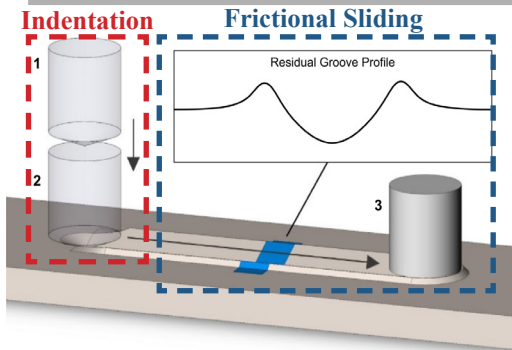# HSD Tester
Nondestructive Material Strength Verification and Long Seam Identification

With the Hardness, Strength, and Ductility (HSD) Tester, MMT provides customers with essential material data for their pipeline assets. The HSD reliably identifies longitudinal seam type and accurately measures yield strength, ultimate tensile strength, and strain hardening behavior of in-service pipelines without sample removal or service interruption. Operators agreed that the data provided by MMT supported decision making for:

- Integrity management and prioritizing maintenance schedules
- Extending the life of assets and making repairs to those in need
- Confirming grade and completing MTRs

Robust. Accurate. Reliable.

Indentation **Frictional Sliding**

Residual Groove Profile

Robust Technique

Indentation - Utilized by other instrumentation manufacturers

MMT's HSD Tester - The **only** portable implementation of frictional sliding which allows for:
- Accurate Predictions: 2.5x lower maximum error than indentation
- **Reliable Testing: More data in less time, detects material variation, and not affected by vibrations**

Unparalleled Accuracy

From PRCI NDE 4-8 comparative validation report, the HSD is *"the best performing technique with the lowest MAPE, highest correlation coefficients, and highest quantity of data within the specified error bands for both YS and UTS."*

Source	Mean Absolute % Error	R-squared	+10% / -10%	+10% / -15%
MMT (NDE-4-8)	7.0%	0.70	76%	88%
MMT (2019)	5.2%	0.83	88%	92%
MMT (2019) results for seamless pipes and homogeneous steel plates:			93%	97%

Performance has reached industry expectations

Reliable Performance for Every Application

Long Seam Identification Method

MMT was able to reliably classify over 30 ERW segments for a single operator using our seam classification methodology. All joints were accurately classified as HFN-ERW as anticipated *(right)*.

Unique Ability to Test Fittings and Complex Shapes

The versatility of the HSD Tester ranges from 2" to 60" diameter pipes, flat plates, and has the ability to test complex fittings such as elbows, T-joints, reducers, and more.

Reliable Performance on Seamless Joints

Performance on 30 seamless and homogeneous plate samples show 93.3% of predictions within +10% / -10% difference *(table above)*.

Classification Tree

Normalized ΔHSD Hardness (%)

Normalized L_{HAZ} (%)

- LF-ERW
- HF-ERW
- HFN-ERW
- Field

19040