

Introduction of Research group of Energy machinery in Korea

“(Carbon Neutrality Energy Machinery : Heat pump and industrial technology)”

11st March 2024



한국냉동공조인증센터
KOREA REFRIGERATION & AIR-CONDITIONING ASSESSMENT CENTER



한국산업기술기획평가원
Korea Planning & Evaluation Institute of Industrial Technology



KOREA INSTITUTE OF
MACHINERY & MATERIALS

0. Thanks remark

- On the behalf of Korea research group, I and we are very appreciated your OST(ISE, WPZ) welcome
 - Especially I give a lot of thank for Professor Stefan Bertsch.
also, I knew Dr. Cordin give so much effort this meeting. Really
Thank him very much.
- Brief introduction : Jeongsik Seo (KRAAC), 5 min
- Introduction for KEIT : Hyojun Park (KEIT), 15 min

0. Outline

- **Objective**

- Trends on researches for Heat pump and industrial technology for carbon neutrality in Europe
- Enhancements on global cooperation network
 - * Inform KEIT demand research

- **Outline of Research group (KEIT)**

- Task Force for planning R&D Project and supporting KEIT
- Experts for four Energy part (KRAAC, KIMM, KAITEC)
(Cryogenic system, Cold chain, Heat pump, Fluid machinery)

1. Introduction of Participants

● Participants

(Korea team)

Guenseok Park^(PD), Hyojun Park, Jeonghwan Yun (KEIT*)

*Korea Planning and Evaluation Institute of Industrial Technology

Sanghyuk Lee, Byungchang Jung (KIMM)**

**Korea Institute of Machinery and Materials

Jeongsik Seo^(Chair of Energy Machinery), Minjun Kim (KRAAC*)**

***Korea Refrigeration and Air-conditioning Assessment Center



KEIT is a government funding agency (www.keit.re.kr) under the Ministry of Trade, Industry and Energy(MOTIE).

Mission

Industrial competitiveness through supporting technological development

→ Innovative R&D performance

Vision

A global leader in R&D support to enrich the future of mankind

→ Globally renowned R&D funding agency

Goal

- Objective & rigorous evaluation process
- Efficient R&D management for sustainable development

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Non-Profitable, Test laboratories (Ansan, Residential HVAC, Hwaseong: Commercial HVAC, Renewable energy, Geothermal, water source), www.kraac.or.kr

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Since 2006, Testing laboratory and Standardization (KOLAS,)ILAC, ISO 17025 Supported by MOTIE (Korea government)

150+

Test items and standards for HVAC (Heat pump (Geothermal, Water source) , AC, RAC, CAC, VRF, ERV, AHU, Show case, Refrigerator and so on.)

70 % +

Specialist and Experts for testing and standard of HVAC product

Test Items	Standard
Water-water Geothermal HP	MOTIE Renewable (Korea Energy Agency) KSB8292~8294 and so on
Water-Air Geothermal HP	
Water-Air Multi Geothermal HP	
Ground heat exchanger (Vertical type)	
Ground heat exchanger (SCW type)	
Ground heat exchanger (Energy Pile type)	

Test Items	Relevant grounds
W-W HP (see water, water source)	(Korea Rural Community Corporation)
Air+W –W Hybrid HP	
Air – Air HP	
Air – water Hp	

Test Items	Regulation
screw refrigerator	Ministry of Trade, Industry and Energy "Regulations on Promotion of the Supply of High-Efficiency Energy Equipment" (Korea Energy Agency)
absorption chiller	
medium-temperature water absorption	Ministry of Trade, Industry and Energy notice 'Efficiency management equipment operation regulations' (Korea Energy Agency)
Centrifugal Chiller	
late-night electricity utilization thermal energy storage system	

VISION

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<p>Research Institute of Autonomous Manufacturing</p> <ul style="list-style-type: none"> • Semiconductor Manufacturing Research Center • Department of Ultra-precision Machines & Systems • Department of Laser & Electron Beam Technologies • Department of 3D Printing 	<p>Research Institute of AI Robotics</p> <ul style="list-style-type: none"> • Advanced Robotics Research Center • Department of AI Machinery • Department of Bionic Machinery • Daegu Research Center for Medical Devices & Robotics 	<p>Eco-friendly Energy & Environment Research Division</p> <ul style="list-style-type: none"> • Department of Urban Environment Research • Department of Carbon-free Power Generation • Department of Resources Recirculation Research • Department of Eco-friendly Mobility Power 	<p>Busan Machinery Research Center</p> <ul style="list-style-type: none"> • Department of Industrial Laser Technology • Department of Automotive Parts • Department of Nuclear Equipment Qualification & Safety
<p>Research Institute of Carbon-neutral Energy Machinery</p> <ul style="list-style-type: none"> • Liquid Hydrogen Technology Research Center • Heat Pump Research Center • Department of Energy Storage Systems • LNG & Cryogenic Technology Center 	<p>Nano-convergence Manufacturing Research Division</p> <ul style="list-style-type: none"> • Nano-lithography & Manufacturing Research Center • Department of Nano-devices & displays • Department of Advanced Battery Manufacturing Systems 	<p>Virtual Engineering Platform Research Division</p> <ul style="list-style-type: none"> • Virtual Engineering Research Center • Department of Industrial Machinery DX • Department of Reliability 	<p>Daegu Research Center for Medical Devices & Robotics</p> <ul style="list-style-type: none"> • Department of Medical Devices • Department of Medical Robotics

Detail of Participants



Name : Geun-Seok, Park(KEIT)

Title: Ph. D, Program Director, Department of Machinery, Robotics & Equipment

Organization : (KEIT) Korea Planning and Evaluation Institute of Industrial Technology

● Research interest

- ✓ Planning new program(project) about construction/agricultural machine, HVAC, etc
- ✓ Establishment of Roadmap for Advanced Machinery
- ✓ Establishment of Government Policy in Advanced Machinery

● Key areas of promotion

- ✓ Discovering international cooperation tasks and establishing international cooperation networks
- ✓ A Study on the Latest Technological Trends in Construction Machinery, Agricultural Machinery, and Energy Machinery
- ✓ Finding and fostering small and medium-sized enterprises in Korea's high-tech machinery sector

Detail of Participants



Name : JeongHwan Yun(KEIT)

Title: Legal Affairs and Project Accounting Team

Organization: (KEIT) Korea Planning & Evaluation Institute of Industrial Technology

● Research interest

- ✓ Improvement of plastic processing process(i.e Metal extrusion, Fine blanking, forging, etc)
- ✓ Metal cutting process and machine manufacturing
- ✓ Metal forming process computer simulation(Metal flow & Temperature & Friction analysis)
- ✓ Interpretation, enactment and revision of R&D laws and regulations

● Research experience

- ✓ Green manufacturing process for helical pinion gear using cold extrusion process
- ✓ Environmental impact of helical pinion gear manufacturing using extrusion process
- ✓ Improving the manufacturing process of automotive instrument plates by computer simulation of shearing process
- ✓ Prediction of the life cycle of a die(Metal forming)

Detail of Participants



Name : Jeongsik Seo (KRAAC)

Title: Ph. D, Vice president, Head of Carbon Neutrality Energy Machinery

Organization : (KRAAC) Korea Refrigeration and Air-conditioning Assessment Center

* Chair of Energy machinery

● Proceeding Researches

- ✓ Research planning for Carbon Neutrality Energy Machinery (industrial heat pump, MVR, temperature lift heat pump and so on)
- ✓ Standardization of HVAC products (i.e Heat pump, refrigerator, chiller, ERV, etc)
- ✓ Measurement and verification for water source heat pump for renewable energy legislation
- ✓ ISO activities (I.E, Air source heat pump standard, ISO 19967-2)
- ✓ Legislation for heat pump, Gas HP, MVR and so on

● Research interests

- ✓ International network for testing laboratories and certification bodies
- ✓ Energy labels and renewable energy regulation and certification program and items
- ✓ Measurement and Verification for Building and plant (Zero energy building, application of heat pump in a plant, cold chain system etc.)

Detail of Participants



Name : MinJun Kim (KRAAC)

Title: Ph. D, Chief Researcher, Carbon Neutrality Machinery team

Organization : (KRAAC) Korea Refrigeration and Air-conditioning Assessment Center

● Proceeding Researches

- ✓ Standardization of HVAC products (i.e Heat pump, refrigerator, chiller, ERV, etc)
- ✓ Geothermal & Water source heat pump System for Renewable Energy regulation in Korea.
- ✓ High Temperature heat pump unit of alternative of industrial boilers

● Research interests

- ✓ Cooling & Heating System using TES(Thermal Energy Storage)
- ✓ Geothermal Heat Pump System & Ground Heat Exchange(Vertical close-loop, SCW(Standing Column Well))
- ✓ Cooling & Heating System Process Design for Building and plant (Zero energy building, application of heat pump in a plant, cold chain system etc)

Detail of Participants



Name : Sang Hyuk Lee (KIMM)

Title: Ph.D, Senior Researcher, Team Leader

Organization : Rotating Machinery Research Team, Virtual Engineering Research Center, KIMM

● Research interest

- ✓ Computational Fluid Dynamics (CFD) & Fluid-Structure Interaction (FSI) Analysis on Fluid-Thermal Systems
- ✓ Digital Twin for Fluid-Solid Interaction in Mechanical Systems
- ✓ Prognostics and Health Management of High-Speed Rotating Machinery
- ✓ Evaluation of Fluid-Induced Vibration (FIV) in Plant Equipment and Piping Systems

Detail of Participants



Name : Byungchang Jung (KIMM)

Title: Ph.D, Principal Researcher, Team Leader

Organization : Vibration & Shock Research Team, Virtual Engineering Research Center, KIMM

● Research interest

- ✓ Prognostics and Health Management of Mechanical Systems
- ✓ Vibration and Shock Analysis, Test and Evaluation of Mechanical Systems
- ✓ Development of Smart Valve for Autonomous Rupture Detection&Isolation in a Pipeline System
- ✓ Development of Vibration-based Energy Harvesting Device for a Wireless Sensor

**Thank you,
Merci, Grazie,
Vielen Dank.
Danke schön
감사합니다.**
