EDITORIAL

Remembering Henry, Howie and Rudy

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Henry Pusey, Howie Gaberson and Rudy Scavuzzo were all dear friends of mine. They were role models and mentors, each in their own way. I met them all through the shock and vibration community. These three men, all leaders in the field, had long and distinguished careers as teachers, consultants and technical experts. However, my intent here is not to provide an exhaustive list of awards, papers, affiliations, titles and achievements, but rather to share a few personal and fond memories of each man.

Henry

Henry's career included a Bachelor of Science degree in physics from George Mason University (Phi Beta Kappa), a member of the technical staff of the Army Engineering Research and Development Laboratories, and a brief stint with Container Laboratories, Inc. This was followed by a decade-long career with the Naval Research Laboratory, working at the Mechanics Division of the Shock and Vibration Branch, later named the Shock and Vibration Information Center (SVIC). Henry ultimately became the fourth and final SVIC director until his retirement from government service in 1983, but this was far from the end of his professional career. He remained active in the shock and vibration community for more than 60 years. In later years, Henry was referred to by some as the "godfather of shock." Henry's professional career is well documented in his autobiography.[1] Henry was awarded the Shock and Vibration Information Analysis Center Lifetime Achievement in Shock and Vibration Award at the 79th Shock and Vibration Symposium in October 2008. Rudy made the presentation.

However, beyond his professional career, I would like to reflect on Henry the person. I met Henry shortly after his retirement from government service, which was when I first got involved in the naval shock and vibration business. I briefly talked to Henry at the 1985 Shock and Vibration Symposium in New Orleans, and got to know him better when I attended an April 1987 workshop Henry organized in Dayton, Ohio. The purpose of the workshop[2] was to establish the need for a shock and vibration Information Analysis Center (IAC) to replace the Shock and Vibration Information Center, which had been discontinued by the U.S. Navy. As it turned out, this is also where I first got to know better another friend, Dr. Rudolph (Rudy) Scavuzzo, who led the working group that I was assigned to at the

Rudy (right) presenting Henry the SAVIAC Lifetime Achievement Award.

Dayton meeting. The culmination of this workshop was that a Shock and Vibration Information Analysis Center (SAVIAC) was established in 1990. In the interim years between the 58th and the 61st Shock and Vibration Symposium, Henry and his wife Sallie personally kept the S&V Symposium going during the four-year gap on a non-interrupted basis, with funding provided by the Naval Surface Warfare Center/White Oak, Maryland.

My first impression of Henry at the Dayton workshop was that he was friendly and personable, certainly not pretentious. Through the years I never once saw Henry "lose his cool." I enjoyed seeing his name appear on my office phone display and always liked talking to him, even when he sometimes called me by mistake. Henry's sight was failing in his later years, and he would sometimes accidently hit my dial button on his phone when he was actually trying to call someone else.

Upon graduation from Milford High School in Delaware, Henry did not immediately enter college. Instead, he enlisted in the U.S. Army, in part to take advantage of the GI Bill. This led to a very interesting assignment at the Nuremberg War Crimes Trials. During his tour of duty at Nuremberg, Henry had a number of duties which included escorting the wives of the Justices of the British Supreme Court, buying liquor dispensers for the officer's club and guarding a trailer full of cigarettes. Two of the more memorable events at Nuremberg involved Rudolph Hess and Rita Hayworth. Henry once spoke to Rudolph Hess, who was in a basement cell at Nuremberg. Henry said, "Guten tag, Herr Hess." Hess did not

Drew Perkins of HI-TEST Labratories (left) and Ed Alexander presenting Howie the SAVIAC Lifetime Achievement Award.

respond. Another notable event was that Henry served as a guide for Rita Hayworth. He even danced with her (secretly at her request) at the enlisted men's club, much to the chagrin of his army buddies.

Many of us did not realize that Henry was a singer. Since I have been involved in music one way or another all of my life, this provided another connection with Henry. He once sang the lead part in *HMS Pinafore* in a community theater. Henry's favorite singer was Patsy Cline, and he once suggested that my band, Purgatory Creek, do more Patsy Cline music, especially *Crazy* which was his favorite song. I found out later that Patsy Cline was from Winchester, Virginia, which was where Henry and Sallie, his wife of 41 years, lived.

Another little known fact about Henry was that he served as president of the Culpeper Minutemen Chapter of the Virginia Society of the Sons of the American Revolution. Henry was installed as president of the Minutemen chapter in January 1998.

Just prior to Henry's death in December 2014, HI-TEST Laboratories published his autobiography[1] and shortly after Henry's death, Drew Perkins (HI-TEST Laboratories) wrote and distributed a thoughtful description of Henry's long and successful professional career, which ultimately lasted more than 60 years.

Howie

As was the case with Henry, I became acquainted with Howie Gaberson through the shock and vibration community, and over the years we became friends. Howie was devoted to the pseudo-velocity shock spectrum (PVSS), and he spent much of his professional career trying to convince structural dynamic engineers that the PVSS was superior to the shock response

spectrum (SRS) as a measure of system damage. Howie ultimately developed a short course to preach this gospel on the virtues of the PVSS as well as the shortcomings of the SRS.

I nominated Howie for the SAVIAC Lifetime Achievement Award, which he received at the 78th Shock and Vibration Symposium in 2007. I was happy and proud to be the person who introduced him during the ceremony and to present him with the award.

Howie came to the Mayo Clinic in Rochester, Minnesota, annually for health checkups. He would fly into the Twin Cities, which is where I live, and occasionally I could convince him to either stop by my house for dinner or agree to meet Sally, my significant other, and me for dinner at a restaurant close his hotel. One of the times he agreed to come to my house, I even managed to get him to take a boat ride on Lotus Lake where my boat was docked. When he came to my house, I always made sure that I had a bottle of Tanqueray and a fresh bottle of tonic water for him.

I recall that during the 77th Shock and Vibration Symposiums held in Monterey, California, Sally and I offered to take Henry and Howie out to dinner at Clint Eastwood's Hog's Breath Inn in Carmel. Howie got a suspicious look on his face, turned to Henry and said, "I'm not going to one of those beer and wine joints!" I assured Howie that he could get a proper meal *and* a proper cocktail at the Hog's Breath Inn. He ultimately consented and we all had a good meal.

Howie's lifelong passion was the pseudo-velocity shock spectrum. Howie and Dick Chalmers started working on the PVSS back in the 1960s. At the time, Howie worked at the Navy Facilities Lab in Port Hueneme, California, and Chalmers worked at the Navy Electronics Lab in San Diego. The term pseudo-velocity shock spectrum is used, rather than an actual velocity, because the pseudo-velocity is obtained by determining the peak relative displacement of a single-degree-of-freedom (SDOF) oscillator relative to a moving base, multiplied by the natural frequency of the SDOF oscillator. Howie always made the point that a proper plot of the PVSS should be presented on log-log four-coordinate paper, where the vertical ordinate is velocity. Howie's and Chalmers' point was that damage is more closely related to induced velocity, which is apparent from a PVSS plot, rather than peak acceleration, which is apparent from an SRS plot. Further, velocity has a more direct relationship to energy ($1/2\ mv^2$) than does peak acceleration.

Howie spent the last 30 years of his life educating structural dynamic engineers about the PVSS. Howie and Chalmers even designed an experiment to prove that the PVSS was most likely to predict damage based on subjecting identical equipment to six different shock inputs; three from drop tests and three from MIL-S-901D UNDEX tests. The equipment used in the testing were identical squirrel cage blowers. Five of the six tests failed the respective blowers, and only one of the test inputs did not fail a blower. Sure enough, as Howie predicted, it was not clear from the SRS plots which input did not fail the blower. It wasn't until the input accelerations were plotted as a PVSS on four-coordinate paper that it became clear which base accelerations caused five blowers to fail, and which one did not. The result was that the lightweight shock machine (LWSM) did not fail the blower, even though the peak acceleration input was nearly 1,000 gs which was significantly higher than most of the other inputs. On the SRS plots, the LWSM had among the highest peak acceleration, but the LWSM PVSS clearly had a lower maximum velocity than the other five acceleration inputs. Touché!

In his later years when his health was failing, Howie could not always travel and asked me to fill in for him teaching his PVSS short course. I taught his course several times while Howie was still alive, the first of which was when HI-TEST Laboratories took our shock courses to Melbourne for the Australian Ministry of Defense. Subsequent to Australia, I continued to teach Howie's PVSS shock course through HI-TEST Laboratories until it was discontinued. Howie once said to me, "Learn this stuff real good so you can keep teaching it when I can't anymore."

Rudy

Rudy Scavuzzo also had a long and successful career and ultimately became the department head for mechanical engineering, and the associate dean for the College of Polymer Science and Engineering at the University of Akron. Rudy was awarded the SAVIAC Lifetime Achievement Award at the 72nd Shock and Vibration Symposium in 2001 in Destin, Florida.

I first got to know Rudy at the aforementioned conference/workshop in Dayton to establish the need for a Shock and Vibration Information Analysis Center to replace SVIC.[2] We split into six working groups, and Rudy was the leader for my group. As was the case with Howie and Henry, I had great respect for Rudy's abilities and even tried to arrange to have Rudy be my Ph.D. advisor in the mid 1990s when I was just starting my research at the University of Minnesota. Rudy was willing to accept me as one of his students, which I greatly appreciated, and it would have been a good fit, since my research was related to mechanical shock and spectral methods. However, since Rudy was a professor at the University of Akron, I was not able to convince the University of Minnesota administrators to accept the arrangement, which was unfortunate.

As was the case with Howie, I ultimately ended up teaching Rudy's material for the HI-TEST Practical Shock Analysis And Design Class. The origins of this shock course date back to the early 1980s. Rudy and Henry developed a ship shock course, under a consulting agreement with NKF Engineering, to be presented to Lockheed Ship Building in Seattle. This course was successful and so well received by Lockheed that ultimately the content was expanded to five days and presented to other shipyards, including Newport News Shipbuilding, Avondale, Ingall's Shipyard and Bath Iron Works. The course was eventually offered to the public and changed hands several times until HI-TEST assumed ownership. Rudy, Henry and others continued to instruct the course. Starting in 2009, however, Rudy was not able to consistently teach the class do to health issues, and Henry asked me if I would fill in for him occasionally. When I first studied Rudy's slides, it was a steep learning curve. Rudy was the quintessential absent-minded professor, but don't get me wrong – Rudy clearly knew his stuff correctly. I continue to use much of his material for the HI-TEST Practical Shock Course and have now supplemented it with much of my own material.

Another thing I had in common with Rudy, although we didn't know it at the time, was that we both lived in Pittsburgh and worked at the Westinghouse, Bettis Atomic Power Laboratory, just not at the same time. Rudy worked for Bettis in the 1960s and I worked at Bettis in the 1970s. Both Rudy's M.S. and Ph.D. were from the University of Pittsburgh, awarded in 1959 and 1963, respectively. It took me a little longer; I didn't finish my Ph.D. from Minnesota until 2015.

Rudy was not only very prolific as an engineer, but also as a husband and father. Rudy and his wife Peggy Ann had 10 children, 28 grandchildren and five great grandchildren! Sadly, we did not see his wife or children often at Shock and Vibration Symposia over the years. They were present in 2001 however, when Rudy was awarded the SAVIAC Lifetime Achievement Award for 50 years of contributions to the field of shock and vibration.

Final thoughts

The shock and vibration community lost Howie, Henry and Rudy in rapid succession; June 2013, December 2014 and April 2016, respectively. These men made major contributions in the field of shock and vibration, each in their own particular areas of expertise. All received SAVIAC Lifetime Achievement in Shock and Vibration Awards. When I finished my Ph.D., I dedicated my thesis to these three individuals. They provided not only guidance to me, but also to hundreds of other engineers in the field of shock and vibration. They were my inspiration, mentors and role models. I owe a debt of gratitude to all and miss them greatly.

References:

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2. Pusey, H. C., *50 Years of Shock and Vibration Technology*, The Shock and Vibration Information Analysis Center, Booz-Allen & Hamilton, Inc., Arlington Virginia, 1996. SV

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