Sloan Career Cornerstone Center

# Profiles in Aerospace Engineering

## Julie A. Pollitt, P.E.

### Aerospace Technologist - Project Manager
### NASA Ames Research Center
### Moffett Field, CA

**Education:**
MS, Mechanical Engineering, Stanford University
BS, Mechanical Engineering, University of Connecticut

**Job Description:**
Aerospace Technologist involved in project management; builds research and testing equipment, including large-scale models for wind tunnel tests.

**Advice to Students:**
"On a Bachelor's degree level, keep as broad based as possible so that you have many, many more possibilities to go to. And think seriously about graduate school."

**Comments:**
Julie likes her job because she has to be a 'jack of all trades,' working with designers, doing calculations, producing CAD drawings, building prototypes, and conducting tests.

**Video Transcript 1:**
"There is a significant amount of design hours that go into building a wind tunnel model, especially on the scales that we're talking about. -- one of the models we're building is a 42% scale Boeing 757 which is basically half the aircraft size."

**Video Transcript 2:**
"Advice? On a Bachelor's degree level, keep as broad based as possible so that you have many, many more possibilities to go to. And think seriously about graduate school. I actually enjoyed graduate school more than I did Bachelor's."

**Interview:**

**Q: So let's just say who you are and what you do and then tell us about the significance of what we're sitting in front of.**

Pollitt: OK. I'm Julie Politt. I work at NASA Ames Research Center and what I'm doing here is a project-management position where we're building mechanical equipment for researchers to

do their research. The mechanical equipment that we're building actually are wind-tunnel models which are for the facility that's behind me. It's the world's largest wind tunnel and we're testing models in the 40 x 80 test section, which is part of this facility.

**Q: Talk about the wind tunnel.**

Pollitt: A wind tunnel is a facility where you test aircraft models long before they become airplanes. You hold a model of an airplane stationary and blow air by it, rather than flying an airplane through the air which is stationary. This wind tunnel here, being the world's largest, means that we test sometimes full-scale aircraft. A lot of military fighters, we've had F18s in here. We've had Boeing jets, and different types of other commercial jets besides Boeing.

**Q: Well, which end of the wind tunnel is this?**

Pollitt: This is the inlet to the 80 x 120 test section. This actual whole facility is called the National Full Scale Aerodynamics complex. It consists of two separate wind tunnels. One is a closed-circuit wind tunnel, which means that you circulate air in a pattern. The other one is an open-circuit wind tunnel where you bring air in and blow it out the other side. The 80 x 120, which is the world's largest test section, is the one that's the open circuit. The 40 x 80 is the closed circuit. The 40 x 80 is actually becoming an acoustic facility. They ripped out the test section and are putting in a new test section and lining it with about four feet deep of acoustic lining. Which means it will be one of the world's quietest facilities. And when we say acoustic facility, what it will do is cut down on background noise and the reflectivity of noise. It will absorb background noise such as fans, end noise and that sort of stuff.

**Q: How did you decide to get into engineering? What did you major in in school?**

Pollitt: Actually, the way I got into engineering was I had always been interested in NASA. My grandfather used to sit us down in front of the TV set every time an Apollo mission went up, every time anything else went up. He would sit us down in front of that TV set and say, “Watch this, this is history being made.” So from the time that I was little, I always had a real big interest in NASA and the work that NASA did. And when I was about 16, when I was in high school, I made the firm decision that I was going to work for NASA no matter what. So I started talking with college recruiters and different companies and the military and asked a lot of them what types of degrees or what NASA would look for. I didn't come prepared with a lot of money so I was assuming that I was going to Air Force ROTC. And I was actually four years in a wheelchair. I was injured when I was in high school. So they had said that engineering, aerospace engineering, would be a good field to go into to work for NASA. And I was going to go Air Force ROTC, become an aerospace engineer and then go on to work for NASA. But when I got into college actually I ended up going into mechanical because it's a little bit more broad based than aero so I figured it would cover me in case NASA didn't want me. And then I just headed down that path. I headed for a college for engineering. I grew up in Connecticut, so I went to University of Connecticut, got a Bachelor's in ME and headed on and dropped everything and left for California. Came out to NASA Ames Research Center. Knocked on their door and asked them for a job. And fortunately, within a day I was hired.

**Q: That's amazing.**

Pollitt: Yeah. Well, I had a very good Grade Point Average. I also had job experience. I had worked as a research assistant for different professors. I actually started my Master's at University of Connecticut, so I was a teaching assistant for a semester or two. And I had also worked in the summer in Boston with the phone company, with New England Telephone, as a consultant-type position with a bunch of planning engineers. I had also been part of a lot of organizations – ASME -- very, very much so as a student, very active in the student section. And SWE, Society of Women Engineers. And then other organizations across the university. So I had, I think, a fairly decent resume coming out of school. And then like I said, I was hired within a day.

**Q: Tell me about the test in progress. What's the deal?**

Pollitt: In this wind tunnel which is actually the 80 x 120, there is a rotorcraft test which is going on. And potentially with all the high-energy rotors, massed, turning around, it's a little bit dangerous. Also they like to keep people out of the way obviously when they're running a test. So whenever we have a wind tunnel test, it's basically off limits. Nobody can go into the test section. They don't want anybody except for test personnel in the control room where they're running the test so that there's no confusion, no accidents, etc.

**Q: Talk about the great evolution of CAD systems and why we still do tests.**

Pollitt: Actually, computers have come a very, very long way but there are still many barriers, I guess, to properly modeling what is real life. So that's why we take the wind tunnel or real-flight testing, so you can get more of a real-life flow situation rather than trying to just model it on the computer. We're getting closer and closer and closer but, still, fluids codes are lacking in being able to accurately predict. So a lot of what they do with predicting on the computer is they will run the model on the computer, build the model, put the model in the wind tunnel, take pressure measurements on the model, see what the actual pressure measurements are. Then go back to the computer and modify the model. So it's a real iterative process where you're going back and forth between the wind tunnel testing and, and then on the computer building the model and running the fluids codes. Then they might actually take a real airplane and take the measurements from that.

**Q: What kind of tests do you get involved in?**

Pollitt: I actually have not been involved with any wind-tunnel testing yet, per se. I am getting the mechanical equipment ready for a wind tunnel test. I'm responsible for two different wind-tunnel tests for the mechanical equipment.

**Q: What's that like? Is that deferred gratification, what is it?**

Pollitt: There is not a spare minute. There is a significant amount of design hours that go into building a wind tunnel model, especially on the scales that we're talking about. One of the models we're building is a 42% scale Boeing 757 which is basically half the aircraft size. So to build something like that, you're talking a 64-foot fuselage and a 26-1/2 foot wing span. We're actually building a semispan model, which is a half-model to fit into the wind tunnel. And it's

just phenomenal. It's a lot of structure on the inside, a lot of details. This will have movable flaps like an airplane will have movable flaps. It'll have a flow through the cell which is basically to simulate the engine itself and it's just a phenomenal amount of design and fabrication time to build a model of that size. It's not quite as complicated as building an aircraft but -- because there's not the safety factor there -- but it's still a phenomenal amount of design work. So we are actually getting tight. We're having to speed design up a bit more right now.

**Q: Jump back to a larger scale. Say again who you are, what your job is and something about Moffitt Field and NASA and the kind of stuff that goes on there.**

Pollitt: I'm Julie Politt. I work at NASA Ames Research Center, which is Moffitt Field, California. Moffitt Field is actually a naval base and NASA Ames shares the land with Moffitt. NASA Ames is one of the nine NASA centers. There are three that are research centers and Ames is one of them. Langley is the other in Virginia. Glenn is the other in Ohio. At Ames, one of our main researches is "aero" -- aeronautics, aerodynamics, so on, so forth, so we have about twenty different wind tunnels out here at Ames. Currently what I'm involved in is working as a project manager, getting wind-tunnel models and whatever associated other mechanical equipment built for wind-tunnel tests.

**Q: What's it like being a project manager?**

Pollitt: I actually enjoy being a project manager. It still allows me to keep enough of a technical edge that I need to keep, because it's not that large of a project where I'm not directly involved. I'm definitely directly involved in what goes on with the design. And I've always had a natural tendency towards leading groups and wanting to manage, organize, set a course for a bunch of people and head them on that course. So I actually tremendously enjoy being a project manager.

**Q: What are the challenges of being a project manager?**

Pollitt: The challenges of project management? People, working with the people. When you end up spending 90% of your time on one or two people on the project, and those are the people that you can't get to perform the way that everybody else is performing. So that's probably the main challenge. Then the other challenges that arise when people get into fights on your team. So on, so forth. It's mostly the personnel issues.

**Q: Now was there anything in your engineering education background that prepared you for this?**

Pollitt: No, there was nothing in my engineering education that prepared me for being a project manager. Actually, more of the things that did prepare me was a lot of the extracurricular activities I had in college that I was working on, as an ASME student-section rep, and the Society of Women Engineers. There were a lot of other different societies I was involved with. And the other big thing was playing sports, working on a team. That was a big thing ... That's a lot of what project management and design team is about. I mean, it's working as a team.

**Q: What kind of sports did you play?**

Pollitt: I played basketball, soccer and softball.

**Q: OK. A regular jock.**

Pollitt: I was. I was an, quite an athlete in high school. Now currently what I do is go skiing and I tried tennis but I didn't like tennis. I like racquetball. I play some racquetball.

**Q: I want to hear some more about this place. T ell me about the significance of this building here.**

Pollitt: The building that we just passed is a 12" pressure wind tunnel. Pressure, in that, it holds 6 atmospheres “absolute,” of pressure. The 6 atmospheres is for a higher Reynold's number, a Reynold's number is density times velocity times some length dimension or viscosity. So, we use a Reynold's number to correlate between wind-tunnel testing and actual flight. So we have a 12' wind tunnel as a pressure vessel for a higher density to get a higher Reynold's number to get closer to flight. Which means less mathematical calculations go between the wind tunnel data and what would be flight. The 12', being that it is a pressure vessel, and was hydro-tested using an ASME-stamped pressure vessel.

**Q: Now let's go back to things like the work and the challenges of doing this kind of work. What is it about engineering that allows you to be able to do that you couldn't do by yourself?**

Pollitt: Well, one thing we do is play with a lot of neat stuff out here.

**Q: You were talking about that burner can earlier and what's behind that. The fact that you've got -- why is that burner can in your office and ... and what you're doing.**

Pollitt: That burner can is actually a propane burner, which is an engine simulator for a wind-tunnel model. We actually take propane and mix it with air and light it off, so that we get a certain pressure, and temperature levels, at a simulated engine nozzle which will give you the same acoustic characteristics as that engine. So, we do a lot of acoustic testing in the 40 x 80 wind tunnel and what we were trying to simulate was the sounds that the engine will make. Because one of the main driving factors behind the high-speed research program, which I believe is NASA's biggest aeronautics program is the noise that that supersonic plane is going to make. It's next-generation SST. And we've been doing a lot of work on trying to make it quieter, so that we can take it off from a normal airport such as San Francisco airport or New York airport.

**Q: Back to being a student, was engineering easy? Talk about it.**

Pollitt: Engineering was never easy. (Laughing.) Engineering was never easy but on the whole, extremely interesting and a lot of fun, I thought. I did a lot of work, had to work very hard but having this job has certainly made any hard work I had in school well worth the effort. And the job that I do, actually, compared to a lot of the friends that I have that I graduated college with or that I now that are also engineers, I actually think it's a lot more exciting here at

NASA. You get all aspects of engineering. I mean, I work with the designer, we're doing the calculations and we're doing the design, drawing it on the computer, heading out to the shop, having it built, testing prototype apparatus. We get the whole realm of engineering which makes working at NASA really exciting. Whereas a lot of people I talk to in big companies, they'll have one specific area. They may do all stress analysis or all fluids analysis or drafting. I mean, they're not the whole broad range. We're jacks-of-all-trades. Many of us have to be because we don't have quite the resources all the time that private industry has.

**Q: Advice to students, if you were going to talk to a freshman or sophomore right now?**

Pollitt: Advice? On a Bachelor's degree level, keep as broad based as possible so that you have many, many more possibilities to go to. And think seriously about graduate school. I actually enjoyed graduate school more than I did Bachelor's.

**Q: Where did you do your graduate work?**

Pollitt: Graduate work was done at Stanford University.

**Q: Sounds good. Thanks.**