

SEM HISTORY

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William T. Bean, Jr.

Experimentalist, Consultant, Master Showman

My first glimpse at personalities in SESA came through stories brought back from the early Society meetings by my mentors, Erv Stitz at Purdue University and Tom Dolan at the University of Illinois. Their most vivid descriptions of the meetings usually were about W. T. (Bill) Bean. Although Bill's time and my time at Purdue overlapped (he was a graduate student when I was a freshman) we never met until May 1949, when I attended my first SESA meeting. I found him to be jovial, friendly, and every bit as colorful as he had been depicted by all those stories. To me he was one of the SESA heroes, and from the very beginning of the SEM History Series I have intended to include an article about Bill Bean. Although I have heard him talk countless times, and have reread many news items about him in old volumes of *Experimental Mechanics*, I remain deeply indebted to Pete Stein for much of the material in this article. Pete also furnished the photo of Bill Bean, Ferdi Stern, and Greer Ellis.

Hans Meier recently wrote in a SEM History article, "... Bill Bean, a master showman. He was a consultant to industry on dynamic strain measurement. As a showpiece he used an arrow with gages attached and trailing cables to his instruments. An eight-foot bow shot the arrow at a five-foot target ten feet away and invariably hit it. Then he proudly showed the impact-stress history recorded by his instruments." A photo of one

of his many performances is show above. He repeated that act so often that people started to say that the “W.T.” in his name stood for “William Tell.”

Bill has described himself as Ex-Wild-Catter, Ex-Cowboy and Ex-trovert, Unemployed, Unincorporated & Unconcerned. Bill attracted large audiences whenever he spoke because of his down-to-earth approach and because of his humorous style. Although he had a degree in Mechanical Engineering from the University of Oklahoma and a Masters Degree from Purdue, he enjoyed needling engineers and analysts. Some of his famous one-liners include:

- I was the fourth child in a family of five. My father was “Snap” Bean, boss of several oil patches in Southern Oklahoma. His evaluation of me was: “If I had gone to college, I wouldn’t be worth a damn either!”
- For determining stress distribution, a can of Stresscoat is worth about six mathematicians.
- When strength is based on weight alone, weigh the part and question the strength.
- A good design will fail if improperly processed.
- Photoelasticity shore is pretty!
- A bad design is like a rotten egg - its quality is apparent to everyone after it’s busted!
- Good Design + Good Material + Good Processing = Satisfaction.
- Some machine designers have a lot of experience - all bad!
- An engineer who thinks he can make enough assumptions to calculate the facts, is lacking in experience.
- The consulting engineer and the professor of engineering have a great deal in common. The consultant is that engineer who got tired of making an honest living, while the professor was too tired to begin.
- The metallurgist and the surgeon have a lot in common – they frequently destroy the evidence!
- Our universe is controlled by facts – not opinions!
- By the judicious use of strain gages, an engineer ultimately can become as proficient as the boss thought he was when he hired him.
- The analytical approach to design has been over-sold. It should be considered as a trial solution and not *the* solution.
- I asked Dennis Drew from Rolls Royce about his problems with strain gages. He said the biggest problem was not with strain gages but with Mechanical Engineers. He said they know Ohm’s law but did not approve of it.

Like his fellow Oklahoman, Will Rogers, Bill Bean had a dry sense of humor and a chuckle so could say these things without offending anyone.

Later Bill Bean wrote about himself, “I was born and raised in the oil fields of Oklahoma and got my degree in Mechanical Engineering from U of Oklahoma. I was sales and service engineer for the National Supply Co. and was not very enthusiastic about my job. Too much time spent traveling impassable roads at high speed. Christmas vacation 1939, my father-in-law, then President of Northeastern Oklahoma State University visited us and suggested we go duck hunting. We didn’t get any ducks but I got a chance at a new career. In the blind among the swampy reeds he asked me if I knew about the madman in Europe (i.e. Adolf Hitler). I didn’t know. He said we were all going to be involved in putting him down and that this would be a good time to consider my future. He also said he would finance my return to school. I accepted his offer and studied aircraft engine design, advanced engineering mechanics, fluid mechanics and

metallurgy at Purdue University for my Master's degree in 1942. ... There I met Irving Stets who taught me fluid mechanics (Bill meant Erv Stitz - good engineers are not expected to be good spellers!). I also studied metallurgy because I felt that cast iron we used in pumps was slag and inclusions bonded together with blow holes and needed some improvement... (After graduating) I couldn't afford to move, so I stayed to teach aircraft engine design. ...It is amazing what one conversation can do, for I would still be in the oil fields if it were not for that duck hunting trip."

Bill joined Continental Aviation & Engineering Corp in Detroit, MI as Research Engineer in 1943. He also served as Project Engineer on air-cooled engine development for Army Ordnance, and suddenly found himself in Detroit helping to design engines for tanks and aircraft and working on guns. He was at Continental Aviation and Engineering Corp for several years and became expert at the proper use of strain gages and brittle coatings. In those years, the Magnaflux Corp. furnished one day of Greer Ellis' instruction along with each Stresscoat kit. Greer (the inventor of Stresscoat) recalled that when he arrived to show Bill how to use it, Bill ended up showing Greer.

After the war Bill said, "I was tired of making an honest living and became a research consultant. My wife and I set out to share the knowledge obtained during the war years with peace time industry. We worked with automobile people, farm machinery, earth moving equipment, forge shops, foundries and even oil field equipment manufacturers. I had come full circle" (back to the oil fields of Oklahoma).

Bill developed the knack of solving sticky problems effectively, quickly, with savings in production time and materials. In 1948 he established a consulting service with Continental Engines as their first client, and remained a potent force for over 45 years in mechanical design, experimental mechanics and stress analysis and became a legend in his own lifetime. For many years he was the purveyor of "**Everything you need for stress analysis work and didn't know where to get.**" Pete Stein wrote, "Bill Bean's kits were how many of us started learning how to apply strain gages."

For 25 years Bill Bean and Bill Murray conducted for the SESA (now SEM) the famous *Strain Gage Techniques* short courses at MIT, UCLA, and other locations. During many of those years they were joined by SESA stalwarts Frank Tatnall, Pete Stein and Given Brewer. Generations of engineers learned the rudiments of mounting strain gages from Bill Bean through these educational programs. In fact, many SEM members knew about Bill, but didn't realize that he was a much deeper, practically and theoretically experienced engineer than they had suspected. Bill Bean was a highly sought after speaker at SESA/SEM National meetings and at Local Sections meetings. His name was included on a "SESA Speakers List" published periodically in *Experimental Mechanics* which listed speakers willing to speak at meetings of the local sections without charge. In the 1960s and 1970s, W. T Bean, Inc. was a SESA Corporate Member and generous advertiser in *Experimental Mechanics*. Thus he contributed his time, talent and money to Society's welfare.

When the SEM created the grade of *Fellow* in 1976, Bill Bean was a member of the first group to be elected. He also received the *Lazan Award* in 1978 for his original scientific contributions to experimental mechanics.

After Bill retired from engineering, he moved back to his native southwest, but he did not become a couch potato. As a very successful competitor, he won several awards in ballroom dancing contests. Why am I not surprised? CET