved from September 2020 to January 2021

- Why virtually?
 - Covid has changed our way of life.
 - Safety is the priority.
 - To meet person in person becomes nearly impossible
 - But we want to go on.
 - Conference is now online!
 - Plenary session
 - Follows 4 parallel morning and 4 afternoon sessions
 - You can follow 44 presentations in 8 sessions and 2 invited papers
 - Conference will be recorded, and each presentation could be followed later
- Virtual lobby choice of sessions, choice of presentations, possibility to give questions, which will be answered after presentations
- During the lunch time you can attend meeting of commissions B1, B2, E1, E2 which will be moderated by Didier Coulomb, director of IIR
- Invited papers during lunch time are on hydrogen applications development and economy versus climate changes
- Conference conclusion will start at 15:00.
- Commemorative medal on scientist Aurel Stodola will be submitted
- Conference results and future will be discussed
- Proceedings you can buy on our website

2

Welcome on virtual 10th IIR conference on Compressors and Refrigerants Moved from September 2020 to January 2021

Preliminary Programme

13.1.2021

09:00 - 09:55 Plenary Session (Chaired by Peter Tomlein, Didier Coulomb)

10:00 - 11:30 Field measurements (Chaired by Armin Hafner, Alex Cole Pascher)

11:30 - 12:00 Meeting of IIR commissions B1, B2, E1, E2 (Chaired by Didier Coulomb, 12:00 - 13:00)

13:00 - 14:00 Invited paper on developments with hydrogen

14:00 - 15:00 Invited paper on economy versus climate changes

15:00 - 16:00 Closing of the conference (Chaired by Dariusz Butrymowicz, Didier Coulomb, Peter Tomlein, 15:00 - 15:30)

- 4 parallel morning and 4 afternoon sessions
- You can follow 44 presentations in 8 sessions
- 2 invited papers and IIR commissions meeting
- Recorded presentation could be followed later

3

Welcome on virtual IIR conference on Compressors and Refrigerants Moved from September 2020 to January 2021

During lunch time you can visit

- Meeting of IIR commissions B1, B2, E1, E2
- Invited paper on developments with hydrogen
- Invited paper on economy versus climate changes

Plenary papers

We believe that offered activities will support our effort for efficient solutions.

Enjoy the conference and see at the end, when we announce 6 papers recommended for publishing in IJR

4

- Slovakia started compressor's production in the years 1949 – 1954 (Maneta, Calex)
- Slovakia is one of the **biggest compressors producers** per capita all over the world
 - 2006 we produced **1.1 compressor** per capita
 - 2019 we have produced nearly **2 compressors** per capita
- Slovakia have one of the highest production of **cars and compressors** per capita in the world
- Factories Maneta, Calex, Samsung, Danfoss, **Secop, Embraco**

5

World compressors statistics Total number of compressors 350 million in the year 2016 JARN 03/2017

World compressor market in 2016

The refrigeration and air conditioning compressors market is expected to grow at a CAGR of ~3% over the forecast period of 2019-2029. Increasing demand for rotary vane compressors is driving the sales of refrigeration and air conditioning compressors.

With rising processed and frozen food consumption globally, the refrigeration compressor market is expected to grow at a fast pace. Many companies are focusing on cost reduction in the manufacturing of refrigeration compressors. In the last few years, retail stores across the globe are flourishing at a rapid rate

6

History and the background of Conference Compressors in Slovakia

- 1995 **High Tatras**, Calex Zlaté Moravce
- 1997 **Low Tatras**, Calex Zlaté Moravce
- **1999** **High Tatras**, Embraco Slovakia Spišská N/V and Calex
- 2001 **Smolenice**, Embraco Slovakia Spišská Nová Ves
- **2004** **Papiernička**
Embraco Slovakia SNV and Danfoss Compressors ZM
- 2006 **Papiernička, Red Stone, Smolenice**
Embraco Slovakia SNV and Danfoss Compressors ZM
- 2009 **Papiernička, Red Stone, Smolenice**
Embraco Slovakia SNV and Danfoss Compressors ZM
- **2013** **Papiernička, Red Stone, Smolenice**
Embraco Slovakia SNV and SECOP Compressors ZM
- **2017** **Šamorin - Bratislava**
Embraco Slovakia SNV and SECOP Compressors
- **2021** **Virtual conference**
Embraco Slovakia SNV and SECOP Compressors

7

Conference presidents



Marián Blaha
FOUNDER and PRESIDENT

- Of the Conferences in the years 1995, 1997, 1999



Václav Havelský
PRESIDENT

- Of the Conferences in the years 2001, 2004, 2006, 2009, 2013, 2017




Dáriusz Butrymovicz
PRESIDENT

- Of the Conference in the year 2021,

8

The background of the conference

Compressors production in Slovakia
Calex Zlaté Moravce



- **Calex a.s. has been manufacturing their own low-velocity hermetic compressors since 1954.**
- In 1968 a new generation of bipolar compressors developed at the Calex plant were produced, placing the company among the first European companies in such manufacture. The end of the 1970s saw an attempt to develop a home variation of shaft compressors.
- In the year 1992 a compressor license was purchased from Samsung Electronics, which allowed production of five types of compressors with a cooling performance from 70 up to 162 W.

9

Compressors production since 1998

– Embraco Slovakia SNV



- **EMBRACO began construction of a factory in 1998 in Spišská Nová Ves. The factory was inaugurated in the year 1999.**
- Embraco Slovakia has annual production capacity 4,3 mil compressors.
- In addition to compressors, it also produces condensing units.
- Embraco Slovakia was visited by the 230 participants of the conference about Compressors in 1999.

10

Embraco Slovakia (Spišská Nová Ves)



December 5th 1997 Embraco establishment
March 1998 production starts up


2.451 employees
4 production lines
8 labs
4,7 mil. compressors/year
5,5 mil. units annual production capacity

- Production committed to **household & commercial applications**
- Tens of millions compressors produced
- One of the biggest production companies and exporter in Slovakia
- Participant of OSN's **Global Compact** initiative

11

Danfoss Compressors, Danfoss Thermostats

Zlaté Moravce, Slovakia since 2001



- **2001** Danfoss factory established
- **2002** Production of compressor components
- **2005** Production of hermetic compressors
Capacity: 800000/year
- **2005** Production of thermostats started
- **2006** Production of hermetic compressors
Capacity: 2,1 mil./year
- **2007** Production of hermetic compressors
Capacity: 4 mil./year
- **2008** Production of hermetic compressors
Capacity: 5,1 mil./year

12

SECOP Compressors Zlaté Moravce

Mobile Household Light Commercial

Low Cooling capacity High

BD micro PL/BD T XV D N F S G

- 2010 Danfoss compressors Zlaté Moravce acquired by **AURELIUS AG** and change of name to **SECOP**
- 2013 New **X-Series**, opening a new chapter in refrigeration history

13

First Conference Compressors 1995

- President Marián Blaha
- 170 participants from 13 countries
- Linguistic Babylon
- Main speaker Adalbert Stenzel
- Visit of the compressors factory Calex

14

Compressors 1997

- President Marián Blaha
- 190 participants from 15 countries
- Main speakers Kaiser, Kovács, Petrák, Pfeil, Stenzel, Schnotale, Synek, Usov, Vozny, Wurm,
- Visit of the compressors factory Calex

15

Compressors 1999

- President Marián Blaha
- 230 participants from 17 countries
- Main speakers Dagilis, Haložan, Jurgensen, Kaiser, Lampugnani, Lavrenčenko, Milošajev, Morozov, Pfeil, Usov, Vozny, Wurm, Zgliczynsky.....
- Visit of the compressors factory Embraco Slovakia

16

Compressors 2001

co sponsored by IIR

- President Václav Havelský
- 199 participants from 17 countries
- Main speakers Billiard, Deschamps, Haložan, Havelský, Engelhardt Kakalejčík, Neksa, Ota, Pfeil, Silveira, Tronto, Tominaga, Usov, Vozny, Wurm, Zgliczynsky.....
- Visit of the compressors factory Embraco Slovakia

17

Compressors 2004

Fifth Compressor's Conference
For the first time sponsored by IIR

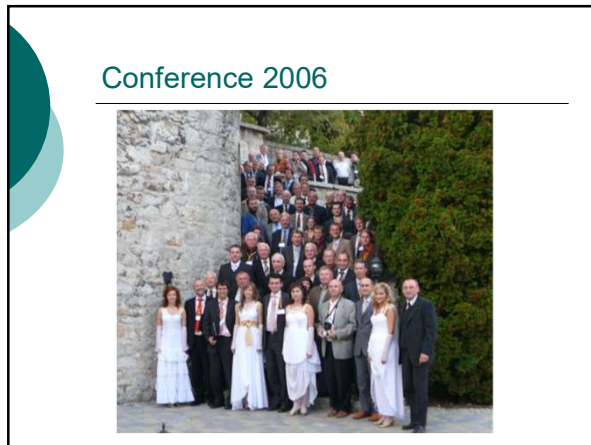
18



19



20



21



22



23



24

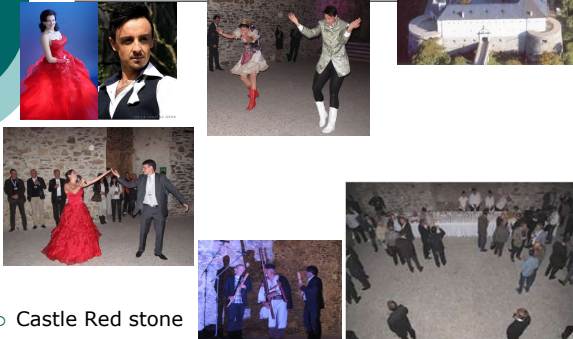
COMPRESSORS
Papiernička – Smolenice 2.-4.9. 2013



8. International Conference
on Compressors and Coolants

25

Opera, operetta,
musical



o Castle Red stone

26

Photo and
glass of wine



27

Firework, laser show, dancing with
majorets and back to Papiernička



28

Conference souvenirs
Drumbla, music pipe and bel
Medicines Borovička, Slivovica, ..



Task for you:

- o Simulation of compressor with:
 - Drumbla as compressor valve
 - Music pipe to simulate compressor's discharge
 - Bels will emit noise after switching compressor off

29

Relax
in Papiernička



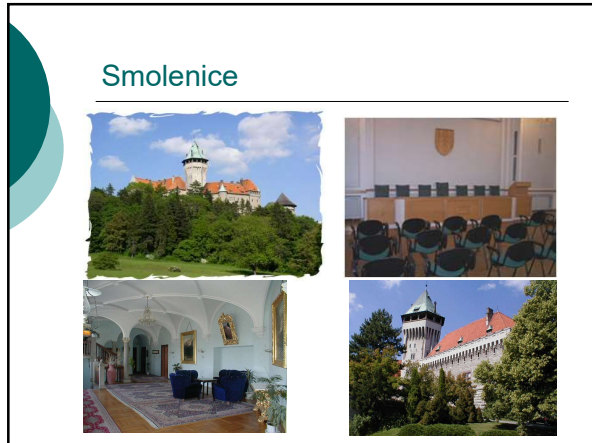
30



31



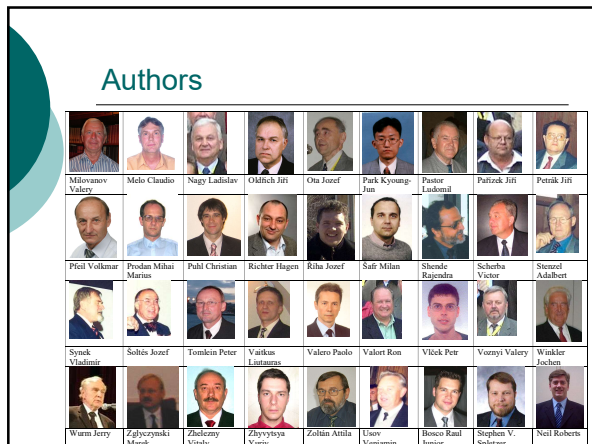
32



33



34



35



36



37



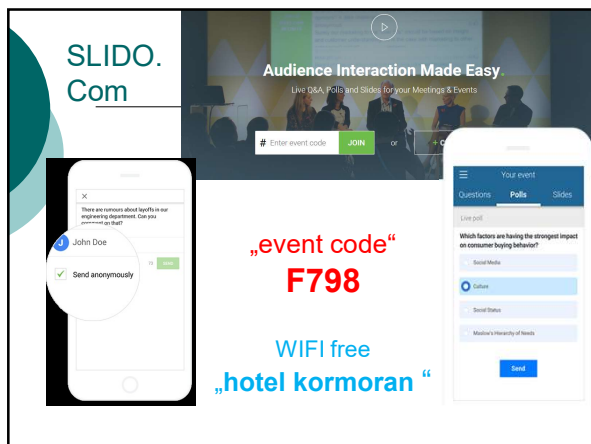
38



39



40



41



42

Thanks to the authors

Authors with five or more papers:

Authors with ten or more papers:

- o **Dariusz Butrymowicz**
- o **Cesar Deschamps**

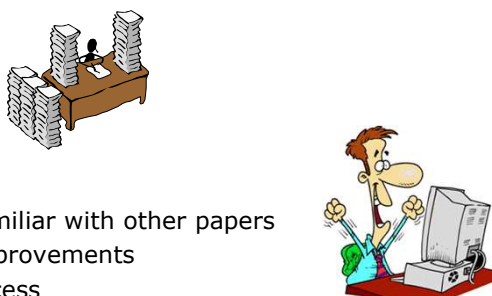
Authors with three or more papers:

- o Hermann Halozan
- o Harald Kaiser
- o Michael Khmelnyuk
- o Marian Blaha
- o Klas Berglöf
- o Vytautas Dagilis
- o Anton Lebar
- o Valery Milovanov
- o Marek Zgliczynsky
- o Zdeněk Čejka
- o Jozef Sedliak
- o Václav Havelský
- o Volkmar Pfeil
- o Peter Tomlein
- o Veniamin Usov
- o Valery Vozny
- o Jaroslav Wurm
- o Vitaly Zhelezny
- o Volodymyr Zhyvtytsya
- o and others

Thanks to all of you for your solidarity and support

43

New system of review process



- o Familiar with other papers
- o Improvements
- o Access

44


Thanks to Reviewers

- o 135 reviews
- o Review process in preliminary sessions
- o Great help to improve our contributions
- o Nice possibility to be familiar with other papers

1. **Václav Havelský, Prof**
2. **Hermann Halozan, Prof**
3. **Dariusz Butrymowicz, Prof.**

45

USB and book of abstracts



Peter Tomlein

IIR Compressors Conf... Compressors Conference

6 - 8 September 2017
Hotel Kormoran, Samorin – Bratislava

www.szchkt.org

46

Timetable

Timetable of the 9. Conference about Compressors and Refrigerants 6-8.9. 2017 in Samorin

Compressors 2017

Date	06.30	08.20	12.00	12.00	14.00	17.00	19.30
6.9. Tues. day	Exhibition installation	Registration and accommodation	Lunch, accommodation	Registration Lunch and Coffee	Opening Ceremony 15.00	Technical visit of Hippodrom Photo 19.00	Welcoming glass of wine with illustration
7.9. Tues. day	6:30-8:00 Swimming Sauna	Session Rotary Compressors (golden seal)	Lunch Business meeting of IIR section B and E	Session Compressors I and II (golden seal)	Plenary I lectures (conference hall)	Ship to the Bratislava gallery Photo 18:30	Social and cultural programme at the Bratislava Castle Lane show 19.00-21.45 Back to Samorin
8.9. Fri. day	6:30-8:00 Swimming Breakfast	Session Compressors and technologies (golden seal)	Closing of the conference 11.00	Session Technologies (conference hall)	Session Technologies (conference hall)		
8.9. Fri. day	6:30-8:00 Swimming Breakfast	Session Low GWP Refrigerants (conference hall)	Lunch 12.00-14.00				

47



www.szchkt.org

48

SLOVAK TECHNICAL UNIVERSITY ORIGIN AND HISTORY

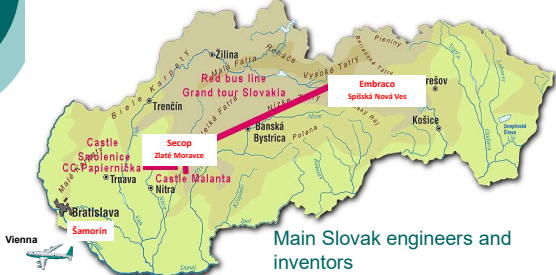


- **1762 Mining And Forestry Academy**
 - Empress of Austro-Hungarian Monarchy Maria Theresa Founded First Technical Higher Education Institution in the World in Banská Štiavnica
- **1939 Slovak University of Technology, Bratislava**
 - Branch of Construction Engineering, of Specialized Sciences, of Forestry And Agricultural Engineering, of Chemical Engineering, of Mechanical and Electrical Engineering

49

SLOVAKIA

compressors production
compressors designing



Main Slovak engineers and inventors
Aurel Stodola – steam turbines and HPs
Marián Blaha – hermetic compressors

50

Looking forward meeting you on
IIR conference Compressors 2023



51