

Remembering Gil Carlson, Hydronics Pioneer

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Gil Carlson passed away on April 28, 1994. He was 72 years young. At the time of his death he held seven U.S. patents and was recognized internationally as one of the foremost authorities on hydronic heating systems. I had the great pleasure of learning from him.

The late Bob Dilg of Colorado's McNevin Company once told me a story about a time when he and Gil worked together at Bell & Gossett. This was during the early 1960s.

"One night after work, I found Gil standing in the parking lot. He looked bewildered so I asked if he was okay. He said, 'Yes, but someone has stolen my car!' I told him I would go back inside and call the police, but Gil said no, and asked if I could just take him home. Doris would have dinner ready, and she would be worried if he were late. He would call the police from there.

"As we drove up to his house, I noticed Gil's car in the driveway. Gill saw it as well, and without any surprise whatsoever, said, 'Well, I suppose Doris must have driven me to

work today."

Thus went a day in the life of hydronic heating's absent-minded professor.

We were sitting in an office in Manhattan one day when Gil told me a story about a problem job he had visited in that same city. This was in 1953. Hydronic heating was still in its infancy at the time. Gil was with Jack Hanley, who was Bell & Gossett's eastern field representative back then, and during their visit to this problem job, the two managed to come up with the concept of primary/secondary pumping.

It seems that the installer had used Monoflo® tees on some perimeter radiation loops in this large office building. The problem, however, was that the pressure drop through each Monoflo circuit was too high; water simply wouldn't move through the radiators. After a few calculations, Gil and Jack suggested that the contractor use small booster pumps on each circuit and run the main pump continuously. How about that?

Today, primary/secondary pumping is a technique we use every day, one to which we hardly give a second thought. It's nice to stop and realize, though, that it all began with a problem job and some creative thinking. Before it can become real, it must first be imagined.

Gil graduated from Purdue University's as an engineer and went to work at Bell & Gossett in 1946. He retired from there as their Director of Technical Services in 1988. He also served on the Industry Advisory Committee of Purdue's Herrick Laboratories for 32 years.

In 1953, Gil joined the American Society of Heating and Ventilating Engineers (now ASHRAE). Shortly thereafter, and with B&G's chief engineer, Harold Lockhart, Gil presented the paper, "Compression Tank Selection for Hot Water Heating Systems."

At the time, the Lockhart/Carlson paper represented breakthrough thinking in the science of hydronic heating. It greatly simplified the compression tank selection process and continues to this day to save countless hours of labor.

That first paper led to a second - the famous "Point of No Pressure Change" thesis, which proved that hydronic systems operate best when the circulator is on the supply side of the boiler, pumping away from the compression tank. I borrowed liberally from Gil's thesis when I wrote my book, [*Pumping Away*](#). Nowadays, I sometimes get credited with original thinking because of that book, but the truth is I haven't had an original idea in my life. It was all Gil. I can remember the days when I sat with him in New York City and tried my best to get this stuff through my thick skull. He was a brilliant engineer and I was a numbskull. But he was patient with me, and for that I will always be grateful.

Gil believed in the power of education, and encouraged others to be all they could be. "I had no degree and Gil wanted me to progress," Bob Dilg told me. "He constantly encouraged me to further my education by taking night courses. When I told him that any

degree would be years away, he just smiled that unique smile and said, 'But you'll be smarter every day!'"

Gil would always take the time to share what his fine mind held. He could make a novice feel comfortable with even the more advanced systems because he had this wonderful ability to explain technical topics in a visual way. He never dealt in mumbo-jumbo. One of his more quotable quotes was, "A difference to be a difference has to make a difference." He also used to look at me and profoundly declare, "Whatever goes into a tee, must come out of that tee." It took me years to realize the simple beauty of that statement, and how well it illustrates the fact that delta-P represents the true Zen of hydronic heating. Look to the tee and you will see the beauty of hydronics.

"He was singularly, seemingly unimpressed with his own genius," recalls Bob Dilg. "One time I went into his office and he was holding a dirty piece of cardboard. It was probably from the back of his favorite yellow sketchpad. He had cut it in a circle and he had drawn some marks on it with a pen. I asked him what it was and he told me he used it for calculations. He never could find the book or charts he wanted. In any event, what he had in his hand eventually became the Bell & Gossett System Syzer®. He just never realized that piece of cardboard he had cut and marked might be of use to anyone else!"

I came to own that round piece of cardboard that Gil made at one point. Gil gave it to his friend, Jim Hope, before dying, and Jim gave it to me. I gave it to Robert Bean, and it is now the Carlson-Holohan Industry Award of Excellence,, which, I think, would have pleased Gil. It certainly pleases me.

Once while on a problem job in Philadelphia, Gil took another piece of cardboard, this time it was the cardboard tube from a roll of toilet paper, and used it (along with a slide rule) to solve a tough flow-balancing problem. That cardboard tube eventually became Bell & Gossett Circuit Setter® valve. He had this wonderful way of seeing the magic and the potential in ordinary objects of everyday use.

Bob Dilg again: "He was so prolific that he would have overlapping ideas. He had so much to write down that he couldn't keep up with his own mind. He once tried a Dictaphone, but that only made things worse since the secretary would type what he said. The ideas would still overlap and the typed copy rarely made any sense. It was part of one thought, mixed with another, and smeared over a third and a fourth. He went back to pen and pad.

"During the rough recession years of early ITT management, tough cost-cutting went on and many people were let go or reassigned. These cuts would trouble Gil as he always knew there was plenty to do. His mind just churned out one idea after another.

"There was one event, however, that he never knew about. An ITT man saw Gil walking in the hallway, actually strolling in his fashion, with that faraway look in his eyes that signaled he was deep in thought. The ITT man raised the question among others as to

who this person was, what he did, and whether he was necessary on the payroll since 'he seemed to lack urgency.'

"This, of course, was completely true. Gil never lived by his watch and sometimes had to be encouraged to go home. Thankfully, more knowledgeable heads prevailed and Gil's position was saved from the head-count reduction."

As time went by, Gil came up with improved procedures and charts for liquid viscosity pumping. He gave the hydronic engineering community a new way to balance flow by trimming pump impellers. He wrote papers on air-handling and antifreeze design as well as on flow-to-heat-transfer relations. In all, he authored more than 100 published technical articles in Heating/Piping/Air-Conditioning and ASHRAE Journal. This is the stuff on which I was raised.

During the 1970s, he developed new ways to design solar heating systems, cooling tower systems, and variable volume pumping systems. His fine mind ranged across a very broad field, but mostly he was a teacher. Over the years, he conducted hundreds of seminars, talks and symposiums throughout the world. ASHRAE honored Gil with their Fellow Award, their Distinguished Service Award, and in 1986, the prestigious Life Member Award. He was a member and chairman of numerous ASHRAE technical committees throughout his career.

He was a teacher, and as I write these words, it is April, and I always think of Gil in April.

Whatever goes into a life, must come out of that life.

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