

Report of the CCM Working Group on Hardness

Sam Low

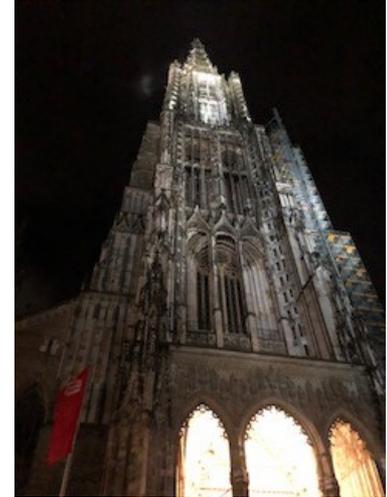
18th CCM meeting, 20-21 May 2021

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WG Meetings held since last CCM

- ◆ The WGH has met twice since the May 2019 CCM Meeting
- ◆ 19th Meeting — 27th September 2019 at Zwick GmbH & Co. in Ulm, Germany In coincidence with the meetings of ISO TC164/SC3 on hardness testing.



- ◆ No meeting in 2020
- ◆ 20th Meeting — 30th April 2021 as a 2-hour virtual meeting hosted by the BIPM



WG Meetings planned

- ◆ The 21st Meeting of the WGH is tentatively planned for November 2021 as a 2-hour virtual meeting hosted by the CCM

Main actions taken and main achievements

- ◆ Key Comparison CCM.H-K3 on Rockwell C hardness (HRC) scale has been re-initiated after a long delay with fewer participating Institutes in order to save time. The labs are chosen to represent 5 world regions.
- ◆ Pilot study CCM.H-P1 on Rockwell diamond indenters: completed, CCM approved and Final Report submitted for publishing on the BIPM website.
- ◆ Pilot Study CCM.H-P2 on Leeb hardness scales D and G: measurements completed; Draft B Report approved by WGH with suggested changes.
- ◆ Pilot Study CCM.H-P3 on Brinell Hardness scale [formerly a KC, but re-classified]: completed, Final Report submitted to the CCM for approval.

Progressing the state of the art

- ◆ Defining hardness tests for an optimum balance between lowest measurement uncertainty and industrial needs [complicated due to the measurement being method dependent]. Example: Rockwell hardness test cycle timing.
- ◆ Improving hardness test methods through influence parameter investigations and transferring the knowledge to standards development organizations. Examples: Rockwell N scales test parameter studies; test cycle issue in ISO 6508-3.

Liaison & stakeholders

- ◆ The Working Group on Hardness (WGH) deals with Hardness standards and promotes the international cooperation among NMIs, DIs, RMO members and international organization like ISO, ASTM, VAMAS and others, for improving traceability and standardization in the field.
- ◆ Stakeholders:
 - NMIs that conduct calibrations of hardness reference standards and hardness measurement instruments
 - Producers of hardness equipment and reference standards
 - Industries and customers that rely on hardness measurement data for assuring the desired and required properties of their products

KCs completed and underway

Key Comparisons

- ◆ KCs Completed:
CCM.H-K1 Vickers hardness(HV 0.2, HV 1, HV 10) scales
- ◆ KCs Underway:
CCM.H-K3 Rockwell C hardness (HRC) scale
[Re-initiated after a long delay]

Pilot Studies

- ◆ PSs Completed:
CCM.H-P1 Pilot study on Rockwell diamond indenters
CCM.H-P3 Pilot Study of Brinell Hardness scale
- ◆ PSs Underway:
CCM.H-P2 Pilot study of Leeb hardness reference blocks scale D and G
[Testing complete, Report being finalized]

KCs planned

- ◆ It is planned that VNIIFTRI – Russian Federation pilot Key Comparisons of the HR15N, HR30N and HR45N scales.
- ◆ It is planned that PTB -Germany pilot Key Comparisons of Brinell hardness.
 - Four scales are proposed:
HBW 1/30, HBW 2.5/187.5, HBW5/750 and HBW10/3000.
 - Measurements at 2 or 3 hardness levels:
250 HBW, 350 HBW and 450 HBW for each scale.

Future Plans

- ◆ KC - Geometrical Measurement of the Rockwell Diamond Indenter
- ◆ KC – Leeb Hardness
- ◆ PS - Geometrical Measurement of the Knoop Diamond Indenter

Program of work for the next 5 years

- ◆ Develop additional hardness test definitions
- ◆ Complete the Rockwell C Key Comparison (CCM.H.K3)
- ◆ Initiate new Key Comparisons
 - Brinell Hardness
 - Rockwell N scales (HR15N, HR30N ,HR45N)
 - Geometrical Measurement of the Rockwell Diamond Indenter
- ◆ Harmonization of hardness CMC format

Proposed changes (membership, chairmanship, ToRs)

- ◆ CCM-WGH Membership is by Institute (20) with one delegate and the option of one additional Technical Expert

Since 2019

- ◆ No changes in Institutes have occurred
- ◆ Interest by NSC Institute of Metrology (Ukraine) to join the WGH
- ◆ Two Institute delegates have changed

NIMT	Thailand	Montree Pakkratoke replaced Sanponpute Tassanai
RISE (formerly SP)	Sweden	Fredrik Arrhén replaced Leslie R. Pendrill

Proposed changes (membership, chairmanship, ToRs)

- ◆ WGH proposed leadership change:
- ◆ **Sam Low** (NIST, USA) is resigning as CCM-WGH Chair on 31 December 2021. Sam has chaired the CCM-WGH since 2014.
- ◆ The CCM-WGH has unanimously approved **Febo Menelao** (PTB, Germany) to be the next Chair beginning on 01 January 2022. Febo has served as Vice Chair of the CCM-WGH since 2014. PTB has given approval for Febo to serve as Chair.
- ◆ The CCM-WGH has unanimously approved **Koichiro Hattori** (NMIJ, Japan) to be the next Vice Chair beginning on 01 January 2022. NMIJ has given approval for Koichiro to serve as Vice Chair.



samuel.low@nist.gov



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