

APMP Member Report 2021

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25-26 November 2021

Measurement Standards Laboratory (MSLNZ), New Zealand

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Please submit this report to APMP-Secretariat@nim.ac.cn no later than 14 November 2021.

Section 1: General Management

Mr Cliff Hastings continues as acting-Director of MSL, until a permanent appointment is made. There have also been changes to the managers of each of the three teams in 2021. MSL continues a transition phase where a number of senior scientists have or are soon to retire and we transfer their skill and expertise in metrology to our new staff. In 2021 we recruited three new scientific staff.

MSL has introduced a Scientific and Technical Advisory Group of MSL's science and technical staff to provide strong scientific leadership of MSL's activities.

MSL continues with its 5-year, NZ\$20 million equipment investment program to address resilience and develop new technical capabilities to support NZ industries' future needs. Notable purchases in 2021, include a second supercontinuum laser and DL lasers, portable signal analyzer and signal generator (up to 40 GHz), and laser scanner and camera head for the new industrial CMM.

Work has been completed on a new building to house the Temperature and Electrical Sections of MSL. Temperature Standards have moved in. Problems with the environmental control system are being remediated and Electrical Standards expect to move in early 2022. A new laboratory for Time Standards has also been completed and is currently being evaluated against environmental specifications. The upgrade of the CMM laboratory has also been completed and the first of the two new CMMs will be installed in November 2021.

Section 2: Technical Highlights

TCEM

The Magnicon CCC bridge and 10 V PVJS are close to delivery with installation delayed due to Covid-19 and building issues.

MSL has purchased a sampling system from NMIA to become our new mains power standard and enable traceable measurements of harmonic content. It is intended that this standard will also be commissioned in the new MSL building in 2022. A new Radian RX-33 has also been purchased as a three-phase working standard to improve the resilience and efficiency of power and energy calibrations.

TCL

Work on the CMM laboratory has been completed and environmental monitoring is being started. Getting installation engineers for the two new CMMs purchased in 2020 has been difficult due to Covid-19. The first machine will now be installed in November 2021.

TCM

Commissioned two new balances and several new masses to improve the large mass capability. Developed bespoke weight changer system for commercial mass balance and reprogrammed mass calibration software to increase efficiency of calibration. New piston cylinder unit was commissioned as primary pressure standard for scale realization activities. Kibble balance research activities are ongoing.

TCPR

Several improvements to existing systems this year include moving data handling of a network of UV sensors to the cloud and preparation for more efficient measurements of UV LED sources. This year has seen MSL independently realise the scale of diffuse reflectance and prepare a new set of reference trap detectors for our primary detector responsivity scale.

TCT

Temperature Standards have relocated into a new purpose-built building. The commercial calibration services for contact and radiation thermometry are operational after the shift, but some of the equipment for realising our thermometry scales is still being recommissioned. First round of measurements for the CCT-K7 comparison (triple-point of water) have been completed. Two new scientists have been employed, one for contact thermometry and one for humidity.

TCTF

A new laboratory for Time standards has been completed, and the move is scheduled between Dec 2021 and May 2022. The Time section is conducting a promising

pilot study on disseminating time and frequency via fibre with New Zealand's telecom fibre infrastructure company Chorus.

TCMM

Possibilities for the purchase of a replacement AFM instrument are being explored, since the old AFM instrument reached end-of-life.

KIBBLE BALANCE UPDATE

Development of the MSL Kibble balance continues. Progress is being made with evaluating effects of magnet-coil misalignment and other stray forces on the coil. Conversion of the two pressure balances to a rotating cylinder configuration is proceeding, with the next step being to carry out dimensional measurements on re-machined parts. Investigations into potential methods for realisation of oscillatory measurements for the calibration mode are ongoing. A vacuum chamber to house the instrument is now being manufactured. The research continues to be largely focused on providing research opportunities for newer metrologists.

Section 3: CIPM MRA Related Matters

MSL maintains third party accreditation of its calibration services to ISO 17025:2017 and has fully transitioned to the new standard. It uses IANZ as its accreditation body and peers from other NMIs as technical assessors. In 2021 we completed a review, and our accreditation was renewed. Technical peer reviews were carried out of the Mass And Related Quantities and the Time and Frequency areas in 2021. These were both carried out remotely on line due to Covid-19 travel restrictions.

MSL currently participating in 25 active comparisons. In 2021 MSL enrolled in 4 new comparisons, completed measurements in 4 comparisons, and received draft or final reports for 3 comparisons.

MSL currently has 177 CMCs in Appendix C of the of the BIPM Key Comparison Database.

MSL staff acted as peer reviewer for NMIA (MC, Feb 2021)

MSL has members on the CCT, CCM, CCEM and CCPR and continues to actively participate in their activities including working groups. Murray Early is the chairperson of the CCEM-WG on Low Frequency Quantities.

Vladimir Bubanja became a member of the IMEKO TC-25 technical committee on Quantum Measurement and Quantum Information.

Annette Koo is one of two APMP representatives on the JCRB task group reviewing the statistical criteria in the CIPM MRA G-11 guidelines. She is also the chair-elect of the TCPR.

Blair Hall is a member of the Expert Group supporting the CIPM Task Group on the Digital SI. He is also the newly elected Chair of the APMP focus group on digital transformation in metrology.

Section 4: Future plans

MSL is updating its 2021-26 Strategic plan under the themes:

Enhance MSL's Role as a World Class National Metrology Institute - Build on recent investment in facilities, equipment, and new staff to ensure MSL continues to operate as a world class NMI and to enhance our national and international relevance.

Build MSL's Leadership & Influence in the National Quality Infrastructure & Science Ecosystem - Develop the brand and reputation of MSL to be proactively sought out to contribute technical advice to government, industry and international science fora.

Contribute to the Evolution of Metrology - MSL takes a leading role nationally and internationally in contributing to new measurement techniques and applying metrology principles to new areas.