



Asia-Pacific
Measurement Forum
on Mechanical Quantities



16th APMF 2026

Program Book

October
20-23 (Tue-Fri),
2026

Hidden Cliff Hotel & Nature,
Jeju, Korea

Organized by

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Korea Research Institute of
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16th **APMF**
2026 Asia-Pacific
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on Mechanical Quantities

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16th **APMF**
2026 Asia-Pacific
Measurement Forum
on Mechanical Quantities

01 Welcome Message

Dear colleagues,

As a Chair of the National Organizing Committee (NOC), I am pleased to cordially invite you to the Asia-Pacific Measurement Forum on Mechanical Quantities (APMF), which will be held in Jeju, Korea in 2026.

As you are well aware of the APMF has a rich history that began in 1992 as a bilateral symposium between China and Japan (ISMFM). Since then, it has grown significantly, evolving into one of the most important international symposia in the world. Over the past three decades, APMF has become a vital platform for harmonizing measurement techniques with the daily requirements of people in the Asia-Pacific region.

Following the 15th symposium held online in 2023, APMF marks our 16th gathering. We are especially excited to return to Jeju, a location that previously hosted the symposium in 2005. More than just a technical conference, APMF has been a cherished venue where many of us have built lasting friendships and professional bonds for over a decade. We look forward to this symposium being a meaningful opportunity for longtime colleagues to reunite, share their journeys, and further strengthen the close-knit community of experts that defines the APMF.

In addition to the rigorous academic program, Jeju Island—a world-renowned natural heritage site—will offer participants a unique blend of breathtaking scenery and warm hospitality. I am confident that APMF in Jeju will be an event to be of benefit to all the participants academically, physically, and mentally.

I look forward to seeing you all again in the beautiful island of Jeju in 2026.
Sincerely,

Dr. Dongmin Kim

Chairman of APMF2026

02 Program at a Glance

Day	Time	Session Room 1 (Symphony hall, 1st floor)	Session Room 2 (Harmony hall, 2nd floor)
20, Oct (Tuesday)	14:00 – 18:00	Registration	
21, Oct (Wednesday)	08:30 – 09:10	Registration	
	09:10 – 09:40	Opening Ceremony	
	09:40 – 10:10	Plenary 1 : Dr. Atsuhiro Nishino, NMIJ Chair: Dr. Dongmin Kim, KRISS	
	10:10 – 10:40	Coffee break	
	10:40 – 12:00	S-1. Mass I	S-2. Force & Torque I
	12:00 – 13:20	Lunch and Coffee (Panorama, 2nd Floor)	
	13:20 – 14:00	Plenary 2 : Dr. Dae-Im Kang, President of UST Chair: Dr. In-Mook Choi, KRISS	
	14:00 – 14:20	Group Photo	
	14:20 – 14:50	Coffee break	
	14:50 – 16:10	S-3. Mass II	S-4. Pressure & Vacuum I
	16:10 – 16:30	Short break	
	16:30 – 17:50	S-5. Force & Torque II	S-6. Pressure & Vacuum II
	17:50 – 18:30	Break & Moving	
	18:30 – 20:30	Welcome Reception (South Bounder, Pub(*walk 5 min))	
22, Oct (Thursday)	09:00 – 09:30	Plenary 3 : Dr. Jian Wang, NIM Chair: Dr. Koji Ogushi, NMIJ	
	09:30 – 10:50	S-7. Pressure & Vacuum III	S-8. Mass III
	10:50 – 11:20	Coffee break	
	11:20 – 12:40	S-9. Force & Torque III	S-10. Acoustic Metrology
	12:40 – 14:00	Lunch and Coffee (Panorama, 2nd Floor)	
	14:00 – 15:00	S-11. Applications	S-12. Force & Torque IV
	15:00 – 16:10	Poster Session with Coffee Break	
	16:10 – 17:40	Break during banquet setup	
	17:40 – 18:10	Closing Ceremony	
	18:10 – 20:10	Banquet	
23, Oct (Friday)	09:00 – 15:00	Technical Tour	

03 Committee

International Program Committee

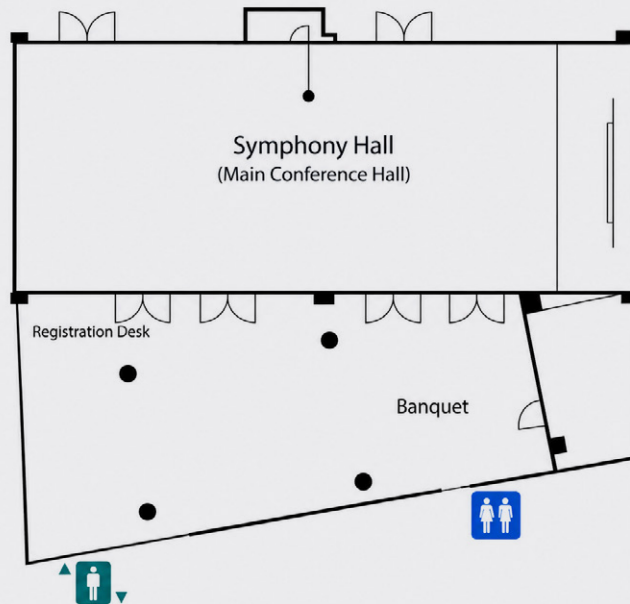
- Tokihiko Kobata (NMIJ)
- Sheng Jui Chen (CMS/ITRI)
- Kitty Fen (NMIA)
- Koji Ogushi (NMIJ)
- Yon Kyu Park (KRISS)
- Wirun Laopornpichayanuwat (NIMT)
- Jian Wang (NIM)
- Takanori Yamazaki (Tokyo Denki Univ.)

National organization Committee

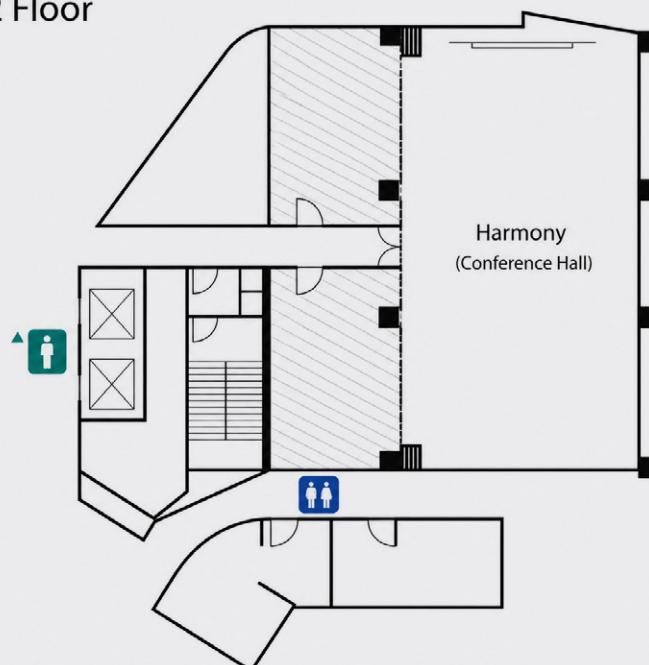
- **Organizing Chair**
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Jong Ho Kim (KRISS)
Jin Wan Chung (Korea Instruments Co. Ltd)
Jeong Tae Lee (DAEKYUNG Tech & Testers)

04 Maps

1 Floor



2 Floor



05 Program

21 October (Wednesday)

Plenary 1

Chair: Dongmin Kim (KRISS)

Symphony hall, 1st floor

PL1 09:40 – 10:10 **Torque Metrology: From Deadweights toward Electromagnetic Realization**

Atsuhiko NISHINO¹

¹National Metrology Institute of Japan (NMIJ), AIST, Japan

Session 1. Mass I

Chair : Jian Wang (NIM)

Symphony hall, 1st floor

S01 10:40 – 11:00 **The research on a tabletop joule balance**

Zhengkun Li¹, Yang Bai¹, Yue Wang¹, and Zhonghua Zhang¹

¹National Institute of Metrology (NIM), China

S02 11:00 - 11:20 **Development of KRISS Kibble Balance II**

MyeongHyeon Kim¹, Dongmin Kim¹, Minky Seo¹, Sungwan Cho¹, Kyung-Taek Yoon¹, and Kwang-Cheol Lee¹

¹Korea Research Institute of Standards and Science (KRISS), Republic of Korea

S03 11:20 - 11:40 **Multi-loop control method of electromagnetic force for weighing module**

Pengpeng Sun¹, Jian Wang¹, Junjie Chen², Ruilin Zhong¹

¹National Institute of Metrology (NIM), China; ²China Jiliang University, China

S04 11:40 - 12:00 **Recent Progress in Developing a SQUID-based Superconducting Gravimeter at KRISS**

Gracia Kim¹, In-Mook Choi¹

¹Korea Research Institute of Standards and Science (KRISS), Republic of Korea

Session 2. Force & Torque I

Chair: Akira Hasegawa (NMIJ)

Harmony hall, 2nd floor

H01	10:40 - 11:00	Design of a Calibration System and Procedure for the Test Force, the Displacement Measuring Device, and the Test Cycle of a Nanoindentation Instrument Patchayapron Doungkom ¹ , Prapavit Suwannimit ¹ , Rattasit Suato ¹ , Rugkanawan Wongpithayadisai ¹ , Antharika Chewwisate ¹ and Nitiwat Sasom ¹ ¹ National Institute of Metrology (Thailand) (NIMT), Thailand
H02	11:00 - 11:20	Research of Multi-Component Force and torque Calibration Based on Hexapod-Structured Platform Kai Zhang ¹ , Nan Li ¹ , Yi Wei ¹ and Wei Zhang ¹ ¹ National Institute of Metrology (NIM), China
H03	11:20 - 11:40	Development of a High-Precision Six-Axis Force/Torque Sensor Using Electromagnetic Force Compensation Jungchan Na ¹ , Kyung-Taek Yoon ² , and Young-Man Choi ¹ ¹ Ajou University, Republic of Korea; ² Korea Research Institute of Standards and Science (KRISS), Republic of Korea
H04	11:40 - 12:00	Development of a Loading Platform Leveling System in Consideration of Robustness to Various Load Conditions Kodai Kayaba ¹ , Yoshiyuki Noda ¹ , Yukinori Sagoh ² and Kiyooki Kakiyama ³ ¹ University of Yamanashi, Japan; ² Toyota College, Japan; ³ KER Co., Ltd., Japan

Plenary 2

Chair: In-Mook Choi (KRISS)

Symphony hall, 1st floor

- PL2** 13:20 - 14:00 **APMF: 34 Years of Progress and a Vision for the Future**
 Dae-Im Kang¹
¹University of Science and Technology (UST), Republic of Korea

Session 3. Mass II

Chair: Myeonghyeon Kim (KRISS)

Symphony hall, 1st floor

- S05** 14:50 - 15:10 **Research on Diameter Measurement of Standard Silicon Spheres Based on Solid Density Primary Standard Device**
 Xu Chang¹, Jintao Wang¹, Xiang Liu¹, Lin Tong¹, Ligong Guo¹, and Jingyue Zhang¹
¹National Institute of Metrology (NIM), China
-
- S06** 15:10 - 15:30 **Democratizing Full Bayesian Uncertainty: A Multi-Agent AI Assistant for Mechanical Metrology**
 Seungnam Park^{1,2}
¹Korea Research Institute of Standards and Science (KRISS), Republic of Korea;
²University of Science and Technology (UST), Republic of Korea
-
- S07** 15:30 - 15:50 **Research on High-Precision Gravity Field Re-measurement and Value Transmission for the International Comparison of NIM-2 Joule Balance**
 Duowu Su^{1,2}, Shuqing Wu^{1,2}, Jinyang Feng^{1,2}, Lishuang Mou¹, and Dong Wang¹
¹National Institute of Metrology (NIM), China;
²National Market Supervision Administration Key Laboratory, China
-
- S08** 15:50 - 16:10 **Design of a Device for the Comparison of Mass Standards Below 1 mg with a 10 ng Resolution based on a Modified Electromagnetic Force Transducer**
 Michal Solecki¹
¹Radweg Wagi Elektroniczne, Poland
-

Session 4. Pressure & Vacuum I

Chair: Yuanchao Yang (NIM)

Harmony hall, 2nd floor

H05	14:50 - 15:10	Study on a calibration method for differential pressure gauges using a single pressure balance Momoko Kojima ¹ <i>¹National Metrology Institute of Japan (NMIJ), AIST, Japan</i>
H06	15:10 - 15:30	Development of optical interferometer system for vacuum pressure standard in KRISS Sungwan Cho ¹ , Han Wook Song ¹ , MinKy Seo ¹ , Bo-gyu Bok ¹ , Jong Ho Kim ¹ , and Sam Yong Woo ² <i>¹Korea Research Institute of Standards and Science (KRISS), Republic of Korea;</i> <i>²Pressure Development of Korea (PDK), Republic of Korea</i>
H07	15:30 - 15:50	Precise evaluation of the pressure transmission characteristics of a tube-type liquid media separator under high pressure Tomoya Muramoto ¹ , Hiroaki Kajikawa ¹ , and Hideaki Iizumi ¹ <i>¹National Metrology Institute of Japan (NMIJ), AIST, Japan</i>
H08	15:50 - 16:10	Shear Stress Measurement of Impinging Jet During Tank Rinsing Yo Murata ¹ , Masaki Endo ¹ , and Hiromasa Suzuki ² <i>¹Tokyo Denki University, Japan; ²Aichi University of Technology, Japan</i>

Session 5. Force & Torque II

Chair: Atsuhiro Nishino (NMIJ)

Symphony hall, 1st floor

S09	16:30 - 16:50	Toward Impact Force Calibration of a Force Transducer Using a 100 kN Dead-Weight Force Standard Machine Akira Hasegawa ¹ and Toshiyuki Hayashi ¹ <i>¹National Metrology Institute of Japan (NMIJ), AIST, Japan</i>
S10	16:50 - 17:10	State Primary Standard of Force at VNIIM: Traceability, International Recognition, and Applications in Heavy-Capacity Weighing and Dynamic Load Measurement Ilya Y. Shmigelskii ¹ <i>¹D.I. Mendeleyev Institute for Metrology (VNIIM), Russia</i>
S11	17:10 - 17:30	Simulation Verification of Autonomous Driving System with Detecting Location of Landmarks in Outdoor Mobile Robot Yusuke Naitoh ¹ , Yoshiyuki Noda ¹ , Yukinori Sagoh ² , and Kiyoaki Kakihara ³ <i>¹University of Yamanashi, Japan; ²Toyota College, Japan; ³KER Co., Ltd., Japan</i>
S12	17:30 - 17:50	Development of acceleration estimation system using force sensor in chisel manipulation Shota Kasai ¹ , Shinyoung Lee ² , and Yoshiyuki Noda ¹ <i>¹University of Yamanashi, Japan; ²The University of Osaka, Japan</i>

Session 6. Pressure & Vacuum II

Chair: Hiroaki Kajikawa (NMIJ)

Harmony hall, 2nd floor

H09	16:30 - 16:50	Effect of temperature variation on dynamic pressure measurement using laser interferometer Daichi Takahara ¹ , Hideaki Iizumi ¹ and Hiroaki Kajikawa ¹ ¹ National Metrology Institute of Japan (NMIJ), AIST, Japan
H10	16:50 - 17:10	Pressure Measurement During Swallowing by Tongue Simulator Seiji Ogawa ¹ , Tetsu Kamiya ² , and Takanori Yamazaki ¹ ¹ Tokyo Denki University, Japan; ² Nagase & Co. Ltd., Japan
H11	17:10 - 17:30	Metrological assurance of dynamic pressure sensors in the Russian Federation R.A. Teteruk ¹ , N.A. Firsanov ¹ , V.N. Zaytsev ¹ ¹ D.I. Mendeleyev Institute for Metrology (VNIIM), Russia

22 October (Thursday)

Plenary 3

Chair: Koji Ogushi (NMIJ)

Symphony hall, 1st floor

- PL3** 09:00 - 09:30 **Quantum and Digital Era: The Future of Mass Metrology**
Jian Wang¹
¹National Institute of Metrology (NIM), China

Session 7. Pressure & Vacuum III

Chair: In-Mook Choi (KRISS)

Symphony hall, 1st floor

- S13** 09:30 - 09:50 **Relationship between piston motion and periodic pressure fluctuation in hydraulic pressure balances**
Hiroaki Kajikawa¹, and Hideaki Iizumi¹
¹National Metrology Institute of Japan (NMIJ), AIST, Japan
- S14** 09:50 - 10:10 **A Design of Twin Pressure Balances for Low Gauge Pressure Standard**
Yuanchao Yang¹, Yichao Li², Yanhua Li¹, Jia Dong¹, and Guibing Pang²
¹National Institute of Metrology (NIM), China; ²Dalian Polytechnic University, China
- S15** 10:10 - 10:30 **Current Status of APMP Key Comparisons in Gas Pressure**
Gracia Kim¹, In-Mook Choi¹, Momoko Kojima², and Hiroaki Kajikawa²
¹Korea Research Institute of Standards and Science (KRISS), Republic of Korea;
²National Metrology Institute of Japan (NMIJ), AIST, Japan
- S16** 10:30 - 10:50 **A Study on Base Pressure in Radial Jet through Abrupt Enlargement Region**
Kazuhiro Maeda¹, Yoko Sakakibara¹, Masaki Endo¹, and Hiromasa Suzuki²
¹Tokyo Denki University, Japan; ²Aichi University of Technology, Japan

Session 8. Mass III

Chair: Zhengkun Li (NIM)

Harmony hall, 2nd floor

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| H13 | 09:30 - 09:50 | Dynamic Current Compensation for EMFC weighing module
Pengpeng Sun ¹ , Jian Wang ¹ , Zhiwei Sui ¹ , Junjie Chen ² and Ruilin Zhong ¹
¹ National Institute of Metrology (NIM), China; ² China Jiliang University, China |
| H14 | 09:50 - 10:10 | Automated Measurement of Magnetic Susceptibility and Polarization Intensity of Weights with Integrated Uncertainty Evaluation
Sai Huang ¹ , Pengpeng Sun ¹ , Jian Wang ¹ , and Ruilin Zhong ¹
¹ National Institute of Metrology (NIM), China |
| H15 | 10:10 - 10:30 | Evaluation of a 2023 KOLAS-Approved Proficiency Testing Scheme Using an Intentionally Adjusted 2 kg Standard Weight
UiHo Jo ¹ , SeungWon Jung ¹ , and ByeongWoo Soh ¹
¹ Korea Testing Laboratory (KTL), Republic of Korea |
| H16 | 10:30 - 10:50 | Experimental study on Dynamic Behavior of Checkweigher Subjected to Vibration (2nd report)
Taiyo Moriyama ¹ , Yuji Yamakawa ² , and Takanori Yamazaki ¹
¹ Tokyo Denki University, Japan; ² The University of Tokyo, Japan |

Session 9. Force & Torque III

Chair: DongJoon Won (KRISS)

Symphony hall, 1st floor

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| S17 | 11:20 - 11:40 | Stiffness Calibration of Micro-Cantilever with Modulated Light
Yue Wang ¹ , Kang Wang ² , Zhengkun Li ¹ , Yang Bai ¹ , Kai Zhang ¹ , Qing Sun ¹ and Jinxin Xu ²
¹ National Institute of Metrology (NIM), China; ² China Jiliang University, China |
| S18 | 11:40 - 12:00 | Design of an Electromagnetic Microforce Measuring Device Based on the Kibble Balance Principle
Junfang Zhu ¹
¹ National Metrology Institute of Japan (NMIJ), AIST, Japan |
| S19 | 12:00 - 12:20 | Force-Based Estimation of Wall Geometry and Contact Stiffness for High-Speed Robotic Wiping
Rio Okuaki ¹ , Ryusei Shigemoto ¹ , and Ryosuke Tasaki ¹
¹ Aoyama Gakuin University, Japan |
| S20 | 12:20 - 12:40 | Dynamic MGP: Overcoming Positional Shifts in Global Palpation via Motion Compensation
Koichiro Kanaya ¹ , and Yuji Yamakawa ¹
¹ The University of Tokyo, Japan |

Session 10. Acoustic Metrology

Chair: Kyungmin Baik (KRISS)

Harmony hall, 2nd floor

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|------------|---------------|---|
| H17 | 11:20 - 11:40 | Implementation of Pressure Calibration System for Low Frequency Calibration of Hydrophone
Wan-Ho Cho ¹ , and In-Jee Jung ¹
¹ Korea Research Institute of Standards and Science (KRISS), Republic of Korea |
| H18 | 11:40 - 12:00 | Characterization of unbonded dynamic pressure environments in an ultrasonic water tank
Kyungmin Baik ¹ , Bernadette Carolina Fritzie Elmina ¹ , Hyosong Lee ¹ , and Yong Tae Kim ¹
¹ Korea Research Institute of Standards and Science (KRISS), Republic of Korea |
| H19 | 12:00 - 12:20 | Study on acoustic characteristics and flow patterns of radial jet impinging on wall
Satoshi Yamazaki ¹ , Masaki Endo ¹ , Yoko Sakakibara ¹ , and Hiromasa Suzuki ²
¹ Tokyo Denki University, Japan; ² Aichi University of Technology, Japan |
| H20 | 12:20 - 12:40 | Enhancing the Reliability of Low-Cost Acoustic Sensors for Array Signal Processing
In-Jee Jung ¹ , and Wan-Ho Cho ¹
¹ Korea Research Institute of Standards and Science (KRISS), Republic of Korea |

Session 11. Applications

Chair: Kyung-Taek Yoon (KRISS)

Symphony hall, 1st floor

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|------------|---------------|--|
| S21 | 14:00 - 14:20 | A hybrid capacitive array tactile sensor integrated with a ball-guide-based two-axis force sensor
Dong-Joon Won ¹ , Jin Seok Jang ¹ , Bo-Gyu Bok ¹ , Seung Hwan Jeon ¹ and Min Seok Kim ¹
¹ Korea Research Institute of Standards and Science (KRISS), Republic of Korea |
| S22 | 14:20 - 14:40 | Investigation of Peeling Characteristics in the Singulation Process of Anisotropic Conductive Films
Ryoto Nakazawa ¹ , Akira Tomita ² , and Takanori Yamazaki ¹
¹ Tokyo Denki University, Japan; ² Ohashi Engineering & Co. Ltd, Japan |
| S23 | 14:40 - 15:00 | A Skin-Inspired Multimodal Artificial Fingertip for Tactile Quantification
Bo-Gyu Bok ¹ , Seung Hwan Jeon ¹ , Junyoung Shim ¹ , Dong-Joon Won ¹ , Gwanghyun Jo ² , Changhyun Pang ³ and Min-Seok Kim ¹
¹ Korea Research Institute of Standards and Science (KRISS), Republic of Korea; ² Hanyang University ERICA, Republic of Korea; ³ Sungkyunkwan University (SKKU), Republic of Korea |

Session 12. Force & Torque IV

Chair: Yue Wang (NIM)

Harmony hall, 2nd floor

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|-----|---------------|--|
| H21 | 14:00 - 14:20 | Investigation of Torque Transducer Output Signal and Angle of Twist during Calibration with a Low-Capacity Deadweight Torque Standard Machine
Takumi Hayashi ¹ and Atsuhiko Nishino ¹
<i>¹National Metrology Institute of Japan (NMIJ), AIST, Japan</i> |
| H22 | 14:20 - 14:40 | Development of an Electromagnetic-Force-Based Torque Tool Calibration Machine for High-Precision Torque Tool Calibration
Misaki HAMAJI ¹ , Tomomi WADA ¹ , and Atsuhiko NISHINO ¹
<i>¹National Metrology Institute of Japan (NMIJ), AIST, Japan</i> |
| H23 | 14:40 - 15:00 | Estimation of Line Width and Bonding Pressure Based on Reaction Force Measurement in Material Extrusion Additive Manufacturing
Ren HOMMA ¹ , Ryuji NAKAGAWA ¹ , and Ryosuke TASAKI ¹
<i>¹Aoyama Gakuin University, Japan</i> |

22 October (Thursday)
15:00 ~ 16:10 /Symphony hall, 1st floor

Poster Session

No.	Title & Author
P01	Design and Control of a Nanometer-Level Precision XYZ Stage for MI(Metrology and Inspection)-SEM Dongmin Kim ¹ , Myeonghyeon Kim ¹ , Kyung-Taek Yoon ¹ and Soo-Keun Shin ² ¹ Korea Research Institute of Standards and Science (KRISS), Republic of Korea; ² VAD instrument, Republic of Korea
P02	Research and Development of a Comparison-type Multi-Component Sensor Calibration Device and Metrological Characteristics Wushi ¹ , Linhai ¹ , Zecheng Tao ² , Liehui Qian ² ¹ National Institute of Metrology (NIM), China; ² Kunshan Innovation Testing Instrument Co. Ltd, China
P03	Development of an Automatic Measurement System For E2 Class Weights (50 g ~ 1 Kg) Minsoo Lee ¹ ¹ Korea Testing Laboratory (KTL), Republic of Korea
P04	TERPS - Resonating With High Accuracy Neculai Moisoi ¹ , Neil Sands ¹ , Martin Cole ¹ and Matthew Abbott ¹ ¹ Druck Ltd, United Kingdom
P05	Toward a Finsler-Geometric Framework for Rotational Torque Measurement Atsuhiko NISHINO ¹ ¹ National Metrology Institute of Japan (NMIJ), AIST, Japan
P06	Development of a Traceable Calibration System for Portable Axle Weighing Instruments Youngcheol Kim ¹ , Sumin Lee ¹ , Joosuk Lee ¹ , and Yunsang Choi ¹ ¹ Korea Testing Laboratory (KTL), Republic of Korea
P07	Pressure Fluctuations caused by Piston Motion in a Pressure Balance and Their Dependence on the Pressure Medium Hideaki IIZUMI ¹ , Hiroaki KAJIKAWA ¹ ¹ National Metrology Institute of Japan (NMIJ), AIST, Japan
P08	Effects of Sponge Structure and Electrolyte Loading on the Pressure Measurement Characteristics of Porous Ionic Sensors Jiseung Kang ¹ , Jongkyeong Lim ² , Seonghyeon Kim ¹ ¹ Gyeongsang National University, Republic of Korea; ² Gachon University, Republic of Korea

No.	Title & Author
P09	Measurement of Geometry-Dependent Breakdown Voltage and Maximum Adhesion Force in Electroadhesive IDE Grippers Keonwoo Kim ¹ , Geon Heo ¹ , Seonghyeon Park ¹ , Daeyong Um ¹ , Seonghyeon Kim ¹ ¹ Gyeongsang National University, Republic of Korea
P10	Surface Property Identification and Trajectory Compensation for Robotic Drawing on Compliant Surfaces Tsubasa Okada ¹ , Naoya Harada ¹ , Minyoung Jang ² , Ryosuke Tasaki ¹ ¹ Aoyama Gakuin University, Japan; ² Meiji Gakuin University, Japan
P11	A Preliminary Study on the Validation and Measurement Uncertainty Evaluation of a Very Low-Frequency Vibration Calibration System for an SI-Traceable National Vibration Standard in Indonesia Nurvita Aji ^{1,2,3} , Pratama Handaka Putra ¹ , Fannisa Rahman ¹ , Hamidatul Husna Matondang ¹ , Maharani Ratna Palupi ¹ ¹ National Measurement Standards Laboratory for Acoustics and Vibration, National Measurement Standards-National Standardization Agency of Indonesia (SNSU-BSN), Indonesia; ² University of Science & Technology (UST), Republic of Korea; ³ Korea Research Institute of Standards and Science (KRISS), Republic of Korea
P12	A Review of Calibration, Measurement, and Verification Methods for Mobile Manipulators Donggeun Gwak ² , Jeamin Lee ² , Donghyeok Lee ² , Kihyun Kim ¹ , Hyoyoung Kim ¹ ¹ Tech University of Korea, Republic of Korea; ² Korea Testing Laboratory (KTL), Republic of Korea
P13	Design and Experiment of Flexure Beam Balance based Mass Comparator Kyung-Taek Yoon ¹ , Myeonghyeon Kim ¹ , Dongmin Kim ¹ ¹ Korea Research Institute of Standards and Science (KRISS), Republic of Korea

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국가 과학기술 발전을 이끌어 온 50여 년 역사의 국가연구기관 캠퍼스,
UST에서 세계적 수준의 연구자로 성장할 과학도를 기다립니다.

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측정 정밀도 보증부터 스마트 IT 관리까지, 전주기 토탈 솔루션으로
고객의 생산활동과 품질 향상의 현장에 함께 하고 있습니다.

50+ Years

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15,000 고객사

연간 20만 건 이상의 고정밀 교정·시험 데이터 처리

2 시간 이내

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코리아인스트루먼트는 KOLAS 공인교정기관으로,
교정·시험부터 밸리데이션, 예방점검, 교육·컨설팅,
IT 시스템까지 장비 관리 토탈솔루션을 제공합니다.

주요 교정·시험 분야

- 길이 및 관련량 게이지블록, 마이크로미터, CMM 등
- 질량 및 관련량 저울, 분동, 자동계량 시스템 등
- 시간 및 주파수 주파수 발생기/계수기, 광회전/접촉식 회전 속도계 등
- 전기 자기·전자파 멀티미터, 내전압 시험기, 스펙트럼 분석기 등
- 온도·습도 온도계, 열전대, RTD, 습도계 등
- 광량 분광광도계, 광택도계, 광조도계 등
- 화학분석가스 가스 분석기, 배기가스 측정기, 수소이온농도측정기 등
- 진동·음향 진동계, 변환기, 교정기, 소음계 등

서비스 분야

- 교정·시험
다양한 측정 분야의 교정·시험 현장 출장 및 전문 기술지원
- 적격성 평가·예방점검
IQ·OQ·PQ 및 밸리데이션 장비 성능 확인과 예방점검
- 교육·컨설팅
계측기 관리·운영 실무 교육 측정 불확도 및 ISO/IEC 17025 컨설팅
- 고객 맞춤 통합지원
전담 담당자·픽업·택배 지원 구입·수리·교정 연계 서비스

관리시스템 제공

모바일과 웹을 아우르는 통합 교정관리시스템으로 계측기 정보부터 교정·시험 이력까지 한 번에 관리 가능합니다.



CWIZ Enterprise
CWIZ Partners

모든 정보는 ISO/IEC 27001 · 27701 인증 기반의
정보보호·개인정보보호 관리체제로 보호되고 있습니다.



Robotic Mass Comparators

High-Accuracy and High-Throughput Mass Comparison



A **Robotic Mass Comparator** is a high-performance comparator balance coupled with a robotic arm that enables a large number of weights to be calibrated in an automatic process. It allows for the calibration of an entire weight sets with different nominal values without human interaction, thereby **ideal for high-throughput weight calibration where high accuracy is required.**



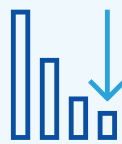
► www.mt.com/lab-robotic-mc

More Details



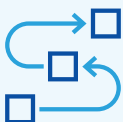
Maximum Throughput

Highly accurate and efficient weight calibration with fully automated, continuous 24-hour operation



Reduced Errors

Eliminate the errors caused by users, such as mix-ups between weights, imprecise placement, and transcription mistakes



Simplified Dissemination

Seamless traceability to your mass standards is ensured through the automatic measurement of weight combinations



Flexible Solutions

Ideal for weights calibration workflow automation as well as for high-throughput weight calibration applications



1588-0180



www.mt.com



helpdesk.korea@mt.com



blog.naver.com/mettler-toledo



For more information



신제품 출시

Cubis® II Manual Mass Comparators

- ☑ Weight Calibration
- ☑ Environmental Monitoring
- ☑ Software Guidance
- ☑ Cleanability
- ☑ Data Integrity and Connectivity



질량비교기 분야에 최고의 성능 제공

- ☑ 여러 실험자에 맞춤화 된 사양
- ☑ 모든 범위의 질량비교기 보유
- ☑ 가장 빠르고 정확한 측정
- ☑ 전자동 수평 조절 장치를 통한 신뢰 준수



Manual Mass Comparators 제품사양

- ☑ 1ug readability | up to 211g capacity
- ☑ 10ug readability | up to 5100g capacity
- ☑ 0.1mg readability | up to 10.050g capacity
- ☑ 1mg readability | up to 64kg capacity
- ☑ 10mg readability | up to 64kg capacity

* 이 밖의 예외 제품은 문의요청

싸토리우스 코리아

경기도 성남시 분당구 판교역로 220 솔리드스페이스 8층
T. 031. 622. 5700 E. marketing@sartorius.co.kr

RMCM 5Y

Mini Robotic Mass Comparators

The RMCM Robotic Mass Comparator is a compact device that houses the functionality of a mass comparator and a robotic transport system.

The comparator is supplied with a 120-position standard magazine and allows performing a fully automatic dissemination with a division of up to 3 mass standards.





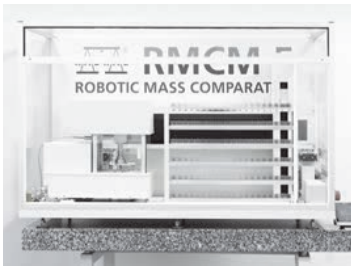
See **RMCM 5Y**
on radwag.com



The mass standard magazine offers up to 120 magazine positions.



The mass comparator facilitates a complete dissemination process.



Combining the advantages of a robotic and automated system ensures better repeatability by not opening the chamber throughout the cycle.



The mass comparator allows real-time monitoring of ambient conditions.

	RMCM 5.5Y	RMCM 10.5Y
Max capacity [Max]	6.1 g	10.1 g
Readability [d]	0.1 µg	0.1 µg
Standard repeatability [5% Max]*	0.25 µg	0.25 µg
Standard repeatability [Max]*	0.4 µg	0.6 µg

*Repeatability is expressed as a standard deviation determined for 6 ABBA cycles. Standard deviation is experimentally determined under ambient conditions for calibration of E1 class mass standards specified in OIML R111 (Table C.1.) document.

Discover Precision

Measurement technology for
science, industry, and a sustainable future.

Supporting the development of science and
technology and the advancement of industry
through measurement.

For
Research



For
Industry



For
a Sustainable Future



Precision Weighing

Reliable performance
for diverse applications



Measurement Technology

Advanced measurement
solutions for reliable results



Calibration Services

Accredited calibration services
supporting traceability



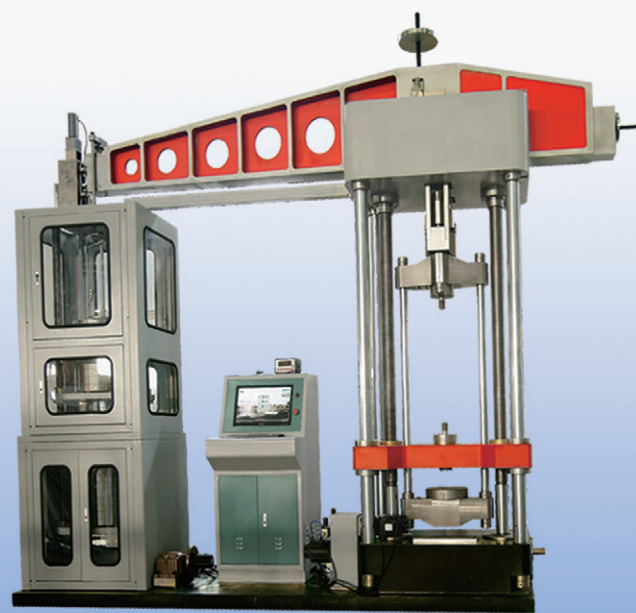
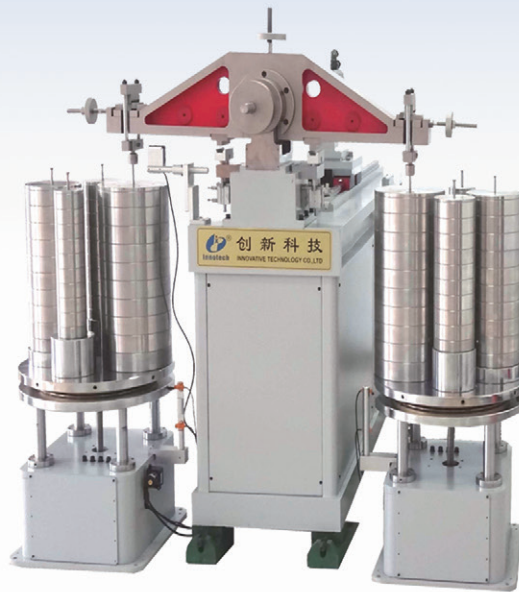
Innotech

Innovative Testing Technology Co.,Ltd.

Innovative Testing Technology Co., Ltd., founded in 2002 and located in Kunshan, has a staff of 120 employees, including 42 R&D personnel, and holds ISO9001 certification.

In the metrology industry, main products include various force standard machines, such as deadweight, hydraulic-amplification, lever-deadweight composite, and build-up types, along with torque standard machines. In the quality inspection industry, main products include automotive series, bicycle and e-bike series, baby stroller and toy series, furniture series, material testing machine series, fitness and rehabilitation equipment series, simulated environmental test chamber series, as well as various non-standard designs and automation control equipment.

We provide customized services for dynamic and static fatigue testing machines, which complies with international testing standards such as ISO, ASTM, and EN, and meets the testing needs of various industries.



Contact Information

TEL: 0512-86163888 E-mail: cxkj@cxtest.com Web: [Http://www.cxtest.com.cn](http://www.cxtest.com.cn)

Add: No. 1888 Jujin Road, Zhangpu Town, Kunshan City, Jiangsu Province, China

1. Company Overview

LAON is a leading provider of specialized solutions for a wide range of industrial applications. Our expertise spans high-precision deadweight pressure testers, portable pressure calibration equipment designed to enhance on-site operational efficiency, and automated torque wrench calibration systems engineered to ensure process accuracy and reliability.

Beyond manufacturing equipment, LAON is committed to continuous research and development, pursuing the highest levels of precision and control to minimize even the smallest measurement errors in industrial environments. Our proprietary calibration technologies are designed with operator safety as a top priority, while offering intuitive operation and enhanced user convenience. These capabilities have enabled us to build lasting trust with numerous companies and research institutions.

Building on our accumulated technical expertise and innovative know-how, LAON is embarking on a new phase of growth. Expanding beyond the conventional precision calibration and measurement equipment market, we are extending our presence into South Korea's defense industry, where exceptional accuracy and durability are essential even under the most demanding operating conditions. Through continuous innovation, technological advancement, and an unwavering commitment to quality, LAON strives to become a global leader in precision measurement and calibration solutions.

2. Core Technologies, Products & Solutions

① DEADWEIGHT TESTER (PISTON GAUGE)	② Torque Wrench Automatic Calibration System	③ Reference-Grade Flowmeters
		

DAEYEONG C&T Co., Ltd.

Excellence & Precision in Calibration & Measurement Services

1. About Us

Founded in April 2001, DAEYEONG C&T Co., Ltd. is a leading recognized calibration laboratory certified by the Korea Laboratory Accreditation Scheme (KOLAS) (Accreditation No. KC02-109) in accordance with KS Q ISO/IEC 17025:2017.

We are dedicated to maintaining national standards and quality management systems to provide the highest level of accuracy, reliability, and technological trust across various industrial measurement sectors.



2. Main Category & Business Scope

Business Category (Middle Classification):

Testing & Calibration Services / Measurement & Quality Control (시험 · 교정 서비스 / 측정 및 품질 관리)

분류코드	분류명(영문)
102	Linear dimension
103	Angle
104	Form
105	Complex geometry
106	Various dimensional
201	Mass
202	Force
203	Torque
204	Pressure
205	Vacuum
206	Volume
207	Density
208	Viscosity
209	Fluid flow
210	Hardness
211	Impact
301	Time/Frequency
302	Speed/Rotational speed
401	DC
402	Resistance, capacitance and inductance
403	AC and AC power
404	Other DC and low frequency measurement
405	Low frequency electromagnetic field
406	RF measurement
501	Contact thermometry
502	Non-contact thermometry
503	Humidity
601	Acoustics
603	Vibration
701	Photometry
703	Medium properties
901	Chemical analysis

Core Competencies:

Authorized KOLAS Calibration Services

Advanced Measurement & Metrology Solutions

3. Key Advantages

Proven Track Record: Over 20 years of continuous technical capability and trusted partnership since 2002.

High-Precision Standards: Strict Quality Management System ensuring minimal measurement uncertainty.

4. Contact Information

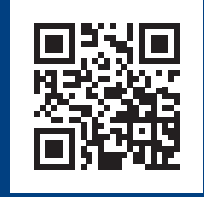
Address: 10-10, Gongdan-ro 140beonan-gil, Gunpo-si, Gyeonggi-do, Republic of Korea

Accreditation No.: KOLAS KC02-109

Email: dycnt@dycnt.co.kr

Website: <https://dycnt.co.kr/>

CAS SMART FACTORY FOR TOMORROW



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Powered by CAS Sensors Technology
Precision in Every Gram, Efficiency in Every Step

Applications in Sensor-Based Industrial Technologies, Automation, and Logistics Systems

With the advent of the Fourth Industrial Revolution, industries are striving to transform traditional manufacturing sites into smart factories. The key to smart manufacturing lies in the precise collection of sensor data and historical data management through big data analytics. CAS enhances productivity and quality across industries through advanced sensor technology, and supports the smart transformation of industrial facilities by collecting real-time data and leveraging big data.



Application of the sensor



Industrial technologies



Manufacturing Automation



Inventory Management System



Physionics Co., Ltd.

Hybrid Tactile Sensors and Robotic End Effectors
Multi-channel Force/Pressure Distribution Sensing System
Biosignal Measurement Module

HYBRID TACTILE SENSOR



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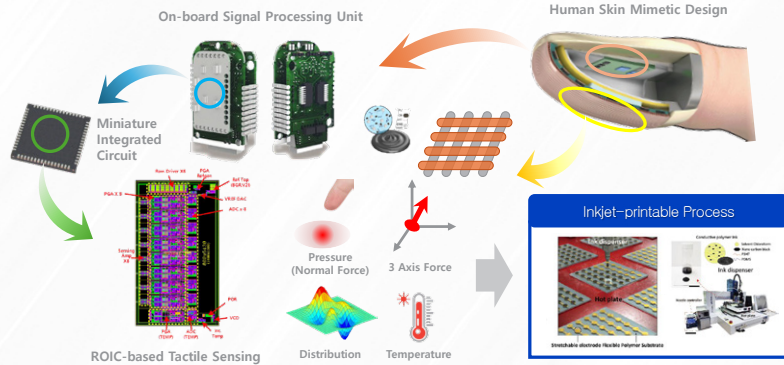
<https://www.physionics.co.kr/>



Technology

Unlike conventional single-pressure sensors, Physionics **Hybrid Sensor** simultaneously measures **"Pressure, 3-Axis force, and Temperature"**, enabling richer tactile perception and complex interpretation.

Multi-channel pressure sensing extends from fingertips to joints and palm, forming a continuous tactile network.



Products



Tactile Sensing Robot Hand



Array Pressure Sensor Measuring System



Hybrid Finger Type Tactile Sensor



경성시험기(주)

KYOUNGSUNG TESTING MACHINE CO., LTD.

설계부터 **공인교정**까지,
시험기의 모든 과정을 한 회사에서
Design · Manufacturing · KOLAS Calibration

1992년 창업 이래 **만능재료시험기, 피로·내구시험기, 자동차 부품 시험기, 환경·배터리 시험장비**를 직접 설계·제작해 왔습니다. 직접 만든 시험기를 자사 KOLAS 공인교정 체계로 교정하고 이력까지 관리합니다.



KOLAS 국가공인교정기관

힘 · 토크 · 경도 · 압력 · 길이 등 12개 분야 41개 항목



KOLAS 국가공인시험기관

역학 분야 (금속 · 산업용 기계 · 건설 및 건축재)

■ 주요 제품

- 재료시험기 — 만능재료시험기(유압식·기계식), 압축충격시험기
- 피로·내구시험기 — 유압서보·AC서보 피로시험기, 방진고무 시험기
- 자동차 부품 시험기 — 스티어링, 볼조인트, 속업소버, 시트벨트 내구시험기
- 환경·배터리 — 온습도·오존 챔버, 배터리 압축·관통 시험기
- 자체 개발 컨트롤러 **KSRTC-V1** — 8 kHz 페루프 디지털 제어



기계식 만능재료시험기



유압식 만능재료시험기

1992

창업 · 34년 업력

624대

시험기 납품
2020.1 ~ 2026.6

41항목

KOLAS 공인교정
12개 분야 인정

6건

특허 등록
2020 ~ 2025

백만불 수출의 탑

제62회 무역의 날
2025



Company Profile

DAEKYUNG TECH & TESTERS MFG. CO., LTD.

Founded in 1991, Daekyung Tech & Testers is a Korean manufacturer of precision testing equipment based in Incheon. We develop and manufacture systems for material testing, component evaluation and force calibration, supporting research, product development and quality control.

Our product range includes universal testing machines, hardness testers, fatigue and durability testing systems, torsion testers, and hydraulic and deadweight force calibration machines. We also design custom grips, fixtures and dedicated test systems to suit customer specimens, test standards and operating requirements.

With experience supplying equipment to customers including Hyundai, Kia, Samsung and Hyundai Rotem, we combine mechanical engineering, measurement technology and computer control to deliver practical testing solutions. Our capabilities include system configuration, testing software and automation, together with installation, operator training and technical support.

24, Namdongseo-ro 53beon-gil, Namdong-gu, Incheon, Republic of Korea

Tel. +82-32-822-5511 | Fax. +82-32-821-4580

Website: www.dktt.co.kr | E-mail: rainbow5630@daum.net



29 Samdeok-ro, Sasang-gu, Busan, Republic of Korea (Deokpo-dong)

Tel: +82-51-341-7701-2

Fax: +82-51-341-7708

E-mail: help@kcs.kr

Website: <https://www.kcs.kr/>

KCS Co., Ltd. is an internationally accredited calibration laboratory accredited by the Korea Laboratory Accreditation Scheme (KOLAS).

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(주)케이시에스

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