ORAL HISTORY: F. Suzanne Jenniches

About F. Suzanne Jenniches

F. Suzanne Jenniches grew up in Pennsylvania and was technically oriented throughout her childhood. After receiving her bachelor's degree in biology from Clarion College in 1970, Jenniches started her career as a high school biology teacher in Maryland. Yet it was only once she began to study environmental engineering in an evening program at Johns Hopkins University that she contemplated becoming an engineer. Upon deciding to enter the engineering profession, Jenniches joined Westinghouse as a computerized test engineer in 1974 and earned her master's degree in environmental engineering in 1979. In her tenure at the Westinghouse and Northrop Grumman corporations, Jenniches held a number of management positions. She served as supervisory engineer of robotics development for electronics manufacturing in the late 1970s and operations program manager in the early 1980s, during which time Jenniches was responsible for the B-1B electronically scanned antenna and the APQ-164 offensive radar systems. In 1986, she was appointed manager of Systems and Technology Operations and, from 1989, she managed a broad cross-section of Defense and non-Defense operating units. Jenniches retired as Vice President and General Manager of Northrop Grumman Government Systems Division in 2010. She remains an active member of several engineering societies and is currently working to expand opportunities in science, technology, engineering, and math for all individuals in the U.S.

In this interview, Jenniches discusses her 36 year-long career at the Westinghouse and Northrop Grumman corporations. She outlines her transition from engineer to manager, speaking about each of the positions she has held at the organization. Jenniches talks about the many programs on which she worked over the years, including a decade-long project with the U.S. Postal Service. She discusses working with brand new technologies, compares defense and non-defense work, and talks about international facets of the business. Jenniches also comments on the topic of women in engineering, discussing her own experiences as well as her efforts to attract more females to the engineering profession.

About the Interview

F. SUZANNE JENNICHES: An Interview Conducted by Frederik Nebeker, IEEE History Center, 13 April 2010

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Interview

INTERVIEW: F. Suzanne Jenniches
INTERVIEWER: Frederik Nebeker
DATE: 13 April 2010
PLACE:The National Electronics Museum, Baltimore, MD

Background and Education

Nebeker:

This is Frederik Nebeker of the IEEE History Center. It is Tuesday the 13th of April 2010. I'm here at the National Electronics Museum in Maryland to interview F. Suzanne Jenniches. Suzanne, can we start with where and when you were born and a little bit about your parents?

Jenniches:

I was born February 28th, 1948, and was almost a leap year baby. My mother was determined that I would not be. [Laughter] So I think I was actually born around 11:30 p.m. My father was in the Air Force, and my mother worked for the state of Missouri. They met when he was stationed in Missouri, but they had returned back to Pennsylvania.

Nebeker:

Were they from Pennsylvania?

Jenniches:

My father was. My mother was from Missouri. Then a few years later, I came along. But my mother returned to Missouri to be with her mother for the first child.

Nebeker:

I see.

Jenniches:

I spent all of six weeks in Missouri and the rest of my time either in Pennsylvania or Maryland later in life.

Nebeker:

So you grew up in Pennsylvania.

Jenniches:

I did, western Pennsylvania. My father, after he left the Air Force, went to work for General Motors and then set up a business on his own. And he and my mother ran a service station garage for Sunoco. They put in long, long hours, and they worked

originally seven days a week. Then probably when most people are thinking about retirement, they cut back to six days a week. So I really think I got my work ethic from them.

Nebeker:

Did you help out at the station?

Jenniches:

They wanted us to concentrate on schooling. So I did not help out a lot, occasionally on weekends. But I was always very, very technically oriented. Even from the third grade on, a school teacher had recognized that I seemed to be inquisitive and was technically drawn. So every year for Christmas, I got power tools or some kind of tool, [laughter] so that when I got married much later in life, I brought all the tools to the marriage because that's what I had. I got tools to work on things. My mother, who was very business oriented, kept all the books. And she was the public relations at the service station. She would run out and meet the car because at that time, you pumped gas for the client, you know. Yes, you did all of that. [Laughter] She did all of those kinds of things. So I always say I got my communications and business skills from my mother and my technical skills from my father.

Nebeker:

Were you into woodworking as a kid?

Jenniches:

I did a variety of things. I worked in clay. I worked in paper mache. I was very much into paper mache at one point in time in my youth. People thought that my strawberries were real. I had to say, "No, paper, paper." [Laughter] But I was very eclectic. I did a lot of different things. However, now that I have retired, I have said what I want to do is take woodworking courses because I find it fascinating. And although I greatly admire artists and their creativity, their innovation, I have absolutely no skill. I can admire art. But I know my limitation. But somehow woodworking appeals to me because I think it is very precise and technical and would be something that I would really enjoy doing. But I haven't started yet.

Nebeker:

I know you just retired.

Jenniches:

Although I have tools. Yes, I just retired just a little over a month ago. But I do have my tools started already for my shop.

Nebeker:

You must also have been interested in science since you went into biology.

Jenniches:

Well, that's an interesting story. One of the reasons why I'm so passionate about engineering and education is that I went all the way through school, K through 12, never hearing the word engineer. I was always extremely technically oriented. And I actually got a scholarship that I could go to any school in Pennsylvania, full scholarship.

I remember a chemistry teacher once telling me that I needed to work even harder because I had a very high aptitude. He thought I could do even better than what I was doing. I was always very motivated. But no one spoke about engineering. When I went to the university, it was actually a state teachers' college, Clarion. They said, "You should take biology because you could be a nurse or you could be a teacher." So that's what I did. I showed up first day freshman year, enrolled in biology, and I loved it. But I didn't see it as a springboard to anything other than teaching.

From Teaching to Engineering

Nebeker:

And at that time, engineering was not a career path for women.

Jenniches:

It was not as much a career path for women, absolutely. And biomedical engineering, which might've been a logical springboard, was just in its infancy.

Nebeker:

Yes.

Jenniches:

But I was not aware of it. So I went off to teach. I went through school in under four years. I got a job in Maryland and began teaching biology at Westminster High School, loved the classroom, loved the students.

Nebeker:

You were there from January 1970 to June 1974?

Jenniches:

Yes. I started studying engineering at Johns Hopkins University. And it was an unusual path. I was a biology teacher. And 1970 was the first year of Earth Day for the United States. I decided I needed an advanced degree to continue to progress as a teacher financially. I received a magazine that had on the back cover something about environmental engineering. And you just had to tear off a postcard [laughter] and send it in.

Nebeker:

All because of that postcard.

Jenniches:

Yes, and I sent it in to Johns Hopkins. [Laughter] It was actually a National Teachers' Association magazine. But Hopkins was advertising on it. I tore that off because in my mind biology, ecology, Earth Day ...

Nebeker:

Ecology was a big thing about that time.

Jenniches:

Very big. Environmental engineering. So it made sense to me.

Nebeker:

Right.

Jenniches:

I got a letter back from Johns Hopkins. They said, "Congratulations, you have been admitted. However, you have 48 undergraduate credits to make up before you can enter the Masters' program." I had had no mathematics, no dynamics, no mechanics, no physics, as an undergraduate. I started to make up those undergraduate credits by going in the evenings.

Nebeker:

You were still teaching full time?

Jenniches:

Yes. While I was teaching full time, I went four nights a week. And all year long, so four semesters: two main semesters and two mini-semesters in the summer. I found it fascinating, the math and the engineering. Four years into the doing all the undergraduate work, the Dean called me in. He said, "Mrs. Jenniches" — I was married at that time — "are you ever going to take a class in the program that you've been enrolled in?" [Laughter] I said, "I didn't realize that was a requirement." [Laughter] I was just having a great time studying. He said, "You've been enrolled as a Masters' environmental engineering. And you only have five years to complete the program." I said, "This may be a problem because this is my fourth year here. And I haven't taken any classes." He said, "Well, you're right. It could be a problem. But we can extend the period if you're genuinely serious about it." I said, "Absolutely, I am." So then I stopped taking some undergraduate classes. I had been taking a lot of electrical engineering classes actually.

Nebeker:

Just because you were interested in electrical engineering?

Jenniches:

Yes, and I was up to like 60-plus credits by that time. So then I started seriously studying the environmental engineering. I finally did graduate with a Masters' in environmental engineering in 1979. But it took me nine years because the first four I was off doing other things.

Nebeker:

You didn't, you didn't think about switching to electrical engineering?

Jenniches:

Well, at that time, I knew that I wanted the Master's degree. I knew that to get a second Bachelor's would only be a minimal advantage in teaching high school.

Nebeker:

You couldn't get a Master's in electrical engineering without a Bachelor's?

Jenniches:

Or without a great deal more prerequisites.

Nebeker:

Okay.

Jenniches:

I was a teacher of biology. So it didn't make a lot of sense to me to get another Bachelor's in electrical engineering.

Nebeker:

I understand.

Jenniches:

So I did complete the program. But in the course of completing the program, I discovered that I really found the electrical engineering far more fascinating than the environmental engineering, which was very much fluid mechanics and storm drain design. And I had also met a number of people from Westinghouse.

Nebeker:

How did that come about?

Jenniches:

Well, for the evening classes at Hopkins, I went to Homewood Campus. And I met a number of people who were pursuing their undergraduate degree in electrical or mechanical engineering.

Nebeker:

While they were already employed at Westinghouse?

Jenniches:

Yes. They were employed as technicians.

Nebeker:

I see.

Jenniches:

They were going to school to get a Bachelor's degree so that they could have career progression. One year, a student, a fellow student said, "I'm a test engineer at Westinghouse. And we need additional test engineers." I was studying microprocessors. He said, "You seem to be very much in tune with what a test engineer needs to do. Why don't you come and interview at Westinghouse?" I said, "I don't know, what in the world would a defense contractor want with a high school biology teacher?" and "What could a high school biology teacher do at a defense contractor?" He said, "Well, you really ought to think about it seriously."

So over Christmas at that time, Westinghouse did not shut down for the holiday, but the schools did. So during that holiday period, I went to Westinghouse and worked — worked, I'll put it in quotes — for two weeks because I didn't get paid. But I went for two weeks. I worked on the DITMCO., which was an in-circuit tester. 'DITMCO.' stood for drive-in movie theater company. They built a tester to test circuit boards for drive-in movie theaters. We were using it to test radar printed circuit boards, to make sure that the printed circuit board had good continuity and isolation before you put all those electronic components on it which made it very expensive.

So I worked for two weeks. And at the end of two weeks, I went back to teaching. And then in April of 1974, I got an offer to join Westinghouse as an Associate Test Engineer. So I thought about it for a couple months, and I decided, yes, I'm going to do this. Now the interesting thing about it was I had no concept of what I'd done during those two weeks at Christmas. I had no concept of the engineering principles behind it. I had no concept of what a test engineer really did. But I so admired the people that I had worked with for those two weeks. They were so committed. They were so dedicated. They seemed to thoroughly enjoy what they were doing. They were engaging. They made me feel a part of what I'm sure was a babysitting assignment for them. But it was just a wonderful atmosphere to work in. So I thought that was an atmosphere that I would enjoy being a part of. So I turned in my resignation. Everybody was very surprised because they were trying to talk me into going into administration.

Nebeker:

This is in the summer of '74.

Jenniches:

Yes. I turned in my resignation in the May timeframe and finished teaching through June and then joined Westinghouse in July. The interesting thing was I actually more than doubled my salary going from a teacher to an associate engineer. It was just astonishing to me that someone would pay me that kind of money to have fun, [laughter] to really enjoy what I was doing. Now I did enjoy teaching. I loved teaching. But I clearly could see that there was a limit to career progression as a teacher, unless you left the classroom, which was the one thing I enjoyed. So this I thought was limitless. It was really a turning point. And I am so grateful to Dave Hewitt who said, "Why don't you come to Westinghouse and see what a test engineer does?"

Women in Engineering

Nebeker:

There weren't other women test engineers there?

Jenniches:

No, I was the only one. In fact, I was the only one for a number of years.

Nebeker:

How did you feel in that environment?

Jenniches:

I felt fine. You know, it was interesting. I often talk with women now and engineering students. And I say, "I am so grateful that somebody mentioned engineering to me because I did not realize that as a career option."

Nebeker:

Yes.

Jenniches:

Quite frankly, when I think back on it, I do believe that there were people throwing stones and rocks and arrows at me. But you know what? I didn't really notice. So I tell people you've got to have really thick skin. I call it rhino hide. I say you've got to have rhino hide because if you let them distract you and get concerned about what are people saying, they have won.

Nebeker:

Yes.

Jenniches:

But if you just keep on charging and do whatever it takes to get the job done. It is important not worry about what other people were saying or questioning "Is this appropriate?" or "Am I working at the right level?" Just do the job. Then it's amazing what you can accomplish as an individual. So when I look back on it, probably there was some bias. Not only was I young and female, but I wasn't a typical engineer either because I was still studying at the university.

Nebeker:

Yes.

Jenniches:

And I was studying environmental engineering for goodness sakes, working as a test engineer, electrical engineer. So there are a lot of areas to criticize if people had wanted to do that. But for whatever reason, I just never felt it was a problem for me.

Memory Testing for AWACS

Nebeker:

And you took to the work there evidently.

Jenniches:

Absolutely. The group was very accommodating and nurturing. I worked on a lot of firsts because there was no expert in memory test, for instance. So one of my earliest jobs was programming read-only memories for AWACS.

Nebeker:

I see.

Jenniches:

Then they decided to go into high-speed memory tests. There was nobody who had experience in that, so they decided to send me away to school. I would become the high-speed memory expert. It was really a wonderful thing that they did for me because they gave me a set of credentials and an area of expertise. I could've worked for a decade and not been able to achieve that if I had just followed a traditional path.

Nebeker:

I see.

Jenniches:

So the management in the test engineering department was very willing to take risks. I was also very willing to take risks, mainly because I didn't realize I was taking risks [laughter]. I just saw it as a new job. And I'll go off and do it. But it was fascinating. So I got in on a leading edge of an exciting phase of radar.

Nebeker:

Both with the programmable read-only memory and then with the memory device?

Jenniches:

High speed, yes.

Nebeker:

Would you say a little bit about that, because I think it's interesting the way the read-only memories were programmed.

Jenniches:

With punch paper tapes. The design engineer — and I was not a design engineer — the design engineer would work out the digital sequence to actually set the current and set the power levels and parameters like that and actually program the 1s and 0s that ran the processors.

Nebeker:

Yes.

Jenniches:

So they would experiment in the lab. When they thought they had a sequence that actually caused the hardware to perform the functions they would come down with a roll of paper tape. We were programming in octal and with 1s and 0s. I would punch them into the programming machine, and it would produce a paper tape. Then we would run the paper tape through a machine that actually programmed a read-only memory and fix that pattern into memory.

Nebeker:

One by one?

Jenniches:

One by one. And PROMs [programmable read-only memories] at that time were expensive. So they would burn one and then go back to the lab, try it out. At the time,

we were running 24 hours a day. So many times I would get a call at home at 2:00 in the morning, and they would say, "Suzanne, we have to reprogram the PROM because the PROM we did this afternoon, it's not quite right. We need a new pattern." Well, then I would throw on my clothes, drive into work, and program a new PROM because that's what it took. It took real-time support, the design engineering and the testing to create what is still the most remarkable radar—airborne command and control radar—in the world.

Nebeker:

Yes, the AWACS.

Jenniches:

The AWACS. It was exciting to be part of that. But we did run seven days a week, 24 hours a day. You were always on call. And I think it was that commitment that not only enticed me and bound me to the team, but also I felt like I was making a real contribution, even though I was just punching and programming PROMs one at a time.

Nebeker:

To follow the chronology: from beginning at Westinghouse in July of '74 until May of '77, it was as product evaluation engineer and work with the PROMs. Then you started working with the high-speed memory circuits.

Jenniches:

Which was a logical extension. It was still very early in the technology of random access memories. Originally AWACS had a core memory. That was a very proven and reliable technology, but it was slow. In order to process the information that was coming in, form the beams and send them back out, they needed something much faster. At that time, integrated circuits and random-access memories were coming on board. But in producing them, many of them had flaws. It was impossible to detect those flaws just by looking at the mask of the integrated circuit.

Nebeker:

These are not production flaws but some design flaws?

Jenniches:

No, production flaws in creating the device.

Nebeker:

Okay.

Jenniches:

Because it was the leading edge of integrated circuits. So what you needed to do was to test the integrated circuit at speed after it had been packaged. It was also necessary to test their interaction because some ICs would be really quick, and other ICs would not be quite as quick. And so you'd get skewing of data . So in order to produce a memory card that would effectively operate ...

Nebeker:

Which had a number of these RAMs.

Jenniches:

It might have 100 of these devices on it. You had to test all the devices. Every board had to be tested at speed running many, many random patterns through them. Because what you were trying to do is find that one random flaw that wasn't obvious and then understand the impact of whether you could use it, or work around it, or whether it had to be replaced. So it was a critical, very time-consuming effort.

Nebeker:

Were these also for AWACS?

Jenniches:

Yes, they were for AWACS. And then they went on to use them in F-16 and B-1 and other aircraft. All of our electronic products ultimately had these. But I got in on the ground floor of that. And it was exciting.

Nebeker:

Was this a separate test division?

Jenniches:

No, it was a functional organization in support of the various product lines. We cut across various product lines. We had what's referred to as a matrix organization. So product evaluation test engineering supported all of the products that went through. But as an individual, you would get assigned to a specific program for a period of time.

Move into Automated Manufacturing

Nebeker:

So you were doing the high-speed memory testing from May of '77 to July of '78 and then you moved to the printed circuit assembly and automated manufacturing?

Jenniches:

Yes, what I found when I was doing the high-speed memory testing was sometimes everything was fine except it was a workmanship problem. In other words, there might be a solder splash that was pulling something to ground and things like that. As a test engineer, I got frustrated that many times we would've been able to get that printed circuit board over to the radar if it weren't for the fact that we had to go back through and rework things. And so I said, "I think I ought to go out to printed circuit assembly and figure out why we can't make it right the first time." Of course, these were very dense boards. And the people who worked on the line, predominantly women, had extremely tedious work to do to solder these things in place.

Nebeker:

So a lot of this was hand-soldered.

Jenniches:

It was hand-soldered in the beginning. And then ultimately, we went to wave solder. But even in wave soldering, you would sometimes have to test every part. I decided to leave the test department because I'd actually been there for four years, and move into manufacturing and try to come up with better ways to manufacture the product right the first time. It was an interesting time because we were just going into automated manufacturing with wave solder with automatic insertion machines. And so it was, once

again, another leading edge area, with no experts. People would say, "Give it to Suzanne. She'll do anything."And so off I went to conquer automated assembly.

Nebeker:

So you got an entirely new assignment.

Jenniches:

I did. I was no longer a test engineer but went out in manufacturing to work on produceability.

Nebeker:

Your title was General Supervisor?

Jenniches:

I was a general supervisor of assembly technicians or assembly operators. And there would be a next level supervisor who would actually walk the line and help the people out. They would have maybe ten people under their supervision, building these products. I was a general supervisor, and I worked on the automation and what we needed to do. I also worked on balancing the production because, at that time, the workload in the factory was just phenomenal. Everybody wanted product now if not yesterday. We had to make sure that everybody had their needs met and still kept a good work environment, because it was stressful.

Nebeker:

And that was from July of '78 until May of 1980. This was a busy time for Westinghouse Electronics.

Jenniches:

Yes, very much so. All of our major airborne radar programs were running full speed at that time.

Nebeker:

And it was also the time when a lot of the circuit board was getting automated.

Jenniches:

Getting automated. We were all using brand new technology. We were trying to automate it so that we could get the volume and the quality. And we were operating 24 hours a day, seven days a week.

Nebeker:

Were there any major difficulties with the new equipment?

Jenniches:

There always are. By definition, there were a lot of problems, you know…

Nebeker:

One crisis after the other?

Jenniches:

Of course. But because we were pushing the state of the art. The alternative of not having it would have made the equipment unaffordable if everything had to be done with manual labor, so we had no alternative. So you didn't really stop to think about the problems. I mean, what value would it be? You just had to go out and solve the problems. So that's what we did and with a huge team of people, obviously not just me. All of my experiences were very team oriented,.

Nebeker:

How large was that printed circuit assembly operation at Westinghouse?

Jenniches:

During that time, there were probably 150 assembly operators there.

Nebeker:

Wow.

Jenniches:

And the commensurate 15 or so supervisors. Then a couple general supervisors- – I wasn't the only one obviously – and then manufacturing support engineers. So it was a huge part of the operation because we were going from hand-wired analog circuitry to digital circuitry in high volume. And so it was just a tremendously exciting time to be involved in the industry.

Nebeker:

The analog to digital transition is one of the great transformations of the second half of the 20th century. How did that go with the printed circuit boards? Did that take place without major difficulty?

Jenniches:

Well, the real challenge of course was for the design engineers. And once they had perfected a design – and we worked with the engineers to build what we call bread boards, brass boards, the first unit – it was our challenge to productionize it and put it into volume. And we actually had two different assembly areas. The analog was done in a different area than the digital.

Nebeker:

So they were significantly different.

Jenniches:

They were very different, and very different in tests. There were two separate test areas, so it was very, very different. And it was interesting. Over a decade or so, you would see the analog dwindle to only a few boards where it was critical. They had to be. And then the digital predominated.

Developing Automated Assembly Technology

Nebeker:

And then your title evidently changed in May of 1980 to Manager, Automated Assembly Development.

Jenniches:

Yes, they decided to take me out of the day-to-day work, with the large workforce, and to focus strictly on "perfecting" – and I put that word in quotes – perfecting the automation because the volumes and the fineness of the assemblies started to challenge people to the point that they were literally working under microscopes.

Nebeker:

Managing that printed assembly board. I have seen the difference between these printed circuits of the '60s and '90s. And it's incredible.

Jenniches:

Yes it is. We were going to fine-line printed circuit boards. And the components, their leads were all so fine, they almost waved in the wind. So to get them on the board on the right pad and soldered without getting bridging, it was just amazing technology leap. Once again, we worked on automation. I headed up a group of engineers, a lot of them test engineers interestingly enough. So the guys that I worked with before I worked with again. We developed the automated assembly technology. When we could find it in the marketplace, we bought the equipment and then adapted it to our needs and created the interfaces. Where we could not, then we developed from scratch our own. It was at that time that I got involved in robotics assembly. We created some brand new activities under the technology modernization program under the Department of Defense for robotic assembly, for cables and harnesses, and for soldering. I was supplying the assembly technology. Westinghouse built a new plant in College Station, Texas, to be able to accommodate this new radical type of assembly. After we opened the first year or so we received an award, from Cahner's Publication for automated assembly and manufacturing, for Factory of the Year. It felt wonderful to take ideas that people had in their heads convert them into reality, and then use them to build the product. And at that time, I had an abrupt career change again because they said, "Now that you've helped develop this equipment, we want you to be the first program to actually use that equipment to build your hardware." I thought, "Lord, it better work." I became the Operations Manager for the offensive radar for the B-1 bomber in 1981.

The B-1B Bomber

Nebeker:

That does sound like quite a career change.

Jenniches:

Yes, but it was actually quite logical because I had been building the next-generation of automated assembly. The offensive radar for the B-1 bomber was a next-generation electronics radar. Consequently, who better than I would want to make it successful? A lot of people considered it risky, this far-fetched robots building things. So I became the first user of all of that technology.

Nebeker:

That was in January of '82 that you became Operations Manager?

Jenniches:

Yes. They told me in December of '81, and I showed up in January. And there I was a Program Manager.

Nebeker:

That was probably fairly unusual for a woman engineer to be an operations manager.

Jenniches:

I think so. I can't recall another female engineer. But, you get your head down, you're working so hard. You don't look around to see who else is out there doing things. You just know what you have to do. And we were critical path on the B-1B because there had been a B-1A. Westinghouse did not have that radar; it was shut down. Then when Ronald Reagan reactivated the B-1 program, they called it B-1B. And they selected Westinghouse radar.

Nebeker:

Was this navigational radar?

Jenniches:

No, it's an offensive radar. But it does also do follow terrain avoidance. So it is also navigation. It's a multi-mode radar.

Jenniches:

But we were critical path because the air framers and all the other systems had been around for a decade or more and had gone on hiatus but now were cranked up and ready to roll. And we were the risky, critical path. So once a month, Westinghouse and Boeing, the avionics integrator for the B-1B, had meetings with Caspar Weinberger, who was the Secretary of Defense, to give the status on the radar and all the printed circuit boards.

Nebeker:

So you prepared a monthly status report?

Jenniches:

Yes… Well, we actually prepared almost daily status reports. But once a month, it was summarized and delivered. It was a very critical time. And also at that time, we decided to take away the mechanical scanned antennas and go to a phase-array antenna, which was electronic scanning. That was a huge leap in technology and the first in the world anywhere to be flown in production. And so once again, I got a chance to do groundbreaking work. It was so exciting, another one of those 24-by-7 kinds of opportunities. You knew how critical your work was to national security. We were breaking all the rules. We were creating something that had never been created. So it was a tremendously exciting time in my career.

Nebeker:

And you didn't have a nervous breakdown in this period.

Jenniches:

You had no time to have a nervous breakdown. [Laughter] You didn't have time. You just had to keep going. There were obviously lots and lots of people there. It was a wonderful time.

Nebeker:

So you were Operations Manager there from January of '82 to April of '85.

Jenniches:

Yes, and that was building the first unit and the low-rate initial production. When it went into production, they said, "Okay, Suzanne, let's go up and do..."

Nebeker:

[Interposing] We have something else for you.

Jenniches:

Yes, something new again. You never really got a chance to settle down and relax. But that was not necessarily my personality. I was always looking for the challenge.

Nebeker:

So looking back on that B-1B radar and the new electronic scanner, that all came off well?

Jenniches:

Yes. It's flying today. It's unbelievable. It was a long-distance bomber. In fact, I remember the first time I went out to the Air Force base where the aircraft was to see it. The B-1B is an enormous plane. "Do you want to go up in, you know, and see?" And I thought, "Well, yes, I'd love to see." We went up into the cockpit. And of course, the radar's in the nose. So you don't actually see the radar at that time. You just see the panels and the radar displays and video signal processing displays and all of that. There are these really cramped compartments for four pilots. They flew long missions. They were up there for a long time and not able to move around much. I thought, "My goodness, this is a really harsh environment, you know, and plus, just the pressure because when you're out on a mission, there's a reason why you're on that mission." I thought, "I wonder why they didn't give them a little bit more room." And so then they turned me around. And I looked at the bomb bay. You know, 90% of the plane was there to carry, the ordinance. So I said, "I understand now." There was no room. The pilots got what was left over from the ordinance. But it was fascinating to see the whole lifecycle of that radar system. It was such an important radar system at the time because we were obviously still very much in the cold war situation at that time.

Nebeker:

And that kind of electronic scanning was implemented after that in many other systems.

Jenniches:

Yes, in production. It has gone in other systems. It is expensive. If it's not necessary, if more traditional technology, such as flat panel, mechanical scan arrays will work, then obviously you make the cost-benefit trades. But when it is necessary for performance, for reliability, then yes.

High Security Advanced Development

Nebeker:

So what happened in April of '85? You moved onto advanced development operations.

Jenniches:

Yes, and so that became the period where I don't talk much about what I did. But we worked in special-access-required facilities, working on advanced, next generation development. Now many of those generations are in this museum. But at the time of course, you didn't talk about it at all. In fact, when you went to work, you went inside a building. And large bank-vault doors were closed and cranked. You were locked inside.

Nebeker:

My goodness.

Jenniches:

Because it was shielded so that no one could look in, listen in.

Nebeker:

Like eavesdrop electronically?

Jenniches:

Exactly. You did your work inside these vaults. And we often joked that if someone sneezed, we would all be sick forever because air was re-circulated. But it was an interesting environment to work in, very high tech, with the anechoic chambers that we

used for tests. So I still was using my test background to test the kind of very sensitive electronics.

Nebeker:

Well, I imagine a great deal of the work at Westinghouse was classified.

Jenniches:

Yes, it was.

Nebeker:

But this was so high security because it was future technologies.

Jenniches:

Well, it was special. Everybody would say, when they'd see you in the hall, I haven't seen you for a long time. Where are you? Out back. And that was all. Everybody would say, "Okay." You know, so no one knew what happened out back.

Nebeker:

You didn't talk with colleagues?

Jenniches:

You can't. There are only so many security billets. If you were on the program, then obviously you talked. But if they weren't on the program, you did not talk about it, no. So it meant you had to be extraordinarily self sufficient because you didn't have the normal self-support structure around you. You couldn't go out and ask somebody if you got in trouble.

Nebeker:

Couldn't you ask somebody in a somewhat veiled way when you had a problem?

Jenniches:

Well, you know, if you could ask them in a veiled way such that they understood the problem, then you violated security. It was pretty strict, very strict.

Nebeker:

And so you don't talk about what particular projects you were involved with at the time.

Jenniches:

No, I don't talk about those. But over time, of course, they become fielded. And therefore, they become unclassified because people can see them. And like I said, a number of the projects are here. But you still don't comment on whether you worked on them or not.

Nebeker:

How was it to be doing that work for you? I mean, did it bother you that it was very high security?

Jenniches:

No. I've always been very proud of being part of Westinghouse, and then Northrop Grumman, to do the type of work that we do to protect our nation and our democracy. I've always considered a privilege to do that. The only bothersome part was I used to worry: what if I can't solve these problems, because obviously they were very difficult problems. Now I was not a design engineer. The kinds of problems that I was solving were more produceability problems. But nevertheless, if you can't produce the product it doesn't matter how brilliant the design is. So I felt that what I was doing was extremely important. It was, and I took it very seriously.

Working with the U.S. Postal Service

Nebeker:

So in November of '89, you became General Manager of the Automation and Information Systems Division.

Jenniches:

Now this was an abrupt change. I went from defense to non-defense. I had been doing advanced development. And then Westinghouse sent me away to Harvard for what was at that time a 14-week program to study principles of general management. When I came back I didn't have a job because somebody else had taken over advanced development.

Nebeker:

You applied for that program?

Jenniches:

I was nominated for that program. In my whole career, I never applied for anything. I was always told where to go. And I would always say, "No, I'm not the right person for it." Or "I'm too busy. I have too much going on." And they would always say, "Nevertheless, go." I never applied for anything. I wouldn't have applied for that because I was up to my eyeballs in advanced development of advanced defense systems. But it was always very good that they'd force me.

Nebeker:

Was the thinking at Westinghouse that managerial skills are so important that they'd send a certain number of people?

Jenniches:

Yes, one a year.

Nebeker:

One a year only.

Nebeker:

Was that training valuable for you?

Jenniches:

Tremendously valuable, yes. It was interesting. Like I said, I would never have chosen it for myself. But looking back on it, at the time, there was one person from the entire

corporation sent each semester; two each year from the entire corporation, one from defense, but not necessarily every year. And so it was very much an honor to be chosen to go. It stretched your mind. The class had 140 people in it and half of the class or 70 people were from outside the United States. It was also very interesting to see how they thought, how they approached problems.

Nebeker:

Were the majority of the people also advanced career people?

Jenniches:

Yes, but from broad industry all over. One of the people in my class was the Director of Technology for the United States Postal Service, Currie Boswell. When I came back to Westinghouse, I went to my boss Aris Melissaratos. I said, "What do you want me to do? I'm back." They hadn't really thought about my next job. So I was a little disconcerted. But nevertheless, I knew how they were.

Nebeker:

You knew they'd find something for you.

Jenniches:

Yes. He said, "Well, interesting." He said, "Somebody was just in my office talking about an opportunity with the United States Postal Service." Well, of course, we don't do anything with the Postal Service. We're a defense contractor. "But why don't you take a look at that and see if you can help them out?"

Nebeker:

Had they started the commercial operations at that time?

Jenniches:

No.

Nebeker:

So everything was government defense.

Jenniches:

Yes. I went off to talk to Tom Evans. He had a neighbor that was having trouble with a contract. He was having a hard time executing. I said, "you know, I actually know someone from the Postal Service that I went to school with at Harvard. And he's the Director of Technology. So let me give Currie a call and see." I called him up. I said "Westinghouse is interested in seeing if there's some way we can help." We talked with them. We actually didn't help with that particular product because the Postal Service wanted us to do something different with a German design company because they were looking to establish a U.S. manufacturing base.

Nebeker:

The German company would have a U.S. manufacturing base.

Jenniches:

By direction of the U.S. Postal Service.

Nebeker:

Specifically for the Postal Service?

Jenniches:

Absolutely. They asked us if we would be interested in that. We got a request for proposal and proposed it. We got the request for proposal right after July 4th weekend. So we got to work on that. It was turned in on August 8th. And on August 16th, we won a $32 million contract. That was the first production automation contract within Westinghouse for automated postal sorting equipment.

Nebeker:

Was this letter-sorting equipment?

Jenniches:

It was. It was called a barcode sorter.

Nebeker:

That was picking up the barcodes from…

Jenniches:

That were sprayed on the letters.

Nebeker:

Was that done by somebody keying in zip codes?

Jenniches:

No, optical character recognition.

Nebeker:

So it was picking up the zip code and printing on a barcode?

Jenniches:

Well, no. Sometimes the barcodes were preprinted. Other times, you read the address and determined the barcode and sprayed it on. That whole technology evolved over a decade. It was fascinating. At the time, I think people thought that a defense contractor was overkill and they knew that a lot of defense contractors were worried about downturn. So they were looking at dual-use technology. That was a buzzword at that time. So people who had been in the postal sorting business sort of thought that we were a bit frivolous and we wouldn't last long. The interesting thing is when I had one of our eminent experts in pattern recognition and signal processing take a look at the problem of reading an address – and these were machine-printed addresses; they weren't handwritten, just machine printed but there was so much variability in the machine print– and he said, "My goodness. This is more complicated than anything we do in radar when you consider the amount of variation, and the limited amount of time that you have to acquire the image, analyze the image, and then convert it into a machine-readable barcode." He was flabbergasted. Well, then everyone in Westinghouse took it very seriously, as did the United States Postal Service, and the foreign companies because most of the technology had been done by foreign country companies. There weren't many U.S. companies that were interested in doing this.

Nebeker:

Was the Postal Service already using some equipment produced by this German company?

Jenniches:

Yes, they had used their equipment for years. They had a very long relationship with them. And in the beginning, the relationship was stressed because the Germans didn't think that we truly appreciated the nature of the challenge. And we were trying to apply defense processes, such as configuration control. Prior to that time, every machine was sort of designed and assembled by hand. You couldn't swap parts. So we were talking about interoperability of parts, configuration control.

Nebeker:

You're talking about these sorting machines?

Jenniches:

Yes, the sorting machines. We also talked about systems engineering. In the past when a piece of equipment was to be upgraded, they pulled the entire piece out of the field, put it in a factory for six months or so and then put it back in. We talked about doing what we called a rolling wave. We would get a jumpstart kit. We'd go out to the field. We'd change it in the field. They'd only be down for a week or two and then be back processing now. So we introduced a whole set of defense mentality processes into a very different industry.

Nebeker:

So the technology that this German company, and no doubt other companies, had developed was in this entirely different context. Explain to me exactly what Westinghouse was doing.

Jenniches:

To begin with it was build print. But we approached the build cycle differently than what they did. As time progressed, we put in upgrades. We changed the design. We actually changed the whole logistics.

Nebeker:

Was Westinghouse manufacturing these machines?

Jenniches:

Yes, we did. We did right here in Linthicum, Maryland[phonetic]. Lockheed Martin ¬¬– at the time Martin Marietta – also entered into the industry just about the same time as we did in the same path. But they didn't do it in Orlando. They moved their facility to Albuquerque. We kept, as I like to say, close to the mother ship so that, if I needed any help, the engineers were less than a mile away. We did them in leased facilities, you know, rather than in the main plant because the main plant was used for producing defense hardware. Period.

Nebeker:

So you had this long-range contract with the Postal Service that made this huge investment possible.

Jenniches:

Yes, we actually didn't invest much. The Postal Service did all the investing. But we worked very, very hard. We worked just as hard as I had worked on all of those defense and special programs. It was just very different. The equipment had been predominantly mechanical equipment. And we just happened to enter the marketplace when it was shifting from mechanical to electromechanical and to optical. We brought a set of disciplines and knowledge that the traditional postal suppliers were not as expert in. So timing was everything. We just happened to be in the right place at the right time. The needs were tremendous at the Postal Service. We have done literally billions of dollars worth of business for them.

Nebeker:

So there must be some machines that take sacks of letters and line them up nicely for, for reading addresses. Is that right?

Jenniches:

Well, there are machines that take sacks of mail and dump them in. But the singulation and lining up is done on sorting equipment called feeders.

Nebeker:

So the sorting machine is doing that as well as looking at the address and putting a barcode if there isn't one.

Jenniches:

Yes.

Nebeker:

Is it a separate machine that's reading the barcodes and sending them?

Jenniches:

No. It's all integrated. It's a very complex system. It feeds in the mail. It faces the mail. It reads the mail. The mail travels in a delay loop while it's processing what it read. Then it sprays a barcode on it. And then it sorts it. And then that barcode is used in downstream operations to continually sort based upon…

Nebeker:

Finer sorting.

Jenniches:

Yes.

Nebeker:

Wow.

Jenniches:

So it was wonderful.

Nebeker:

How long did that activity occupy you? It looks like from November of '89 until August of '99?

Jenniches:

Yes, I was there for a decade.

Nebeker:

So this is anomalous for you to be on one project for a decade.

International Partnerships
Jenniches:

For a decade, I know. But it was the establishment of a business; making it credible, not only with the USPS but also, quite frankly, with the corporation. And we had to minimize our investment because it was not core. It was not traditional. The only way it was going to stay around was if it was very profitable. So we had to constantly think about produceability, manufacturability, how to make it profitable, and then ultimately how to make the equipment better. Then about midway through that decade we did go into engineering of new products in partnership with the Germans. And also the French. It was my first exposure to international business.

Nebeker:

Tell me a little about how that worked. Would they send a team of engineers over to discuss a new product?

Jenniches:

The Postal Service was a party to that. And it was always Westinghouse and, initially, AEG. Later on, AEG was bought by Siemens, just like Westinghouse was bought by Northrop Grumman. We would work on prototypes together.

Nebeker:

So there would be a, a common prototype?

Jenniches:

Perhaps. Or we might take a machine and divvy it up. But ultimately, it had to integrate together. And it had to work. You had to be able to produce it in production. It had to return investment to the Postal Service. If not, they wouldn't buy it. It was very serious business.

Nebeker:

It seems to be an amazing operation. Was AEG or Westinghouse looking for other customers for such equipment?

Jenniches:

Well, we did in fact do some. We did some additional work for Federal Express, but not with AEG. There we worked with a Danish company, who had a tilt-tray sorter. And we put the processing front end on it. FedEx used it to process all of their parcels in Memphis, in their main hub. That was an enormous project.

Nebeker:

Is that part of this decade?

Jenniches:

Yes, it was.

Nebeker:

I'm glad you didn't lack for projects in that time.

Jenniches:

No, we always had something. And we had done a few things with UPS. But we became convinced that it took a very large customer operation, to be able to justify the expense of the automation. So we didn't look to small businesses.

Nebeker:

There weren't big enough customers out there.

Jenniches:

Exactly. So it either had to be federal governments, and we did do overseas as well as here in the U.S.

Nebeker:

For other postal services?

Jenniches:

Yes, the United States has 65% of all the mail in the world. So if you're going to choose a customer, choose the U.S., which is why the Germans were here. And the French came. So we had a wonderful natural marketplace with the United States Postal Service. But we did work with other countries.

Nebeker:

So Westinghouse equipment was purchased by France or some other countries?

Jenniches:

Yes, and then ultimately we did acquire – but not during this decade, just after this decade – a French company as a subsidiary that does postal equipment. And so we still have two subsidiaries, one in Gentilly, which is a suburb of Paris, and another in Valence, and so still to this day producing sorting equipment for around the world.

Managing Communications
Nebeker:

So we're now to August of 1999, when you became Vice President of Communication Systems. It's now Northrop Grumman.

Jenniches:

Yes, it is Northrop Grumman. The President of Electronic Systems at the time was Jim Roche. Dr. Roche said I had to leave postal. I'd been there too long, and he wanted someone else to do that. He wanted me to leave and go fix a problem that we were having in a small subsidiary in Ohio that was doing work for Boeing. I said, "Dr. Roche, I don't know how to spell communications much less do that." [Laughter] I said, "Surely, there's someone else who can do this." So typically I didn't want to leave. And he said,

"Too bad. You're going." So I went off to become the Vice President of Communications. He was right. Boeing was not happy. Things were tough. But there were brilliant engineers in Ohio. We just got everybody focused. And we worked not so much on the electronic communications but on the management communications, which I did know how to do very well. We got everybody settled down and focused on the problem. We solved the problems technically. We produced the hardware. And it turned out to be a very good contract.

Nebeker:

These were airborne communication systems?

Jenniches:

Yes, they were. And I learned a lot about communications during that time. I also picked up some subsidiaries in England, Park Air, that also did air-to-ground communications. That was similar to the first experience I had a long time ago: to run a Canadian operation earlier in my career. But this was my first real P&L responsibility overseas, in the international marketplace. Once we got the Ohio products running well, we started to expand the Park Air products. We acquired another communications company out of Norway and were expanding that. Then they asked me to take over the postal business again.

Homeland Defense

Nebeker:

So we're now to September of 2003. And you become Vice President and General Manager of the Government Systems Division.

Jenniches:

Right. And it was made up of the communications work and the postal work. We started a new business at that time in homeland defense because everyone remembers September 9/11, with the World Trade Center towers. But people may not remember that in October of 2001 there was an anthrax threat.

Nebeker:

I remember well.

Jenniches:

And U.S. Postal Service employees died as a result of anthrax. There was a program put in place led by Dave Tillis and a team of radar engineers, who knew nothing about chem-bio. But they nevertheless were very smart about processing and manufacturing and developed an anthrax detection system – called the biological detection system – using proven technology from the medical field. It provided a clinical analysis to detect anthrax DNA if it was present in an envelope. And so with our knowledge of how to sort, we put a front end on that would actually squeeze the envelopes to force air out so that we could sniff the air to see if anthrax spores were in there. The threat occurred in October 2001. Six months later, we had an operating piece of equipment through tests and deployed into the Baltimore Post Office Processing and Distribution Center. It was a remarkable effort engineering-wise as well as production-wise. We formed a partnership with the Postal Service, and that equipment is still in operation today throughout the United States. There are literally thousands of these systems testing every single piece of letter mail that goes through every day. And we have not had one single false alarm in the whole time. So I lost count. But in the last year, it was over 8 million pieces of mail and not a single failure. It was a remarkable engineering feat by a very small group of people, background just like when we started sorting machines. Everybody said, "What would a defense contractor do with sorting?" Well, here it is a defense contractor doing chem-bio detection systems and doing an incredible job.

Nebeker:

Could that be adapted to other threats?

Jenniches:

Yes, in fact the team has expanded and is looking at many threats. There are probably between 8 and 11 really dangerous things out there. And they're developing detectors for all of those. We've gone beyond just the Postal Service to other agencies and most recently to the Department of Homeland Security. So that's another business that started in the early 2000s – 2003.

Nebeker:

So that was in September of 2003.

Jenniches:

Right. And after we have those running, then I was also asked by Bob Iorizzo, who replaced Jim Roche as the President, to take over our international Air Defense Command and Control business. So I spent my last four-plus years overseeing the postal business and homeland security and for awhile the communications. But that we spun off. I picked up the international ground-based radars and air defense.

Overseeing Sales outside the U.S.

Nebeker:

And you recently retired as Vice President and General Manager.

Jenniches:

Yes.

Nebeker:

This is for sales outside the United States?

Jenniches:

It's international. Although the U.S. government does own some of those radars, but small numbers in comparison to the number that we've sold overseas. We predominantly sell the air defense and command and control systems in the Middle East and North Africa. And we sell the air traffic control and the other radars around the world.

Nebeker:

How does it work when Westinghouse develops a radar system, say, for the Air Force or, or Navy? Can it then look for customers?

Jenniches:

We can do foreign military sales, which is under the auspices of the U.S. government. In some cases, we develop the radar specifically for the international market but with the knowledge of the U.S. Air Force. And they did buy some. In fact, one of our most successful radars in the international marketplace is also used by the Air Force and is

used in the Caribbean Basin network for looking for low-flying drug trafficking and similar kinds of threats. The work is just fascinating. It is absolutely done in cooperation with the U.S. government, the Department of Defense.

Nebeker:

I would also imagine there must be a lot of classified systems that Westinghouse cannot commercialize.

Jenniches:

Well, absolutely. We cannot. And that's all very much controlled by the Department of Defense, the State Department and ITAR. Nothing is done without the full knowledge and cooperation of the U.S. government.

Nebeker:

But it's interesting you say there are some projects that are seen as a commercial product from the beginning, with maybe the Navy as a customer.

Jenniches:

Yes, or the Air Force, the Army, or whoever. And but the beauty of it is, if you get the larger volume from the international marketplace, that drives overall production costs down. And the U.S. government benefits when they buy one of those radars. There may be different software or different capabilities, depending on what the U.S. government feels is appropriate for export. But still the foundation greatly benefits from the additional production volume.

Nebeker:

And how did this overseeing the international business go?

Jenniches:

I found it fascinating. Once again, I had said, "No, you don't want a woman to go." There are thousands of years of reasons why a woman should not be leading the business in that part of the world. And Bob Iorizzo said, "We want you to go do it." So I said, "Okay." But I did surround myself with people who were very knowledgeable about the market and the customers and things like that. When I went in, my initial feeling was that it

would be more ceremonial and that I would be going in to meet the Head of State or the commanding general of the Air Force or something like that, but not to conduct any real business. And I could not have been more wrong. I was treated incredibly businesslike.

In my first meetings I almost always got yelled at because there was a problem. And that's why I was going in to see what needed to be done. So my Ohio experience, taking care of Boeing, taught me well. I'd go in. I'd listen. I'd find out what was going wrong. It was generally a management communications problem, not a technical problem, although there were technical problems and we had to get those fixed. It was fascinating. In many ways, I met higher-level people and was able to meet with them quickly and easily and was treated with more respect than I would have been in our own Pentagon because they needed our help. And it's interesting. They didn't care whether you were male or female. All they cared was could you solve the problem? Did you keep your word? And did you make things happen in a timely manner? And if you did that, you were fine with them. And so I had wonderful experiences. I went all over the Middle East and North Africa.

For instance, in Saudi, I had to wear the burka, the abaya because that is the custom of the land. I was meeting with the commanding general of air defense. He said, "How do you feel, Mrs. Jenniches, about wearing the robes?" I said, "Well, I feel fine because I knew what the requirement was before I applied for the visa. When I got the visa, I knew exactly what I have to do. So I have no trouble wearing this robe." He said, "Could you speak with my daughter?" He said, "My daughter is rebelling against wearing this, you know. And she wants to drive. ." I smiled and said, "Well, General, "I think you're going to have to handle that one. I don't think I can solve that problem." I said, "Now let's talk about our air defense issues." I found the environment to be very welcoming of technical Western women. And it was astonishing to me. I thoroughly enjoyed the time.

It was also exhausting because you had to go at the drop of a hat. The flights were very long. You got off the plane. You went to a meeting. You had your meetings. You got back on the plane. You went someplace else. And so my last four or five years were just a whirlwind environment. But I felt like I was making a difference. I was setting a foundation. I had a tremendous team of people, who really cared very much about the products and the nation and the threats, as does the U.S. government. They want our systems in there because of the threats in that part of the world. So it was a wonderful way to end my career and retire. I've had 36 years of tremendous challenge and opportunity, and I've worked with the best people in the world. And I wouldn't trade a day, not a day of it.

Involvement in Professional Societies

Nebeker:

Wonderful account. I wonder if I could ask you also about professional societies, if you've found any engineering societies or management societies that have been valuable to you.

Jenniches:

I obviously have been involved throughout my career in professional engineering societies for the very reason that I didn't hear the word engineering until I was 23 years old and already had a Bachelor's degree in biology. And I often say, "I don't think every child in America has to be an engineer, but I think every child should have the option of becoming an engineer, which means that their education from elementary school-on has to be inclusive enough to allow them to pursue an engineering career." So because of that, I've been very, very active with the National Academy of Engineering, with the Society of Women Engineers. And in 2005, I was the Chair of the American Association of Engineering Society and met with a tremendous amount of leadership from the various engineering societies, including of course IEEE, which is a very important engineering society, not only here in the U.S., but worldwide. I am still very active with all of those societies. And because what I really feel is my third career – the first was teaching, the second was industry – my third career will be hopefully helping with engineering and education to try to open up the opportunities in science, technology, engineering, and math for all individuals in the U.S. – in particular for minorities and women because the numbers are still lagging tremendously. Yet the need for engineers is huge and growing. The white male population who wants to pursue that is pretty much capped or declining. So if we are to continue with the level of innovation in the United States, we are going to have to attract all people into engineering, women, minorities, and of course white males. I consider that to be one of the most critical issues facing the United States, especially when you hear of the number of engineers that are being graduated from India and China. We may graduate 40,000 or 50,000. They graduate 400,000, 800,000 engineers a year. And when you think about that, they may well need that many engineers. But we need a whole lot more than 50,000. It's disconcerting that the innovation and challenge may go overseas rather than staying here in the U.S.

Nebeker:

You've been President of the Society of Women Engineers.

Jenniches:

I have, yes.

Nebeker:

Is that the organization that you foresee as being the main way that you try to reach out to achieve this goal?

Jenniches:

I certainly do. In fact, just in this past month, I spent a day on the Hill talking with senators and congressmen and their staffs about STEM education and several pending bills in Congress that need their support in order to put the resources in place to continue the K through 12 engineering. So I certainly see the Society of Women Engineers as helping me get the message out. But I work with so many different organizations. I have worked for almost 13 years now with the National Academy of Engineering on a website called Engineer Girl, which still gets about 1 million inquiries from young women, young men, teachers and parents on what engineering offers middle school children. So I have a lot of networks that I try to use to help get the message out. And it keeps me off the streets, because I have too much energy to truly retire.

Nebeker:

Seems so to be. Are there things I haven't asked about that you'd like to comment on?

Jenniches:

No. You've given me a tremendous amount of time to reflect on what's happened. And I appreciate the prodding because sometimes the 36 years did go by as a blur. It helps to have those little milestones of when I made career changes, many of them abrupt, but all of them fascinating and rewarding. The only thing I would say in finishing is that the best part of my career has been the people that I worked with – just phenomenal people. The concept of teamwork and each one helping one another achieve the most that they can is a wonderful philosophy. And I know that the IEEE as well as the National Electronics Museum supports that. And I'm very grateful to be asked to share.

Nebeker:

Thank you so much.

Jenniches:

Thank you.