Western Instruments

Established 1965

Pit Gauges – History and Development

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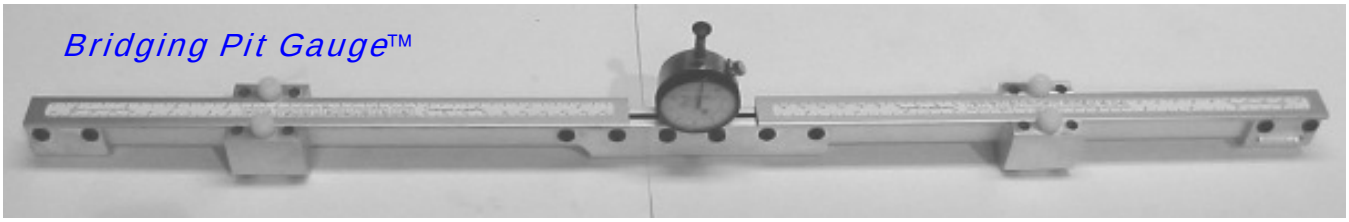
Background

A means of Pit Depth Measurement has been a requirement of Corrosion Inspectors for many years. Inspectors, being a creative lot, have adapted and developed many different tools for the measurement of Corrosion. The original Pit Gauge was patented in 1935 by J. Campbell Stirling and assigned to his employer Stanolind Pipeline Company (now Amoco). The original tool was a Lever Type Pit Gauge, commonly referred to as a *Pipe Pit Gage*. The exact design of the Stirling Pipe Pit Gage, has been simply copied by others with little or very minor change.

Years of Evolution

The most popular of these Stirling 'knock-offs' was the Thorpe Pipe Pit Gauge, however since Stirling's patent any further development ceased, However Stirling's incredibly simple product became an industry Standard for 60 years. As a result, of Corrosion Inspectors complaining about the limitations of *the Thorpe (Stirling)*, the development of our *Bridging Pit Gauge*™ resulted.



As the operational envelopes of Pressure Equipment (Pipelines, Boilers, Vessels, Piping, and Storage Tanks), Oil Country Tubular Goods (Tubing/Casing, Drill Pipe, BHA's), Bridges/Structures, Concrete, and Aircraft Components were pushed, so were their Corrosion Allowances, however today we see an unparalleled safety record. Unfortunately tools were slow to evolve, simply due to cost, but as the cost of equipment (and failures) increased, so did the perceived need (and cost) of equipment to measure Corrosion, increased.

Inspectors were constantly required to perform more accurate measurements of Pit Depth, however their tools were inadequate. Other tools were "adapted" for Pit Measurement, such as Machinist's Depth Gauges, but when high performance is required, adaptation simply isn't good enough. While the Dial Indicators (and Micrometer Barrels) used in Depth Gauges were an improvement in accuracy, they were cumbersome to use in the reality of field inspection. Furthermore, dial indicators were expensive and any modification to them was cost prohibitive.

With the advent of Automatic Machining, and Computer Aided Designs, manufactures of Dial Indicators were more readily able to perform short runs, with very specific

modifications. This lead to the development of Dial Indicator Pit Gauges, while still expensive, these tools provided more accurate measurements, at a cost. With

worldwide competition, we see the cost of these 'task specific' Dial Indicators coming down. Furthermore, with an aging infrastructure the demand for corrosion measurement and monitoring has increased substantially. Over the last 20 years we have seen this industry evolve, with companies specializing in Corrosion Measurement and Monitoring. Specialized manufactures have evolved, such as ourselves, manufacturing industry specific tools. As Business 101 has taught us, when there is a demand, a supply will soon follow. Today we see Digital Indicators, and specialized fixtures, with their increased cost, being offered and used.

Basic Requirements still exist

Manufacturers often lose sight of basic requirements and only address the advancement of their technology. Today we see the use of Highly Specialized Computer Controlled CMM's (Coordinate Measuring Machines) Mapping entire areas of Weight-Loss Corrosion, today's ultimate Pit Gauge costing over $50,000. While these specialized and advanced tools fulfill a niche in industry, they require a skilled technician to operate, a specialist to interpret, and skilled maintenance and repair personnel.

When an inspector is not familiar with specialized measurement tools, such as Dial or Digital Indicators, a Dial Indicator Pit Gauge can be an intimidating piece of equipment. It was not recognized until recently that the greatest demand for Pit Gauges is not advanced tools, but still the simple Lever Type Pit Gauge, a tool that hasn't changed in 40 years. Today however, with the common availability of Dial Indicator Pit Gauges, Pointer Type Gauges are accepted for evaluating corrosion, rather than providing acceptable accuracy.

Development comes full Circle

The Corrosion Measurement Industry, the Reference Specifications Employed, and Regulatory Jurisdictions, are as diverse as the cultures of the countries they exists in. This is further complicated by the Imperial and Metric Measurement systems. Simple Lever Type Pit Gauges have not evolved to meet the Industry's requirements. As an example, a Gauge does not exist with both Metric and Imperial Scales, something inspectors have had to deal with by conversions. A development program was undertaken to test and identify the benefits and shortcomings, of Lever Type Pit Gauges, correct them, and manufacture them economically.

The result of this program is a simple to use Lever Type Pit Gauge, with a Metric and two Imperial Scales, a unique Pointer that aids the inspector to eliminate alignment errors, and a Patent Application. This same Gauge has applications for Weld Inspection with such capability as measuring; Undercut Depth, Weld Crown Height, a Porosity Comparator, with Metric and Imperial rules.

We named this new Lever Type Pit Gauge as the *Tri-Gauge*®, to reflect its versatility. Within a few years, inspectors were asking for a smaller model, so we developed the *Jr. Tri-Gauge*®, with similar functions,

Tri-Gauge® Supplement

Tri-Gauge®

Jr. Tri-Gauge®

The *Tri-Gauge*® offers a Depth / Height range of +/-12.5mm (0.500”), with an accuracy of 0.5mm or a little finer with +/-0.010”. The *Jr. Tri-Gauge*® offers a Depth / Height range of +/-3mm (0.100”), with an accuracy of 0.5mm or a little finer yet at +/-0.005”. Both models are fitted with a Patented *Pointer Offset Correction* for improved accuracy and repeatability by reducing parallax. Lever Pit Gauges are intended to Evaluate Corrosion, and not as an absolute measuring tool.

Pointers for all Three Scales

Pointer Offset Correction