Overview

Although the transportation of solids in the form of slurries is basically older than history—the blood circulating system in mammals involves the use of a positive displacement pump forcing a slurry of solid corpuscles in liquid serum through a complex pipeline—the slurry transportation of solids through long pipelines has been undertaken only in about the last 25 years.

The first long coal-slurry pipeline was built in 1957 from Cadiz, Ohio to Cleveland, a distance of 110 miles. The success of this project prompted the construction of pipelines in Arizona, Tasmania, Brazil, Mexico, and Russia, to name just a few locations. These systems have proven their worth, and slurry pipelining is now a viable and competitive method of solids transportation.

In the domain of abrasive wear, particularly that wear encountered in handling abrasive solid particles, much work has been done in the past half century with regard to "dry" abrasivity, but only in more recent years has interest grown in "wet" abrasivity, namely slurries.

With the advancement of the slurry pumping industry, a need naturally arose for data on the effects of different slurries on equipment as well as for data on the most abrasion-resistant materials available. It was logical that ASTM Committee G-2 on Wear and Erosion would inherit that task. Subcommittee G2.30 on Abrasive Wear agreed that a symposium on the subject would be of value to the slurry industry. Therefore, the International Symposium on Slurry Erosion: Uses, Applications and Test Methods was organized and sponsored by ASTM, The National Association of Corrosion Engineers, The Slurry Transportation Association (now known as the Slurry Technology Association), and the American Society of Metals. The Symposium was held in Denver, Colorado, on 26–27 June 1984.

The fact that most long slurry pipelines utilize water as the fluidizing medium introduces a pernicious combination of abrasion-corrosion, the effects becoming exponential over the effects of abrasivity alone added to the effects of corrosivity alone. Accordingly, corrosion engineering becomes involved in slurry pumping. Unless the test slurry is purposely inhibited, the effect of both abrasion and corrosion will appear in most test procedures described in this book, whether intended or not. This is as it should be for, after all, if the slurry being considered for a pipeline is corrosive, one would have to accept the combined effects on the "wear" of the pipeline equipment.

Herein one will find details of a wide variety of tests that cover the development of such wear- and corrosion-resistant materials, including metals, organic materials, and coatings. Many of the tests pertain to coal slurry, perhaps the most important phase of the industry.

There could be speculation and perhaps controversy over the slurry erosion tests described in these papers, but each one has merits that could be important to the industry. Anyone involved with slurry pumping should find the information contained in this book of value. The publication is worthwhile as a stimulus to much more needed study, investigation, and experiment aside from its value as a communication tool between the laboratory and the field.

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Potential Areas For Standards Development

A panel discussion was held at the conclusion of the two-day international symposium. The specific topics reviewed focused on each of the four program areas: Materials, Process (Fuel) Slurries, Applications, and Test Methods.

The following list is a summary of the symposium consensus that future work in each area would benefit and advance the field of slurry technology:

- Develop a "guide" for data logging and test procedures to improve the correlation of laboratory tests with field performance tests.
- Sponsor "round-robin" test comparisons and publication of results.
- Develop slurry erosion terminology and definitions for addition to G-40 [ASTM Terminology Relating to Erosion and Wear (G 40-83)].
- Standardize (nonstandard) uses of the Miller Number G-75 practice, for example, materials, pH, and slurry content [Test Method for Slurry Abrasivity by Miller Number (G 75-82)].
- Develop reference materials, slurries, and blank test methods.
- Promote test methods and develop procedures for polymer and elastomer materials evaluation.
- Sponsor future symposia on the basic mechanics of erosion-corrosion focused on analytical methods, for example, electrochemical analysis.

The G-2 committee on Wear and Erosion actively encourages the participation of academic, industrial, and government laboratory investigators to join in the development of slurry erosion standards.

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