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Biography of Thomas H. Lee (1923-2001)

This biography of CQM founder and president emeritus Thomas H. Lee is based on eulogies by Ray Stata and Tom’s three sons from the memorial service at MIT honoring Tom, reading the remembrances of Tom from the CQM web site’s In Memoriam page, personal notes in papers in this special issue, an informal memoir Tom wrote at the request of one of his sons that Kin Ping Lee let us read, and many stories Tom and Kin Ping told us over the years.

We provide this brief biography of Tom for two reasons: first, to introduce the man to whom this special issue is dedicated; second, to emphasize the great distance Tom traveled in his life’s journey.

Birth, family and childhood

Tom Lee was born Lee Tien Ho in 1923 in a small town in China. Tom’s father was an intellectual who had a high position in the provincial government as a result of high scores on the examinations used in China until political upheavals and change in government in 1911. Tom’s grandfather was a well-to-do merchant who had a salt monopoly; another relative was involved in an oil business. In those days in China, it was customary for many members of an extended family to live off the wealth of the more successful family members. Thus, Tom spent his early childhood in prosperous circumstances, as part of a large, complex, extended family, living in close proximity in a family compound, doted on by his mother. After the end of the dynasty in 1911, Tom’s father no longer worked; instead, he studied philosophy, literature, history, and so on, which he had Tom study with him on weekends and during school holidays.

In time, Tom’s father moved Tom’s immediate family to Shanghai. There, Tom attended elementary school, where Tom said he was not a very good student. Tom spent his junior high at an elite residential school where he was homesick and continued to do poorly in his studies.

This was an era of unrest in China, as various factions battled for control in the period after the end of the dynasty. At times in his youth, Tom’s family had to hide to avoid literal battles among the competing war lords. Later, Japan invaded China, cutting the family off from the sources of their wealth, and occupied Shanghai where Tom’s family lived. Such unrest continued through the time Tom left China in 1948.

The Japanese invasion and occupation of Shanghai awakened Tom to the fact that he needed to do better in school in order to get into a good college, and he became a superior student in his remaining years of high school.

College years

Tom was accepted into Chiao-Tung University to study mechanical engineering on the basis of his scores on a nationwide entrance examination competition for all government-run colleges. He chose mechanical engineering partly because his father emphasized to Tom as a boy the need for China to industrialize to catch up with the western industrialized countries.
However, Tom had begun to practice ping pong in high school and became an avid player in college. He chose to spend less time studying and more time playing competitive ping pong (and other sports) and generally having fun. In later years Tom delighted in telling how the grading system at his college included minus points for missing class. He missed so many classes that even when he got top scores on the final exam, his total score for a course could only add up to a C or D grade.

During Tom’s college years, the Japanese continued to occupy Shanghai, although Chiao-Tung University continued to operate on a campus in the French concession area of the city under the auspices of a puppet government that nominally governed various parts of China under the control of Japan. However, after Pearl Harbor, the Japanese exercised direct control over Shanghai including the international concessions. The Japanese prevented entry of food that had previously come via the western powers and food that might come from the unoccupied Chinese countryside. Consequently, Tom and a cousin made surreptitious trips themselves to the countryside and smuggled rice back to their families.

Because the war continued to put pressure on the finances of the complex family of Tom’s father, Tom dropped out of college after three years. He moved to Nankang and becoming a fire insurance salesman (having been trained to compute premiums on an abacus). While in Nanking, Tom also found an time to pursue a previous interest in Chinese opera, singing on an amateur basis.

In time, Tom grew restless selling fire insurance. Although it was becoming clear that Japan would eventually lose the war (which would free China from occupation), Tom and his assistant left the occupied portion of China and made their way by train from Nanking to Wuhu and then, after many days of walking, they arrived at Shan Lou near Chinese army headquarters. The day before they got to headquarters, the Japanese surrendered, ending the Japanese participation in the war.

This war in China was actually a three-way war, among the Japanese, Chiang Kai Shek’s army, and the Communists, with a battle occurring whenever two of the three met. After the Japanese surrender, because of his family connections, Tom was taken back to Hangchow by the secretary general of the fourth army in boats with the general’s family and servants (the soldiers, without family connections, walked home). During this trip, the entourage with which Tom was traveling was attacked by farmers sympathetic to the communist cause. People near Tom were killed, and Tom feared for his life. From Hangchow, Tom safely reached Shanghai where he returned to college.

Moving toward a career in business and life after college

During his final year in college (1945), Tom and a few others, including an expert Japanese mechanic, opened an automobile garage business. They depended on used parts (all that were available) to repair cars. Tom handled the business side of things, and the business did well until normal automobile businesses reopened and the Japanese mechanic went home.

During this time, Tom also was introduced to Kin Ping, the beautiful daughter of a well-to-do man in the textile industry. Tom and Kin Ping decided to they would marry, and Tom was introduced to Kin Ping’s father. They became formally engaged in April, 1946, and
in June Tom graduated from Chiao Tung University with a Bachelor’s degree in mechanical engineering.

Upon graduation, Tom heard of a job at a Shanghai subsidiary of General Electric. Coincidentally, Kin Ping had a family connection to this business unit, and Tom got a job in the mechanical department. In this GE subsidiary, Tom worked in a variety of businesses, representing a number of U.S. companies and helped handle the GE apparatus business. Out of this experience, Tom was selected to spend a period of time at GE in the U.S. being training in GE products by actually testing them on the manufacturing floor.

Tom’s boss at the Shanghai GE subsidiary recommended Tom should take his fiancée with him, since things were unstable in China. Kin Ping agreed. (In recent years Tom told friends he thought he owed his life to his boss at the Shanghai GE subsidiary.)

Both Tom and Kin Ping described her father’s concern with Tom, their potential marriage, and their trip to the U.S. In China, the custom was for relatives with less financial means to live off those who had had greater success, and Kin Ping’s father was a person of great success who supported many people. He had doubts about Tom’s abilities and worried that Tom (and Tom’s family) might become a burden on Kin Ping and her father. Tom relished relating that he responded to this concern by telling Kin Ping’s father that he had lived the first 25 years of his life without support from Kin Ping’s father and was sure he could manage equally well for the next 25 years. In the end, Kin Ping’s father agreed they could marry and go to the U.S.

Having obtained the necessary passports and travel clearances, Tom and Kin Ping were married three days before they sailed for the U.S. in June of 1948.

Tom’s mother encouraged him to come home soon; however, Tom’s father worried that China would remain unstable for a long while and suggested he stay in the U.S. until things were more settled.

Tom and Kin Ping said good bye to their families and left China for an uncertain life in a new country. (Tom did not return to China until 1972 to visit his mother who was ill.)

**Schenectady**

Tom and Kin Ping traveled to the U.S. on a military transport ship, paying a fare which required that they stay in separate men’s and women’s dormitories. It took two weeks to get to San Francisco, and from there they traveled by bus across the U.S., stopping along the way briefly to visit acquaintances and relatives.

They eventually arrived in Schenectady, NY, where Tom reported for work at GE. There he rotated through various jobs, which required him to do more manual work than he was used to, to do shift work, and to struggle with the unfamiliar English of the plant floor.

Soon, Tom attempted to matriculate to Union College’s night program to better educate himself. However, his poor college grades (from missing so many classes) were a barrier, and the dean of admissions was unconvinced by Tom’s story of getting top grades on the final examinations but still course grades of C or D. Tom always delighted in finishing the story of the reason for his poor grades in undergraduate school in China by telling about the challenge he made to the dean at Union College: if the dean would let Tom take two courses in spite of his poor undergraduate record, Tom guaranteed he would come out top in each course or he would go away and the dean would never hear from
him again. The dean agreed, Tom got 100 in both courses, he was formally admitted to the program for a Masters degree, and he graduated two years later with an all-A transcript.

In Schenectady, Tom and Kin Ping, after some struggle, found a comfortable place to live, and Kin Ping sought a job, to have something to do. The job was with a bus company reporting to William Smith, the comptroller. Tom and Kin Ping often talked of the personal kindness shown to them by Mr. Smith and his wife and thus why their first son is named William and Tom Jr. is their second son. The Smiths were known to Tom’s children as Grandpa and Grandma Smith.

Tom’s training program at GE had ended while he had one semester to go on his degree, so he enrolled as a full time student, planning to return with Kin Ping to China after he had his degree. Upon graduation, they booked their passage back to China and sold many of their belongings. However, with China’s intervention in the Korean War, the U.S. ocean liners stopped service to China, and there was no way to get back.

Son William was born around this time and, being U.S. born, provided a basis for permanent resident status for Tom and Kin Ping, who were naturalized a few years later. However, Tom had no regular job and was earning some money mowing lawns for people. Both Tom and Kin Ping talked to people they knew at GE, and eventually Tom was rehired into the GE training program for which he had come to the U.S., until a permanent position was found for him in GE’s Control Department.

By this point, Tom had concluded that the situation in China was such that he was unlikely to be able to return. Because climbing the management ladder of GE did not seem likely, given Tom’s Chinese background, he enrolled in a PhD program at RPI to improve his marketability.

Tom’s reasons for his changing approach to life — work to get ahead rather than happy-go-lucky — were, first, that in U.S. society one can get ahead with hard work, and, second, as an immigrant he really had no choice.

At RPI Tom got nothing less than 100 on tests, which particularly impressed one of his professors who was from GE, and made other connections back to GE through the RPI faculty. For his PhD topic, he chose to study electric arcs, an issue important to aspects of GE’s business and did lab work for his thesis at GE. Upon graduation, Tom was offered an assistant professorship at RPI, and GE offered a somewhat larger salary for him to return to GE. He chose the latter. Nonetheless, Tom became an adjunct professor at RPI teaching two courses in the evening program.

Because he was Chinese, Tom could not get a security clearance and in time moved into the more commercial parts of GE’s business. During this time at GE, he worked on a variety of projects with various interesting people, turned down some interesting opportunities, began to be known around the company, and ultimately was discovered by a research director in GE’s Philadelphia laboratory who was looking for someone to do research on electric arcs and to build a practical vacuum interruptor. Thus, Tom and Kin Ping left their first home in America and the friends they had there and moved with their two children to Philadelphia.
Major technical achievements

A major issue in power transmission is switching the power on and off. At high power levels, electric arcs happen across the switching contacts and do odd things, like welding themselves shut when they are closed at high currents — not very useful for a circuit breaker. In the 1920s, Millikan (physicist) and Sorenson (electrical engineer) conceived a vacuum interruptor, i.e., a device in a vacuum for high power switching. GE bought the patent for the idea but could not make it work. By 1950, many had tried in various countries, but no one had succeeded in making the Millikan/Sorenson idea work in practice.

Tom later said that his decision to take on the task of making a successful vacuum interruptor was based on youthful arrogance. First he had to learn the state of the art of vacuum systems, of which he previously knew nothing. He had to learn the characteristics of various materials at high temperatures. He had to learn about zone refining. He had to learn about the geometries of interruptors, and so on. Fortunately, GE was a big company, and some of Tom’s colleagues on the project already knew some of what needed to be learned; and there were people elsewhere in the company who could be consulted on some issues. Also, Tom had a supportive boss who let Tom’s group do necessary experimentation.

There were a number of important steps along the way, but finally Tom got an idea from a paper in a metallurgical journal about putting small amounts of impurities in copper contacts, which made the contacts withstand problems (e.g., welding shut) in the face of high power arcs. He and his group developed the necessary theory, obtained a patent on a mixture of copper and one-half percent bismuth, and GE announced the first power vacuum circuit breaker in 1961.

In parallel with his efforts as a development engineer for a new type of circuit breaker, Tom was doing research on electric arcs and publishing papers on the basic physics of electric arcs. In time, Tom published the book Physics and Engineering of High Power Switching Devices. Through this activity, he came to know people and became known in the international physics community.

Having achieved major breakthroughs, both practical and theoretical, in 1975 Tom was elected to the National Academy of Engineering; and he served as vice president and then president of the Power Engineering Society.

By this time, Tom and Kin Ping had three children (the third son was Richard) and a comfortable life in Philadelphia. Nonetheless, Tom told us stories about the problems their sons faced in those days because Chinese children were not expected to have great capabilities and the steps he and Kin Ping took to make sure their sons achieved all they were capable of.

Moving further into management

With his success on the vacuum interruptor and the general success of the GE department in which he resided, Tom in time became a section manager and eventually manager of the entire laboratory operation. His compensation jumped, there was money to spend on family vacations, the family found Martha’s Vineyard, and Kin Ping started a business of her own that eventually migrated to Martha’s Vineyard.

More responsibility came Tom’s way until he had laboratories
throughout the power transmission group of GE reporting to him. He also
had a steel processing plant reporting to him that didn’t work well
which he had the courage to shut down. He traveled around the world
for GE and was widely recognized in the relevant professional societies.

In 1974, the corporate headquarters asked Tom to transfer from the
power distribution activity to the larger power generation group to be-
come chief strategic planner for that business. This was another story
Tom enjoyed telling. Strategic planning had been introduced into GE by
CEO Fred Borch, and it had not gone well. Managers who had not been
successful running business were given strategic planning jobs. When
this didn’t work, fresh MBAs were hired for these jobs. Excellent look-
ning strategic plans were created that had little practical value. When
Tom was approached, he asked why headquarters wanted him to take a
chief planner job when he knew nothing of strategic planning. He was
told that no one understood strategic planning anyway and they wanted
someone who could think.

Tom took the job, and he and Kin Ping (their sons were essentially
grown by this time) moved near GE’s headquarters office, first in New
York City and later in Connecticut. The first major challenge in the new
job was planning for the future of GE’s nuclear reactor business where
Tom discovered a vast but worthless backlog (customers weren’t going
to be able to pay what they owed) and no prospects for future power
plant orders. Tom often repeated that this experience taught him the
importance of thinking the unthinkable, because it may happen, and
the importance of contingency planning. The experience also influenced
Tom’s book Energy Aftermath.6

During this part of his career — now on Reg Jones’ watch as CEO — Tom
also got to know Gerhard Neumann7 and the people from the jet engine busi-
ness of GE. The GE jet turbine business faced an anti-trust problem which
involved both the jet engine part of the company and power generation busi-
ness where Tom resided. The solution involved an internal joint venture mar-
teting activity between the two divisions, which was assigned to Tom’s plan-
ning operation, definitely an unconventional reporting relationship. How-
ever, the internal joint venture was a great success, sellings products through-
out the world in the face of strong competition.

As he neared retirement, Reg Jones divided the company into five
sectors with the leader of each being a candidate to be the next CEO.
Tom was not happy with the assignment he was given as this CEO tran-
sition played out and, thus, he decided to leave GE.

Retirement(s)

MIT

A few years earlier, Philip Sporn, chairman of American Electric Power,
established the Sporn Chair for Electric Power Education at MIT. At the
time, Sporn asked Tom if he would leave GE and be the first occupant of
the chair. However, Tom felt his family could not afford financially to
leave GE, and told Sporn he would someday go to MIT, when he could
afford to. Thus, when Tom decided to leave GE, he had a path into MIT,
arriving as a full professor in 1980. This was Tom’s first “retirement.”

At MIT Tom taught a course in electromagnetics in the Electrical
Engineering Department, and he began to get involved in some man-
agement courses, including the Management of Technology (MOT) pro-
gram co-sponsored by the Sloan School of Management and the School of
Engineering.

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7. Gerhard Neumann, Herman the German: Enemy Alien U.S. Army Master Sergeant (New York: William
and His Associates Ran the GE Aircraft Engine Business,” Center for Quality of Management Journal
Tom and Ed Roberts, co-founder of the MOT program, enjoyed telling how in a visit of Ed and Tom Allen (another Sloan professor) to GE shortly before Tom arrived at MIT, Tom approached Ed Roberts and Tom Allen and told them he would shortly be at MIT as a full professor of engineering and hoped to work with them in the Sloan School. Ed Roberts and Tom Allen didn’t know Tom and were privately skeptical about someone coming from industry to become a full professor. However, when they arrived back at MIT, they found a message waiting for them that they had missed before they left. The message said they should be sure during their visit to GE to look up Tom Lee, who was coming to MIT as a professor.

Because of Tom’s experience at GE, he was an excellent fit with the MOT program and in time became co-director.

A couple of years later, Tom was asked to manage one of several MIT laboratories working in the energy area. Tom helped MIT solve a larger problem at the same time by agreeing, not only to take over leadership of the one laboratory, but also to become the director of a combination of related MIT laboratories under the new name of the Laboratory for Electromagnetic and Electronic Systems (LEES). As director of LEES, Tom spend much of his time developing new sources of funding.

IIASA

In 1984, the suggestion was made that Tom become director of the International Institute for Applied Systems Analysis (IIASA) in Vienna, Austria. IIASA had been set up in the late 1960s and early 1970s in response to President Johnson’s suggestion that the U.S. and Soviet Union should cooperate on non-military issues that all societies face. Because it was seen to be more stable than if included more countries than just the U.S. and Soviet Union, IIASA became a multi-national institution. After being interviewed by McGeorge Bundy (who took the lead in getting IIASA started for Johnson) and other famous people, visiting Vienna, understanding the IIASA needed someone to lead it in more applied than theoretical directions, and having Kin Ping’s agreement that Vienna would be an attractive place to live, Tom accepted the position on the condition that MIT would give him a leave of absence.

On his first day on the job at IIASA, Tom began to chase down the financial situation — he had begun to study the financial statements before he got there — and discovered the institute had serious financial problems. He also quickly concluded that IIASA needed to put more emphasis on application of theory in practice in contrast with the near total emphasis on pure theory that prevailed when he got there. As the acting director of IIASA said at the time of Tom’s death:

During [Tom’s tenure as director of IIASA], IIASA overcame its acute financial difficulties and embarked on a more modest lifestyle. Lee emphasized quality control and introduced external peer review procedures. Increased interaction with the user community became a priority.

In addition to getting member countries to pay their dues (especially the U.S.), Tom established an office of sponsored research. As part of these activities, Tom had to deal with the people in the U.S. government’s agencies that sponsor research and the people on President Reagan’s staff that influenced those agencies.

During their time at IIASA, Tom and Kin Ping made many friends and learned much about life in other countries, including the socialist countries.
One person Tom got to know well through his IIASA experience was Shoji Shiba, whom he had sought out earlier at the suggestion of a well-placed Japanese business executive named Saba. Shoji and Mieko Shiba came to live in Vienna and from Shoji, Tom began to learn about TQM.

In 1987, Tom and Kin Ping went home to the U.S. by way of a long vacation trip that included a stop in Beijing. In Beijing, tom became involved in organizing a trip of MIT economists to China to help with problems with China’s wage and price systems.

“Leaving” MIT

Back home, Tom decided he no longer wanted to be a regular professor, and retired to professor emeritus status removing himself from the MIT payroll. However, he continued as co-chairman of the MOT program, continued to teach courses, and helped organize the Leaders for Manufacturing (LFM) program to emphasize within MIT the important area of manufacturing. He also participated in a number of National Academy of Engineering studies and other efforts relating to energy and the environment, engineering in the face of globalization of industry, and so on.

CQM

On his return from IIASA, Tom was convinced that American industry would be more competitive if its leaders were able to apply the operational strength of TQM in combination with the power of robust strategic planning. To that end, Tom began working with Ray Stata and other Boston area CEO friends of Ray to do something about the state of management of U.S. companies. He introduced Shoji Shiba, an expert in TQM, and Russell Ackoff, an expert in strategic planning, to Ray and the other Boston-area CEOs. Tom, Ray, Shoji, and several other CEOs started the CQM. Ray was chairman of the board, Tom was president and treasurer, and Shoji served as “guiding counselor.” The founding of the CQM is described in a paper co-authored by Tom,8 and the CQM’s evolution from 1989 until today is described in this issue.9 Much of what Tom was thinking about during this period is documented in his book, Integrated Management Systems.10

Another retirement

In 1998 at the age of 75, Tom retired from the position of CQM president, although he stayed on as a board member and treasurer. He continued to visit the CQM office for a few hours every week or two, continued to provide new president, Gary Burchill, with support and guidance, and continued to push the CQM’s development, including establishing a chapter in China.

When his Chinese college found that Tom had retired from CQM, the college alumni association invited him to take a five year term as president of the U.S. alumni association, and Tom accepted. Tom also began to become active with Transparency International, dedicated to combating corruption around the world.

And, he and Kin Ping continued to enjoy spending time with their three sons, three daughters-in-law, and eight grandchildren.11 Their life was full of family and their many friends in Boston, on Martha’s Vineyard, and around the world.

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11. In the ten years we knew him through CQM, we enjoyed hearing Tom tell about the trips he and Kin Ping took each of their grandchildren on, the trips they organized (especially to China) for large groups of family members, and hearing about and occasionally being visited by their youngest granddaughter, whom Tom and Kin Ping frequently cared for.
The scope of the journey

Over the course of his life, Tom Lee went from the happy-go-lucky son of a wealthy family in a non-industrialized country, through revolutionary times, to a new country with his new wife where they found themselves cut off by war from their home country, through technical accomplishment (including world class engineering breakthroughs) and because of his practicality and ability to work with others rose to a high position in General Electric, converted himself from a technology expert to a management expert, led major and important laboratories at GE, MIT and IIASA in Vienna, founded the CQM, had an extraordinary number of close friends throughout the world and people who credited him with influencing their lives, and raised three sons who assimilated into U.S. society (as did Tom and Kin Ping) and are now themselves elite members of their communities and professions.

At the time of his death, Tom Lee was the holder of thirty U.S. patents, had written over 100 technical papers, and was the author or co-author of four books and editor of two others. In addition to his honors from the National Academy of Engineering and his positions with the Power Engineering Society, Tom received the Power Life Award in 1980, was a fellow of the IEEE, a member of the Swiss Academy of Engineering Sciences, a fellow of the AAAS, recipient of RPI's Davis Medal for outstanding engineering accomplishments, and was awarded in 1990 the National Association for Chinese-Americans Outstanding Achievement Award.

The evening of the celebration of Tom’s retirement from CQM, he told the story, that Toby Woll also recounts elsewhere in this issue12 of growing up in a China where during the lunar eclipse they banged on drums to scare away evil spirits of the devils and then spending of his life in the U.S. where he knew well people who helped put a man on the moon.

Tom was a “son of China,”13 a man and scientist of the U.S., and a citizen concerned with the world. One of his last papers was entitled “Think Globally, Act Locally.”14 Tom always thought big thoughts, and he always put them into useful practice, drawing together the necessary communities of interest from his friends and those that knew they would learn much by joining him in his endeavors. To many of us at the CQM, Tom was one of the greatest influences of our lives and one of our dearest friends. We cherish the time we had with him.

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