

# Sheila Evans Widnall

*Secretary of the U.S. Air Force*

*Sheila Widnall is the first woman ever to head a branch of the U.S. military. She is an aeronautical engineer and was a member of the MIT faculty for twenty-eight years before leaving her position as associate provost to become Secretary of the Air Force. She credits her father for fostering her interest in math and science and her working mother for showing her that women can manage a career and a family. She is a member of the National Academy of Engineering, the International Academy of Astronautics, and the American Academy of Arts and Sciences.*



I was born in Tacoma, Washington, the oldest of two girls. My mother worked as a juvenile probation officer and social worker. My father had a more complex career. He started out as a rancher in Colorado during the Depression and, like many others, lost his ranch. So he went out into the world with a horse and a saddle, working as a ranch hand and riding in the rodeo; he eventually wandered into Tacoma and met my mother. My mother always wanted to be married to a college man and sent him to college. He worked as a foreman in the shipyards while attending college and then afterwards until he went to work at Boeing. Later he earned a master's degree in business administration and taught at a vocational school and a local junior college. In my father's eyes, I substituted for the oldest son, so we did a lot of projects together, like building, painting, rewiring, and pouring concrete. I'm sure that those experiences with my father fostered my interest in science and math and that my "working

mother" influenced my decision to pursue a career and a family.

I attended a Catholic girls' school from elementary through high school. I maintained my interest in science and math and no one ever discouraged me. I entered MIT in 1956 as a freshman in a class of about nine hundred. I was one of twenty women, of whom only ten graduated. That was culture shock—up to that point I had never been part of a minority. At MIT I majored in aeronautics, which thrilled my father because he had always wanted to be



*U.S. Air Force Secretary Sheila Widnall, 1993*

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leave. The net result was that we stayed put. We did both go to Washington in 1974 for a year—I worked in the Department of Transportation and he worked for Congress. Other than that we stayed in Boston until 1993, when I became Secretary of the Air Force.

I was tenured in 1974, became division head of Fluid Mechanics in 1975 and director of the Fluid Dynamics Research Laboratory in 1979. Along with my research and teaching responsibilities, I also served as the faculty chair for a year and chair of MIT's Committee on Academic Responsibility for a year. I became associate provost in 1992 with responsibilities in several academic areas, including federal relations, promotion and tenure, and international educational programs. As my career progressed I became more involved in public policy, government, and science and technology issues through national committees, boards, nonprofit organizations, and the American Association for the Advancement of Sciences (AAAS). I spent a fair amount of time in Washington as president and chair of the AAAS and as a member of the National Academy of Sciences' Panel on Scientific Responsibility. I testified before Congress and interacted with many individual members of Congress. I was involved with the Air Force before becoming secretary as a member of the Board of Visitors for the U.S. Air Force Academy from 1978 to 1984 and the board's chair from 1980 to 1982. I also served on an advisory committee to the Military Airlift Command and Wright Patterson Air Force Base. So I was not a new face in Washington or in the Air Force when I was appointed secretary, and my background prepared me well for the job. I knew the five previous secretaries very well—they were all men in my field, and we shared technical knowledge and expertise.

As Secretary of the Air Force I do a variety of things. I set major policies, but another part of what I do is representational: I visit bases, interact with the larger community, with local and national media, and with members of Congress. Currently women represent about 17 percent of Air Force personnel—al-

though, as in the field of engineering, those women tend to be concentrated among the more recent entrants, and so the distribution across ranks is uneven. My world now is not vastly different from my world in academe; there are more parallels than most people would think. Because I was associate provost at the time I took the leave of absence from MIT, I was used to dealing with a lot of policy concerns, government relations, and international issues. One of the primary modes of working in a university and in government is building consensus. The skills I honed in this area at MIT easily transferred to my work in government. I also have a whole office full of young colonels and majors with whom I work on a variety of projects, including writing papers, so it very much parallels the type of interactions I had and enjoyed with graduate and undergraduate students at MIT.

There's no question in my mind that women face barriers in professional life; there are benefits as well, but on balance it still constitutes a challenge. I've been able to overcome a good number of barriers due to a combination of things: the confidence I have in my own ability, my drive to succeed, my love of engineering, and the support I received from family, teachers, mentors, and colleagues. I also believe that all the attention on the role of women has been a positive force: universities and other organizations have been encouraged to look for qualified women and have found them. I have clearly benefited from that.

My being the first woman Secretary of the Air Force has given this organization a lot of visibility. Everyone within the organization has been incredibly supportive. When I first came in, the Air Force chief of staff, General Tony McPeak, went out of his way to make me feel welcome and to support me, especially behind the scenes. He made it clear to others that my appointment was not a controversial issue, that I was fully qualified, and that he was pleased with the decision. Consequently I got off to a really good start.

I interact with the Secretary of Defense fre-

an engineer. By my junior year I'd decided to pursue a Ph.D., particularly because many wonderfully supportive teachers urged me to go on. Many of these people turned out to be mentors to me and remain my friends and colleagues today. I have had about nine mentors throughout my career—all men—who have been very important influences on my life.

I stayed at MIT for graduate study. I had my first child six months before I finished my Ph.D. and my second child four years later. My husband and I were lucky because there were a lot of graduate students' wives who were looking for employment; we never had a problem finding good daytime child care. I could never have done all that I've done without a supportive husband—that's been absolutely essential.

My field is aerodynamics: I study fluid dynamics, specializing in aircraft turbulence. I have always been interested in the relationship of fluid mechanics to practical engineering problems. My Ph.D. thesis dealt with wing theory, complex wing structure (unsteady and steady), and cavitating hydrofoils. The application is to flutter analysis of dynamic flows, where the wing sheds vortices from both the wingtips and trailing edge, and these vortices affect the entire flow field. My career has involved four or five major interconnected fields. The defining thread through all my research has been unsteady flow—whether I'm studying turbulence, stability, or acoustics. For example, I've studied the effects of wake turbulence of one airplane on another in flight. I've also done a fair amount of research in aircraft noise: unsteady flow is the fundamental cause of noise in aircraft due to things like turbulence or the inherent unsteadiness of a particular flow like helicopter blades. My work has been analytical, experimental, and computational.

I received my Ph.D. in 1964 and became an assistant professor at MIT. I was hired fairly soon after universities began accepting women for faculty positions. There's no question that I benefited from a change in attitude: before, no matter how good you were,

if you were a woman you were not considered for a faculty position. At the time I was hired and for quite a while after, there was only one other woman engineer at the university. Now things have changed: there are twenty-eight women on the engineering faculty; about 40 percent of undergraduate students at MIT are women; and women are in the majority in six engineering departments, including civil and chemical engineering.

I decided to stay in the academic world after earning my Ph.D. instead of heading out into industry for a couple of reasons: I really love teaching, and I enjoy the autonomy of faculty life—I like being totally responsible for setting my own agenda. Along with that comes the responsibility to fight for funding for projects that you believe in, but that's never bothered me; it comes with the territory.

I think both science and engineering provide wonderful careers for women. The fields are very interesting, they usually pay pretty well, they often provide a lot of autonomy, and one's contributions can be measured. There's not much subjectivity in the evaluation of one's work in many areas of science and engineering, which is important for women. I actually believe that engineering is a better career for women than science because it offers a broader range of opportunities, all the way from industry to government, and at different career levels from a bachelor's or master's degree to a Ph.D.

People often comment that it is unusual to do undergraduate and graduate work at the same institution and then stay on as a faculty member. My husband is also an aeronautical engineer, specializing in guidance control. We married during my senior year in college. We experienced the "dual career couple syndrome" and simply have much less mobility than individuals or single-career families. There were times when I was tempted to go somewhere else, either for graduate school or a sabbatical, but my husband was in the middle of something and couldn't leave. And there were times when he wanted to move, but I was in the middle of something and couldn't

quently, about three times a week, because he is the cabinet member to whom all branches of the military report. I often see President Clinton at social functions at the White House and at times travel with him on *Air Force One*. I joke with colleagues that while everyone else on the plane is vying for time with the president, I'm trying to figure out how I can get up front to fly the plane.

During my sophomore year of college, Professor Stark Draper told me that it was important to have fun with whatever career you choose. That was actually a pretty radical idea to me, but throughout my career I've followed his advice. I've always done what excites me, and the details have always taken

care of themselves. I never had a life plan, and I still don't. When opportunities have arisen, I've taken advantage of them.

**PRESENT POSITION:** Secretary of the U.S. Air Force

**FIELD:** Aeronautical engineering

**RESEARCH AREA:** Fluid dynamics

**EDUCATION:** B.S. in Aeronautics and Astronautics (1960), M.S. in Aeronautics and Astronautics (1961), Ph.D. in Aeronautics and Astronautics (1964), MIT

**DATE/PLACE OF BIRTH:** July 13, 1938/Tacoma, Washington

*Sheila Widnall and her husband, William S. Widnall, live in Arlington, Virginia.*

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