

Tuesday Morning, October 29, 2013

Vacuum Technology

Room: 202 C - Session VT-TuM

History of Vacuum Technology

Moderator: J. Hochrein, Sandia National Laboratories

8:40am **VT-TuM3 60 Years of Vacuum Gate Valve Developments, J.F. Hartnett**, Vacuum Research Corporation **INVITED**

In the early 1950's the vacuum industry was just beginning and there were few commercially available components, such as gate valves, for those working in the field. In 1953 three people in northern California formed Vacuum Research Corporation and began a collaboration to develop low cost gate valves for use in high vacuum.

Andrew Guthrie (1915 – 1977) worked at what was then known as the 'Rad Lab' and in 1963 published Vacuum Technology (ISBN 63-20631).

Ernest Martinelli (1919 – 2010) also worked at 'Rad Lab'. He spent many years as deputy chief of the physics department at RAND Corporation.

Hugh Perazone (1900 – 1974) owned and operated a permanent mold aluminum foundry.

Between 1954 and 1963 VRC was issued four patents. Although these patents are long expired the VRC claims are still used today by almost every manufacturer of vacuum gate valves.

Rotary actuator shaft seals as still used today in the VAT Series 14, GNB C-Style, and VRC LPWA Bonnet and OP One Piece styles.

High conductance oversize bores using flanges with the standard ANSI (ASA) bolt circle and outside diameter but with larger inside diameters for higher conductance still used today by almost all vacuum valve makers including VAT, GNB, VRC, HVA, etc.

Remote actuation automatic electro-pneumatic actuators that allowed easy operation of gate valves, even when located in difficult to reach or hazardous locations.

Bonnet style body construction that allows all moving parts to be removed for cleaning or replacement in less than five minutes and without disruption to the pump stack or piping.

Throttle valves with powerful servo motors that also provide leak tight shut off and an unobstructed high conductance port eliminating the need for separate throttle and pump isolation valves.

Protective ring gate valves for dirty applications such as investment casting furnaces.

Water cooled gate valves with both water cooled gates and port flanges.

Rectangular port valves with ports up to 3 meters wide.

Fast closing valves that can close in milliseconds.

Many manufacturers have continued to work on gate valve developments and some of the more interesting developments are:

Pendulum plate valves

Port sizes up to 52" (1320 mm) and beyond

Aluminum valves with aluminum Conflat® flanges

9:20am **VT-TuM5 A History of Vacuum from My Perspective!, K.J. Lesker III, K.J. Lesker IV**, Kurt J. Lesker Company **INVITED**

Having grown up working for my Dad (beginning wage \$0.25 per hour) in our business which started in 1954, I have met a lot of people who started companies, where instrumental in vacuum companies, created new technologies, and competed or collaborated with many companies and people in the vacuum industry. Our industry starts to move forward in the late 1800s, but it is not till WWII and afterwards that it really get moving forward and Vacuum gets used to make many products and used in research to advance technology and the quality of life. I want to go back to before vacuum existed (or was thought not to exist) briefly and explain why there was no such thing as vacuum. How vacuum gets discovered, how it starts to flourish and then grows. There are interesting scientists, vacuum figures and industrialists that drive things ahead. Then I want to bring in the companies of today which form and thrive or merge and get acquired. Hopefully, there will be a few or several moments of "I didn't know that?" or "So, that is the guy or reason these things or companies happened?!" I hope it will be interesting and fun!

10:40am **VT-TuM9 How We've Learned More & More About Less and Less So That Now We Know a Whole Lot About Nearly Nothing - Vacuum Measurement Over the Years, S.R. Goldfarb**, Consultant **INVITED**

Not only have the instruments used to monitor, measure and analyze vacuum evolved over the years, but the terminology has also undergone change. So herein I attempt to create a perspective of where we were in ancient times before I came on the vacuum scene, and continue through the subsequent half century to the present. I start with a requisite but brief description of a "vacuum", then compare the various units of measure, their utility, and the wide variety of tools we once employed and currently employ to characterize the vacuum environment. In addition, I relate how the requirements of various vacuum processes have driven instrumentation design.

11:20am **VT-TuM11 The Quest for Extreme High Vacuum, H.F. Dylla**, American Institute of Physics **INVITED**

The quest for obtaining and controlling an extremely low gas density environment, typically classified by the vacuum science community as extreme high vacuum ($< 10^{-10}$ Pa), has been a journey spanning more than a half century. Unlike other quests for pushing a parameter on the scientific frontier, the push for the extreme high vacuum environment has not been driven simply by the desire to claim a new record breaking parameter. Rather, the need for an extreme high vacuum environment has come primarily from scientific and a technical applications which have driven the march to higher vacuum environments. This paper will review the interplay of applications that have required extreme high vacuum and the technology needed to produce, sustain and characterize the environment.

Authors Index

Bold page numbers indicate the presenter

— D —

Dylla, H.F.: VT-TuM11, **1**

— G —

Goldfarb, S.R.: VT-TuM9, **1**

— H —

Hartnett, J.F.: VT-TuM3, **1**

— L —

Lesker III, K.J.: VT-TuM5, **1**

Lesker IV, K.J.: VT-TuM5, **1**