

Validating Machine Truth

The Motion Validation Envelope™: alignment creates confidence; discrepancy creates evidence.

1 What is the Motion Validation Envelope™?

The Motion Validation Envelope™, or MVE™, is the core validation construct within BoundaryScore™. It defines the acceptable relationship between directly measured physical motion and selected, commanded, estimated or reported machine states under specified conditions. It is an envelope rather than a single perfect value because real machines operate across changing speeds, surfaces, loads and environments.

2 Why does machine performance need to be independently validated?

A machine's internal account is produced by its own sensors, software and assumptions. That account may be accurate, but it is not independent proof of the physical outcome. Validation compares what the machine says with what it actually did. This creates stronger evidence for operators, engineers, customers, insurers, regulators and others who need confidence without opening the proprietary technology stack.

3 How does the Motion Validation Envelope™ work?

Direct motion measurements are time-aligned with selected machine-reported states and operating context. The applicable methodology establishes expected ranges and tolerances for the system, software version and conditions. Each observation is evaluated for alignment, while performance over time reveals consistency, drift and meaningful discrepancy. Those results become traceable inputs to BoundaryScore™.

4 What does operating within the envelope mean—and what does it not mean?

Operating within the MVE™ means measured motion aligned with the applicable reported or expected state within the defined tolerance. Repeated alignment increases confidence that the machine's account reflects its physical behavior. It does not certify universal safety, prove every subsystem is correct, predict future performance or determine legal fault. It validates a defined relationship under defined conditions.

5 What happens when measured performance falls outside the envelope?

A material discrepancy is preserved, time-aligned and evaluated by severity, duration, frequency and context. For example, a machine may report that commanded braking occurred as expected while direct measurement shows materially different deceleration. The excursion is a signal—not an automatic conclusion of danger or fault. It may prompt diagnostics or investigation and may lower BoundaryScore™ under the governing methodology.

6 Can a manufacturer or operator turn off MVE™ monitoring or the resulting rating?

No. A participating machine cannot disable monitoring or exclude unfavorable periods from its rating. A defined temporary exception applies only when the machine is undergoing verified maintenance or a hardware or software upgrade. That status and timing are recorded, and the changed system must complete the applicable validation process before its performance is treated as current and comparable.