

History Leads to Innovation and Development of Major Sulfuric Acid Plant Equipment

By: Leonard J. Friedman and Samantha J. Friedman, PhD – Acid Engineering & Consulting, Inc.

Bio:

Len Friedman is president of Acid Engineering & Consulting, Inc. The company has been involved in the design and operation of over 275 sulfur dioxide scrubbing and sulfuric acid plants. Len has over 54 years of experience in the design and operation of chemical plants specializing in sulfur dioxide scrubbing and sulfuric acid.

Len has a degree in chemical & nuclear engineering with graduate work in nuclear engineering and business administration. He is a member of TMS and a Distinguished Fellow of AIChE. Len is a licensed professional engineer, and published over 135 technical papers.

Abstract:

Those that ignore history are destined to stagnate with the same designs and make the same mistakes. Learning from the past encourages innovation, improves designs and leads to advances in materials and equipment designs.

For example: Acid coolers have gone from cast iron pipes submerged in cooling water baths, to jacketed double pipe cast iron trombone coolers, to vertical parallel banks of extended surface cast iron "S" shaped AX coolers, vertical stainless steel shell and tube coolers of the 1950's, stainless steel plate coolers, stainless steel extended surface air coolers, to today's anodically protected stainless shell and tube coolers (1970's), or non-anodically protected silicon stainless steel shell and tube coolers (2010's). The acid cooler equipment and material progression shows how understanding history and previous designs and their problems, leads to new or innovative designs, or improvements of old designs.

The same is true of acid towers where changes from history have gone from cast iron towers, to brick lined towers and now back to metal towers of stainless steel and silicon stainless steel. Converter progression is much the same going from horizontal cast iron to vertical carbon steel and cast iron to vertical central tube steel-cast iron or stainless steel.

This presentation reviews the history of major sulfuric acid plant equipment from the early 1900's when large plants were 25 to 100 STPD single train single absorption units through today's modern designs of 5,000 to 6,000 STPD single train, single or double absorption designs.