the Bell Jar
Vacuum Technique and Related Topics for the Educator & Amateur Investigator

Notes from the Vacuum Shack **No. 1 December 2019**

This is the inaugural issue of what will be a periodic update on vacuum related news and other topics that might be of interest to the amateur scientist or technology educator. For those who are familiar with the original printed newsletter, this publication will be relatively brief with expanded content, if applicable, on the web. Topics will include news, pointers to articles of interest, activities and projects of amateurs, educational resources and perhaps an occasional article that was in the original *Bell Jar*. As was the case with the print journal, contributions to this letter will be welcome. This could be in the form of brief notes up to detailed project information.

What's Going On with belljar.net?

A few months ago I began a total revamp and update of my site at http://www.belljar.net/. It had pretty much lain dormant since around 2012. Some pages that have aged poorly are gone. A new set of education pages have been added (see the note on vacuum training systems further below). I've also been dusting off my equipment and parts stockpile. A few interesting projects are in the works.

The End of Brass Vacuum Components

Over the years I have amassed a fairly large pile of brass vacuum components. Most of these were KF flanges, all sized to fit standard copper piping. With some flanges, tubing, a plumber's torch and some silver-tin solder, fairly complex apparatus could be constructed at much less cost than with standard stainless steel fittings. Of course, there are temperature and other limitations with brass, but for most medium to high vacuum use, brass was very useful.

Sometime after 2014, it became harder to obtain brass components. In some cases, the prices of brass parts started to exceed those of similar stainless parts. With the enormous growth in vacuum usage in the semiconductor and thin films industries, new and used stainless components could be obtained at reasonable prices.

While some manufacturers just "disappeared" brass parts, ANCORP (formerly A&N Corp) has issued a formal announcement of the discontinuance of brass parts. See https://ancorp.com/wp-content/uploads/2019/10/Brass-Discontinuation-Notice-web.pdf

Richard Hull and the High Energy Amateur Science Gatherings

Richard was a long time contributor to *the Bell Jar* and we have stayed in touch on a regular basis by email and through his fusion forum on his site at https://fusor.net/ He writes:

> As you may know, I have held the yearly conclaves for Tesla Coilers and now fusioneers at my home each year. At these High Energy Amateur Science gatherings, about 50 folks from all over the nation show up to commune and flea market their goods from vacuum materials to high voltage items, minerals, nuclear instrumentation, variacs, etc.. This year was the HEAS 30th year at it. Turner broadcasting has a channel called the "Great Big Story". It is composed of short films about interesting folks and events. They came in October and recorded our event. Here is the link to the 3.5 minute film. Yes, it is kind of sappy and little of the science is seen, sadly. More of a people story.
>
> https://www.greatbigstory.com/stories/building-a-fusion-reactor-in-the-backyard
>
> The HEAS is a Richmond based group that meets monthly since it was the Richmond Robotics group in 1983 which morphed into the Tesla Coil Builders of Richmond, (TCBOR), in 1989 and then morphed again into the HEAS in 2000. We have never missed a monthly meeting at my home and lab since 1983. The average local monthly attendance is on the order of 7-14 people. According to my records that first big 1989 October Teslathon had 21 people show up and peaked at 68 people in 1998, and since then has averaged about 50 people. This year it was 52. It is now called the "HEAS Conference."

Vacuum Training Systems

I had the pleasure of driving the design, development, marketing and support of the vacuum trainers that were produced by MKS Instruments and The Science Source between the years of 1995 and 2015. All of the published documentation including set up, operating procedures and exercises is now available at http://www.belljar.net/education/education_home.html. For those with these systems, I can assist with obsolescence issues, sourcing of replacement parts, modifications, etc.

I am also in the process of developing a new series of trainers. One will be similar to the MKS and TSS offerings but with simpler construction. The other will be a very basic trainer with a highly efficient hand pump. Both of these will be able to be constructed in a modestly equipped home or school work shop and complete documentation will be made available.

Recent Articles of Interest in *Vacuum Technology & Coating* Magazine

I have been writing a monthly tutorial column for *VT&C* since early 2009. The column is titled "Guides to Vacuum Technology." I was talked into it by a former coworker who had been the sole author. He suggested that we do alternate months. After a few months he bailed to pursue other interests. I figured I could keep it going for 2 or 3 years. The column is still going strong after 10 years.

This section will highlight a few articles each month that should be of interest to the vacuum enthusiast. Articles may be accessed at http://vtcmag.com/. Scroll to the bottom of the page to the back issue selection box.

Amateur vacuum was recently covered in 3 issues of the magazine.

June 2019
Olde Tyme Vacuum: Some examples of vacuum practice from the 1930s to 1950s
This article begins with some examples from Johm Strong's *Procedures in Experimental Physics* (1938) and concludes with the rise of amateur involvement with vacuum including home-built vacuum systems and scientific apparatus.

August 2019
Vacuum and the Hobbyist: Amateur Scientists Making Use of Vacuum Technology – Part 1
This covers vacuum related articles in *Scientific American*'s "Amateur Scientist" column during the tenure of C.L. Stong. There is also an overview of *the Bell Jar* from its founding in 1992 through the present.

September 2019
Vacuum and the Hobbyist: Amateur Scientists Making Use of Vacuum Technology – Part 2
This covers the final years of the "Amateur Scientist" column where the last three vacuum articles were presented. Also included is information on the work of Richard Hull's fusor effort and how David Prutchi and his daughter Shanni have made use of vacuum apparatus in their promotion of the study of quantum physics through hands-on experiments.

What are You Working On?

Are you working on project involving vacuum that might be of interest to others? Maybe it's complete or maybe it's just in the formulation stage. Or perhaps it's somewhere in between. This is an invite to share your project in these pages.

That is all for this month.

Steve