REX2024
PRCI Research Exchange

Pipeline Hard Spots, ILI and Crack Management

Panel Discussion

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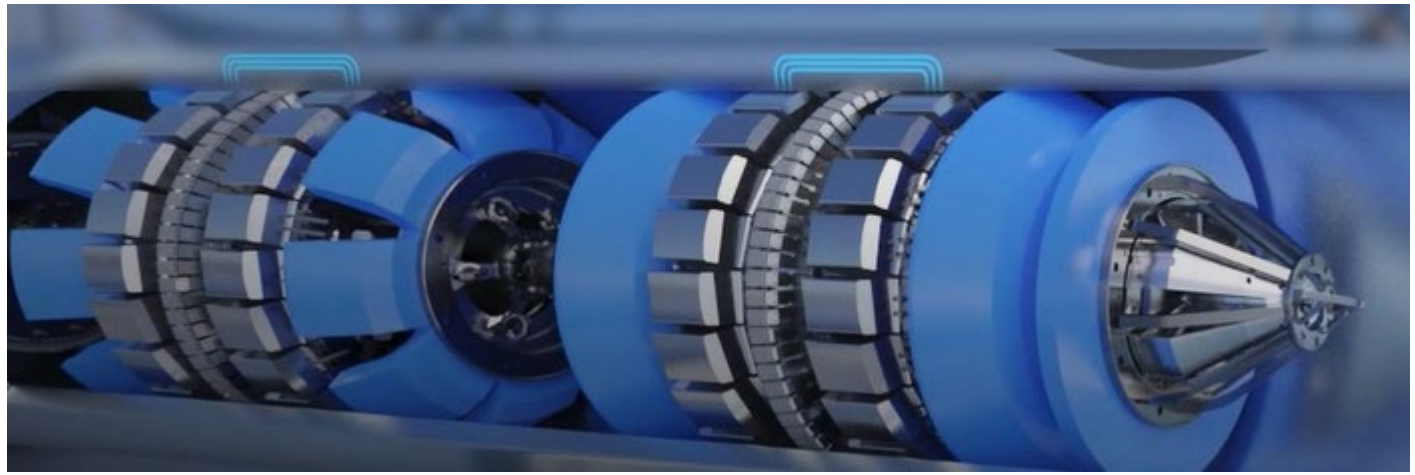
PRCI LEADING PIPELINE RESEARCH
Pipeline Research Council International

RoMAT DMG Technology

- **Dual MaGnetization (DMG) utilizes standard magnetic flux technology (MFL):**
  - Conventional MFL magnetizes on a high level (high mag.) to saturate a pipeline with a magnetic field to be **independent from microstructure changes.**
  - DMG also magnetizes on a low level (low mag.) to **detect microstructure changes.**

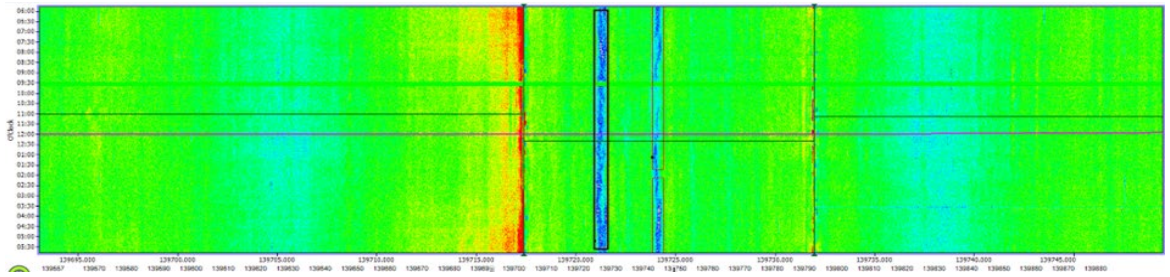


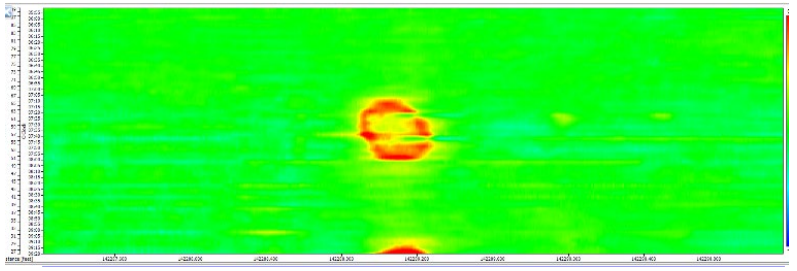
2020 & 2023 Experience – Chance Discovery

- Operators discovered harness anomalies not reported by ILI.
- ILI signal review indicated in both cases the anomalies were detected by RoMAT DMG but not reported as the signal characteristics were not recognized as different types of hardness anomaly.

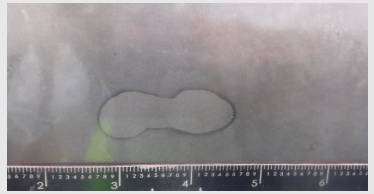
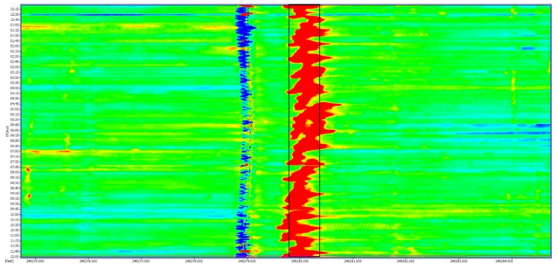
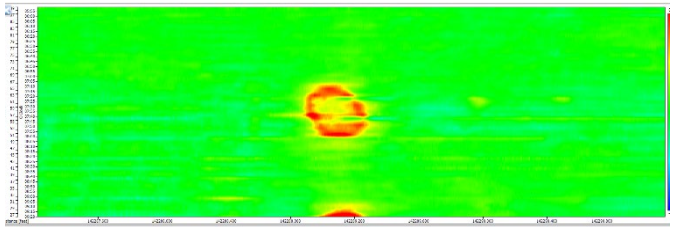
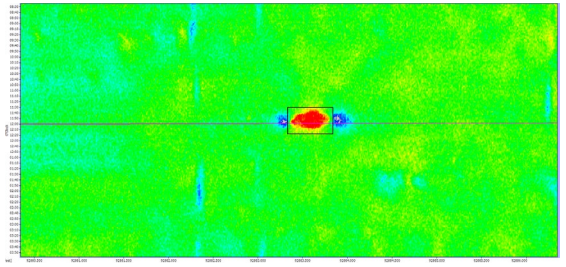
➢ Additional buckets of signal characteristics are categorized.



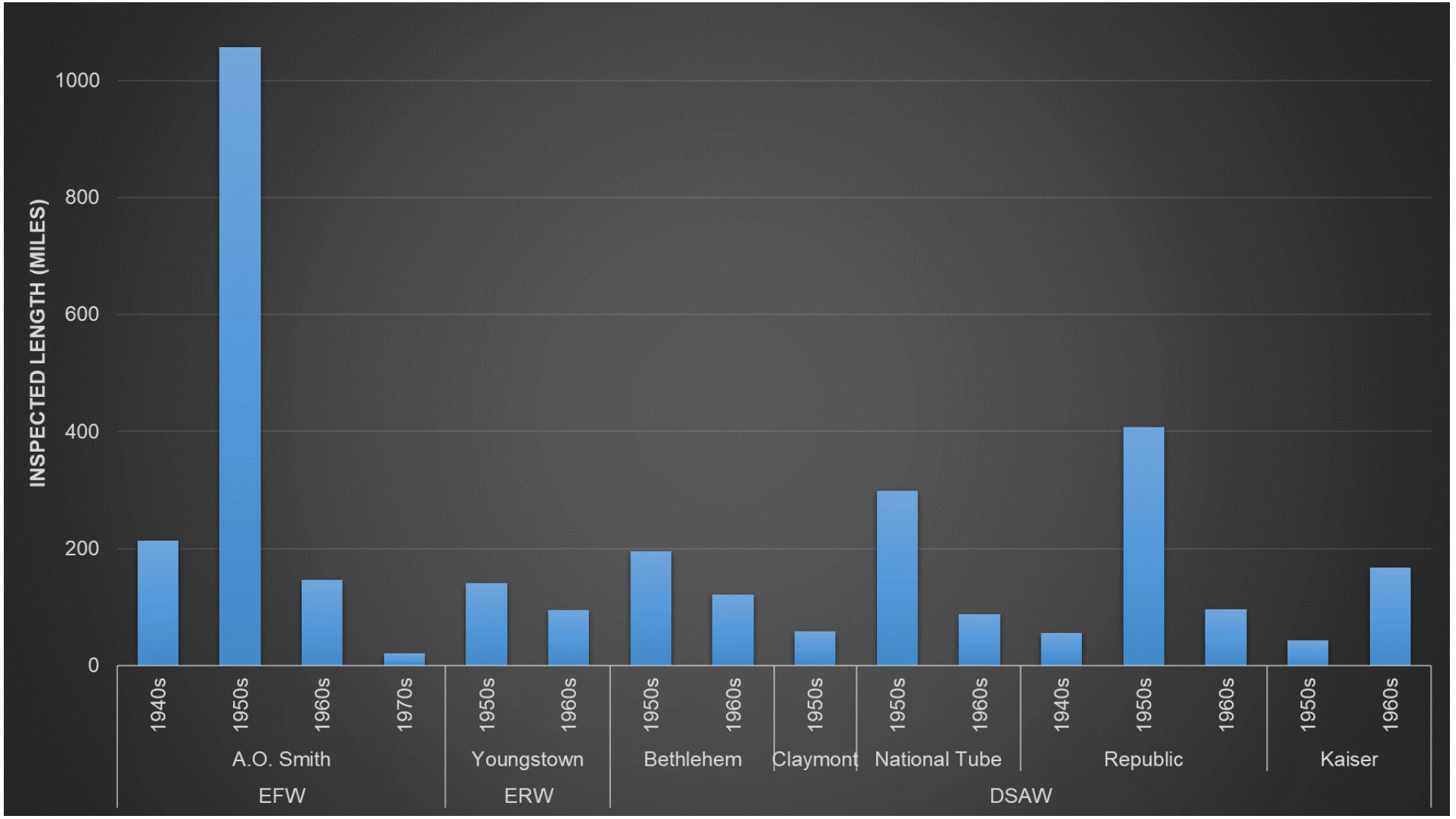




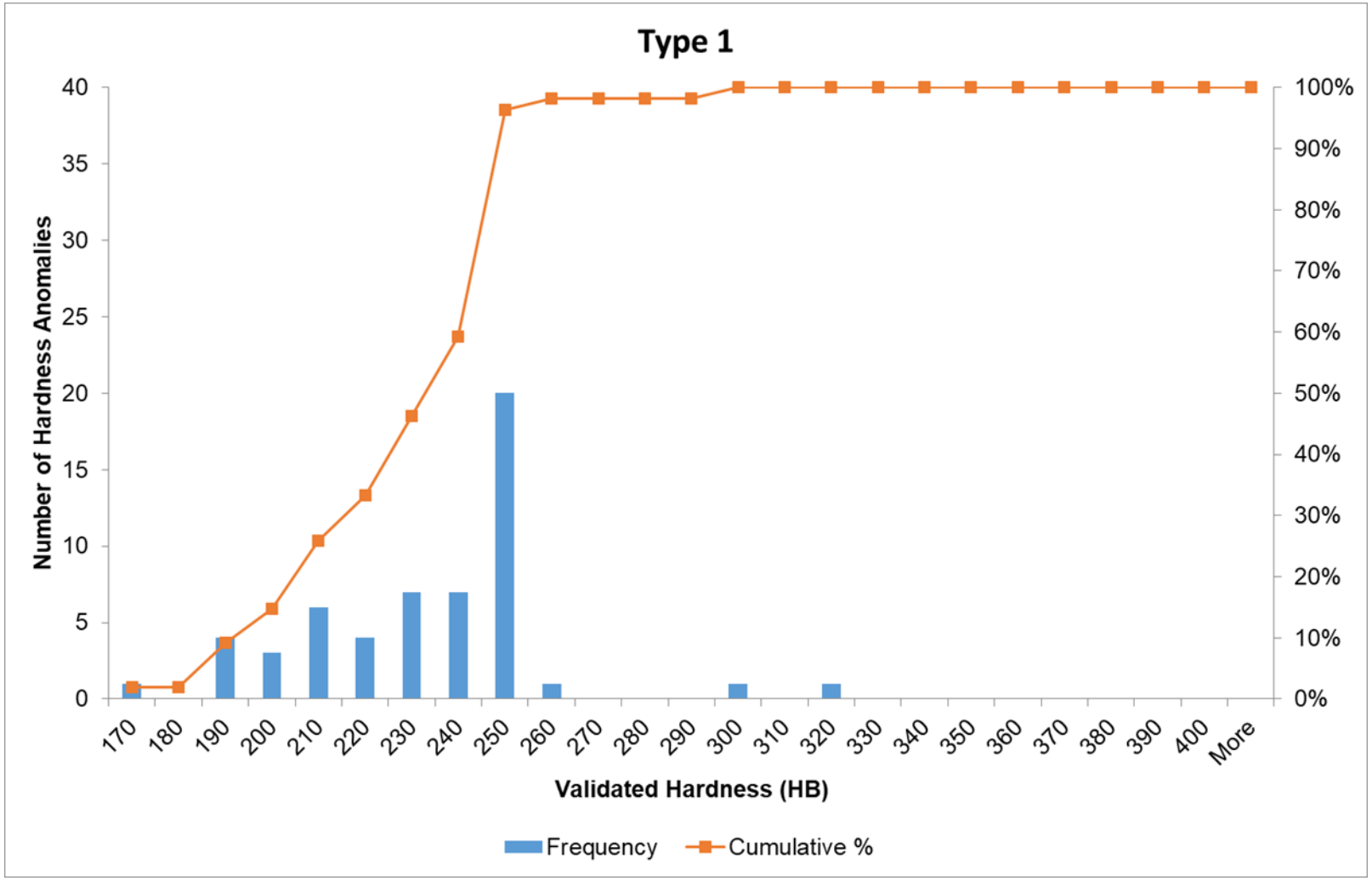
Types of Hardness Anomalies Reported by ILI

	Type 1	Type 2	Type 3
Max validated hardness up to date (HB)	320	400	370
Pipes validated up to date	A.O. Smith, Bethlehem, Consolidated Western	A.O. Smith, Bethlehem, Consolidated Western, National Tube, Kaiser	A.O. Smith, Bethlehem, Consolidated Western, National Tube
Etching example			
ILI Signal			

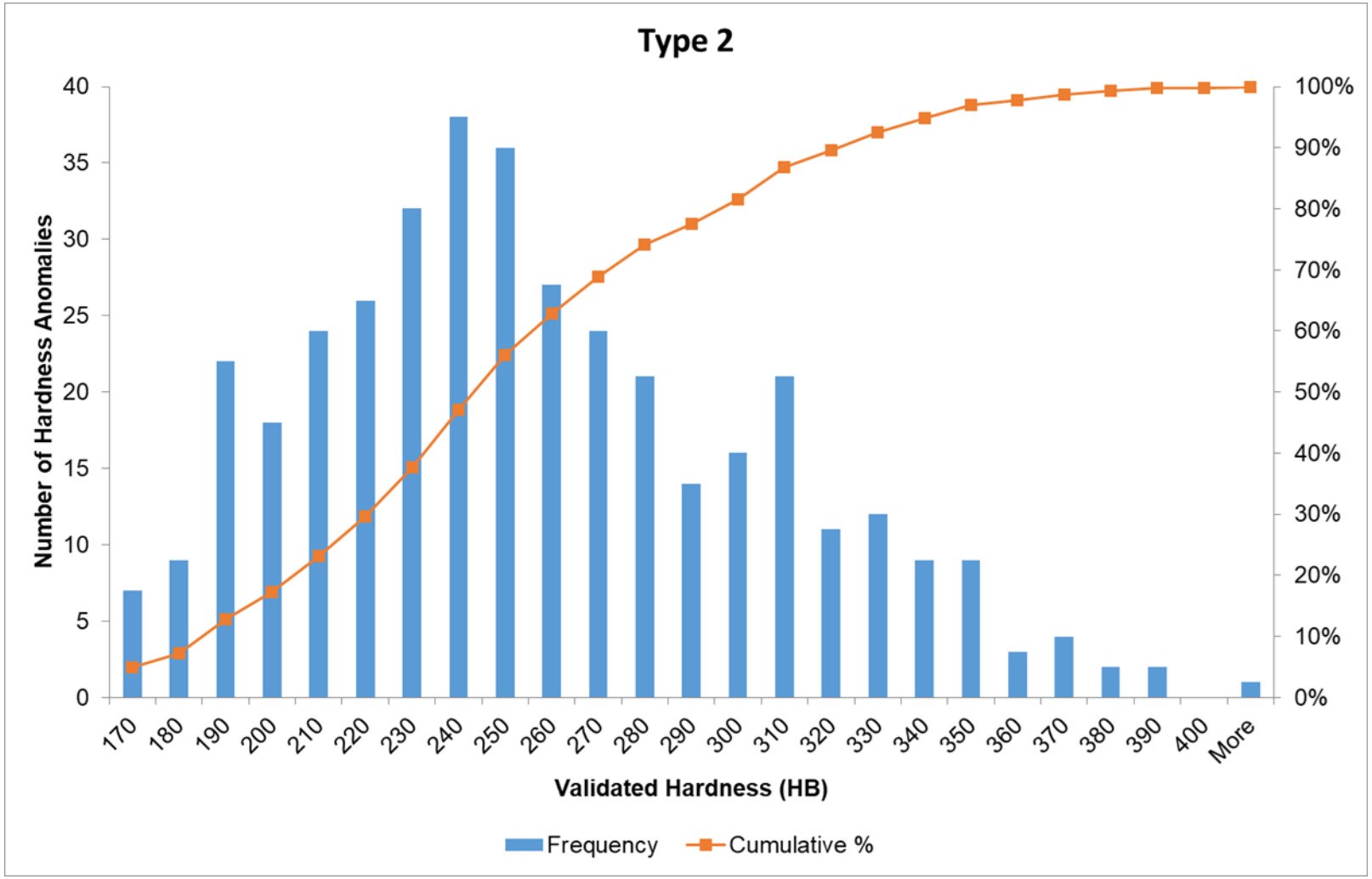
Inspection History (2019 – Q3 2023)



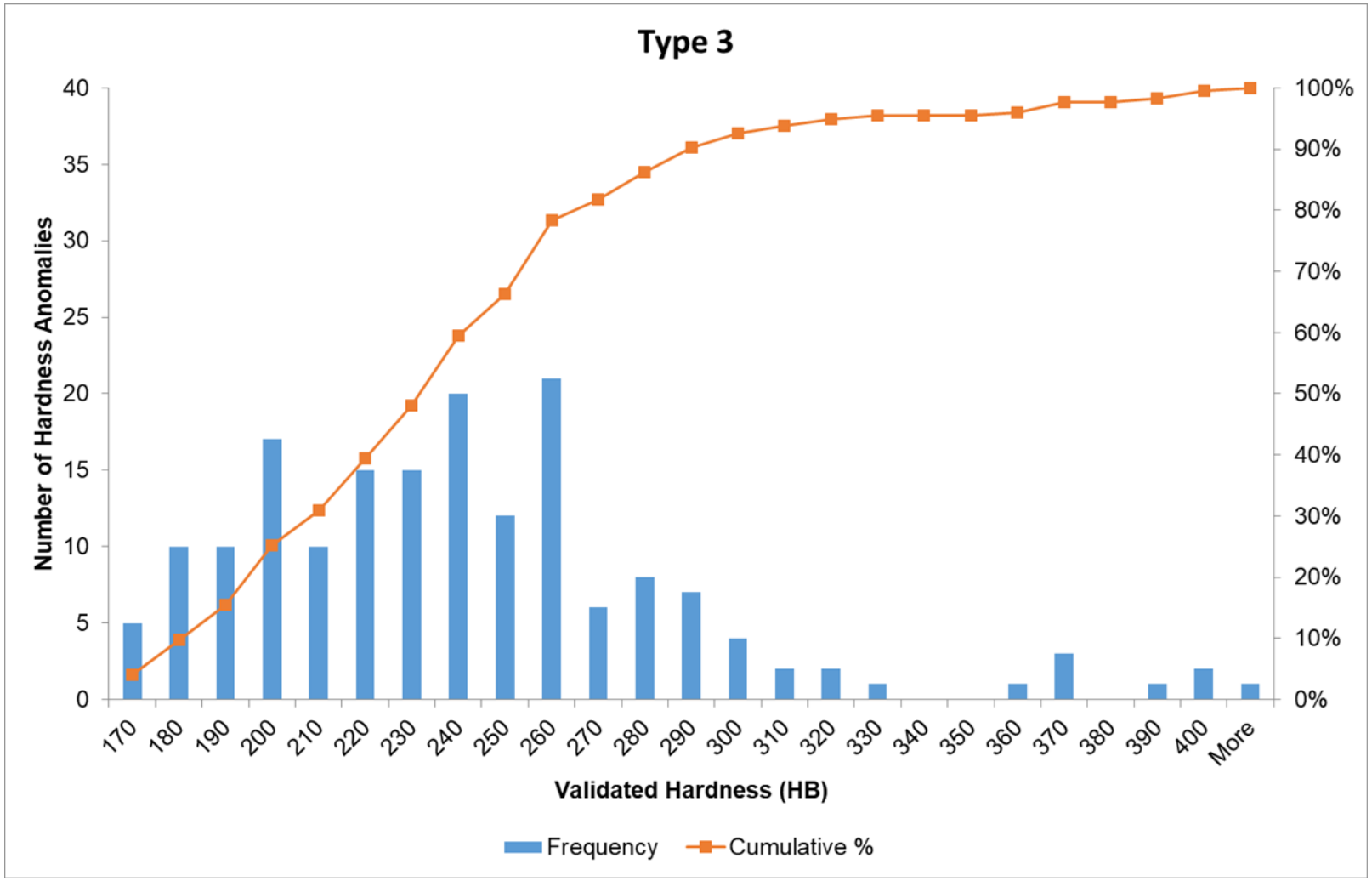
Validation Data – Type 1



Validation Data – Type 2



Validation Data – Type 3



Deliverable

- **RoMAT DMG provides:**
  - Axial and circumferential locations of hardness anomalies
  - Dimensions: length and width (in)
  - Absolute hardness value (HB)
  - Type of hardness anomaly
  - Surface location
  - Base hardness estimation (HB)

Discussion

Challenges

- Possibility of internal hardness anomalies that cannot be validated via NDE
- Limitation of NDE technology to capture max hardness within a volumetric hard spot
- Variances among NDE hardness validation procedures
  - Hardness measurements: UCI, Rockwell, Leeb
  - Grid size
- Other unknown types out there / limited understanding

Continuous improvement

- Refining / developing hardness sizing based on in-ditch / destructive testing
- Incorporating knowledge from industry studies to optimize detection and identification

thank you

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