



Sloan Career Cornerstone Center

Profiles of Mechanical Engineers



James W. Forbes, P.E.

**Research Engineer
Ford Motor Company
Dearborn, MI**

Education:

MS, Mechanical Engineering, Worcester Polytechnic Institute
BS, Mechanical Engineering, Worcester Polytechnic Institute

Job Description:

Research Engineer involved with product, systems, and plant equipment design, plus testing and reliability.

Advice to Students:

"Include a master's degree in their career-building plan. Language courses can be an important asset, when so many employers have overseas interests or operations."

Comments:

"One thing that a lot of engineering students don't realize is how engineering really is a team sport, that any project is made up of the work of hundreds and thousands of people. Engineering in school is very much of a solo effort where you need to find certain key pieces of knowledge."

Video Transcript 1:

"I think there's a lot of talk about whether you'd like to work for a large company or a small company. And there certainly are advantages to both. With a large company, you get stability, you get structure, you get resources. You get peer recognition right within the company. With a small company you get greater flexibility, the possibility for maybe more compensation, but less stability and things like that. Both can be good."

Video Transcript 2:

"I think that in the past couple of years, Ford has certainly become more international. The European operations used to be separate from North American operations to a larger degree. They're certainly very integrated now. I think that's definitely a positive thing. We interface more with people of different backgrounds, speaking different languages, from different cultures. That's really a mind opening experience."

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Video Transcript 3:

"There's a lot of career planning that goes on, and early on they ask you 'do you want to go into management?' 'do you want to stay in engineering?' 'what rotations do you want?' There a whole training period for the first couple of years. Most people who come into Ford will rotate through a number of different areas."

Video Transcript 4:

"We have annual performance reviews and they, early on in the year, would establish what you're supposed to be doing. And then if there's a real deviation between what you're supposed to be doing and what you are doing, they'll mention it at around mid-year and at the end of the year they assess how well you performed. And, to an extent, that determines your pay raises. I think that's one thing to realize in a big corporation -- that no matter how much you achieve or don't achieve that there are only certain brackets that your compensation will fall into. So, if you think you're working ten times as hard as the guy sitting next to you have to realize that you're certainly not going to make two times his pay. That's just a fact of big corporate America."

Video Transcript 5:

"They typically talk about - big companies especially - having a dual ladder. And you can go up the management path, and that's more of a supervisory role, or you can go up the engineering path, and at Ford they refer to that as a technical specialist. The two paths of the ladder will never be equal lengths - there are more opportunities in management than in engineering. But that's not to say you can't be very well compensated in an engineering path. The advantage too, is that the work might be more enjoyable. You might not have to take it home as much with you."

Interview:

Q: And now Jamie, I guess we're going to --

Forbes: Talk about teamwork?

Q: We're just trying to stress how most engineers, especially here, work on teams. And how you interact and what kind of daily, weekly things, other people on the team do.

Forbes: One thing that a lot of engineering students don't realize is how engineering really is a team sport, that any project is made up of the work of -- in the case of Ford Motor Company -- hundreds and thousands of people. Teams of not only engineers, but people in management, as well as technicians and designers, the people that actually work the CAD programs and the test equipment -- all working together to produce the product, or revisions to the product, or whatever we're doing. Engineering in school is very much of a solo effort where you need to find certain key pieces of knowledge. But, when you get out into an industrial environment, especially, there is a great deal of interaction between engineers and technicians and, really, buildings full of people. You shouldn't think that engineering is not going to give that to you, because there really is a great deal of interacting.

Q: What does a typical team consist of?

Forbes: Organizationally, we have departments that are headed by managers and supervisors. And there's a core group of engineers under that structure. And then, technicians

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or designers or mechanics or tradespeople underneath that structure as well. But to accomplish any given task, there would be probably one senior engineer assigned to lead the project and coordinate the efforts of the engineers. And hopefully that would be the person that's had the greatest amount of experience. For instance, I'm very new to this group and I'm working on some suspension design for new vehicles and Jeff's had a lot more experience in that area than I have. And so I'm learning from him. And while he can direct a project, I can do certain portions of it as other people do. Then it all has to be put together and turned into a finished report that our management can decide whether to act on or not.

Q: What about interaction with other departments? You have your own team but is there anything that you could mention about, say, accounting or marketing, public affairs, anything like that?

Forbes: We talk a lot about "cross-functional" teams and the teams I was just mentioning -- engineering teams. In many cases, even with these teams, we have people from other activities like planning, that aren't necessarily very hard-core engineering activities but they orchestrate what types of cars and trucks we want to make years from now. And that's not something that we here are in a position to address but we have other activities that are. Marketing and sales activities -- people that may very well have mechanical-engineering backgrounds but their current jobs aren't directly in engineering. They need to tell us what our customers are going to want years from now and how much they'll pay for it, what features they're going to find important, what their lifestyles are going to be. Really, we need to understand all of society in the future to make the cars for the future now.

Q: Are there any other aspects of teamwork that you think are important in terms of skill building, things that you wish you knew back when you were in school that you could tell to students now?

Forbes: The human interaction thing is difficult to teach -- those skills are developed in school, maybe outside the classroom but certainly in school through campus organizations or roommates. You learn how to deal with people and that's obviously a skill you're going to need your whole life in the work environment and outside.

Q: Jamie, excuse me. Would you just give me your name, your age, your job title, where you work and how long you've been here?

Forbes: OK. My name is Jamie Forbes. I'm a research engineer at Ford Motor Company in Dearborn.

Q: Do you do a lot of traveling?

Forbes: No, no. Some engineers at Ford travel a treat deal. A lot of the evaluation of vehicles that are going to be sold and replaced in the world; we have to drive them everywhere in the world. We go down to Arizona for hot-weather testing; up to Bamidge, Michigan for cold weather testing. We go up to the mountains in Colorado. Now, I don't actually do a lot of that. I'll take an occasional trip to a wind tunnel in Georgia, maybe, or day trips here and there. So not a great deal of traveling.

Q: What do you find you spend most of your time actually doing? Is it on a computer, is it working with other people, meetings? How do you divide up your time?

Forbes: In my current assignment, I do a lot of computer work -- engineering analysis, using the graphics and design systems that Ford uses. Prior to this assignment, just a few months

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ago, I had a lab job where I'd spend a fair amount of my time down in the laboratory doing experiments and trying to understand how the various systems in the car are producing effects.

Q: How did you get your first job out of school?

Forbes: Actually, I stayed through undergrad and got a Master's degree. I went six years straight. And when I was in the process of interviewing for jobs on campus, I was contacted by a recruiter that Ford had contracted, to find someone with my mix of skills.

Q: And so you've only been with Ford straight through. How many positions have you held in Ford?

Forbes: I've been at Ford for six years and I've had just two positions.

Q: Oh, it's just the two?

Forbes: Yeah.

Q: Do any people report directly to you?

Forbes: I work with a lot of people, but in terms of evaluating people's performance, no, I don't have any reports.

Q: What about the hot topic now, we've been hearing a lot about it -- "telecommuting?" Is that something that is done here at Ford, or is that something that in your position you see for the future?

Forbes: Well, Ford's very big and I've heard that we have a pilot program in process where people are set up with computers in their home. From a practical standpoint, I don't think that the kinds of jobs that I've had will ever lend themselves to telecommuting. They're hardware-oriented, lab-oriented, and people-oriented and I think you need the direct interaction. Not to mention that I work with very expensive equipment that I would really have to come here to use.

Q: How many people make up the teams you're working with now?

Forbes: Well, depending on the size of the project, anything from literally as few as the engineer and the designer -- maybe two people -- up to 100 people for complex projects.

Q: What do you think the best aspects of your job are?

Forbes: Working for a big company and working on a very commercial product, we have a great deal of resources. We use state-of-the-art equipment. We're really pushing the engineering envelope. So the challenges that we face trying to make a product that's manufactured in huge quantities, and used in an endless variety of conditions, are very interesting.

Q: What about a down side?

Forbes: Well, with any large company, I think that the flexibility and the resources you have are the strength. And maybe the room for compensation is diminished a little bit. No matter how good my work is, I can only expect to progress through the pay scales at a certain pace.

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So you trade off maybe security and resources for compensation. Whereas in a small company, you could, if you make it big, you could be making millions of dollars, theoretically.

Q: What would define “success” as an engineer, for you personally?

Forbes: To see my work in a commercial product. In my case, in a car. So I can point to a vehicle and say, “Yes, I designed that, I worked on that. I improved that system.”

Q: What were your grades like going through high school and college? Were you always an "A" student?

Forbes: Not an "A" student. I was a fairly strong student, but not top-ten or anything like that. In high school I did well. In college, first semester, I got off to a slow start and then when I got into the actual engineering courses, my grades picked up. And like I said, after four years of undergrad, I stayed on in the same school for another two years to get a Master's degree.

Q: What made you decide -- how did you know you wanted to be a mechanical engineer?

Forbes: I've always liked mechanical systems. When I was applying to colleges, I applied to four schools and I had four different majors. And I hadn't finely tuned exactly what I wanted to do. But once I took a couple of physics courses and, you know, the introductory courses, then I figured mechanical would be very interesting to me.

Q: Did you feel your undergraduate education and your graduate education well-prepared you to be out in the work world?

Forbes: I think I was very well prepared. I had a very favorable experience with my education.

Q: Did you co-op?

Forbes: No, I had one summer job at a jet engine facility.

Q: What do you think are your strongest skills, your most transferable skills, that have led you to go through the ranks, in a sense, and have some versatility in your career here at Ford? What do you think are the job skills that you possess that were important? What are the integral ones that you have?

Forbes: Well, I think that a very useful skill for engineers is, fundamentally, a logical thought process that transcends any particular job you have at the time. And you can get those skills partly from course work, partly from job experience. But that's fundamentally the thing that will transfer the most.

Q: What about international work? Do you do any international work in your current position?

Forbes: Yes. I've been involved with a couple of different international projects. I've been to Ford facilities outside of London and outside of Cologne, Germany. Ford is a very big presence in Europe and right now two of my three immediate bosses are from Germany, on assignment here. We work on European car-and-truck programs to a great degree.

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Q: if you had to sum it up, keeping in mind our audience, how would you describe engineering as a career path?

Forbes: It's a very stable career. I find it enjoyable because engineers make a tangible product in many cases and that I think gives you a set of skills that will always be in demand, especially as the world gets more technical. So, I don't have any fears about my job going away and that's saying something these days. As a career, I find it fulfilling.

Q: What do you know now, being out in the work force a few years, that you wish you had known when you were studying engineering?

Forbes: I think I was given a fairly good view of what engineering would be like. I guess looking back on it, it would have been nice if I picked up some more language skills. I've taken some German courses recently, since I've been out of school. Presentation skills are always good to stress. I've had to pick those up on the job. There are plenty of opportunities to do that, but it's nice -- you can get a real "leg-up" -- if you have an opportunity to present papers while you're in school. That's a good opportunity.

Q: With the corporate culture here at Ford, it's so large, how has it been to kind of integrate yourself into this community? And do you socialize with your peers or your bosses? Do you see them on the weekends?

Forbes: Ford is tremendous. Ford is bigger than my hometown; it's bigger than most cities. And as such, it has its own culture. We have our own TV satellites. We have Ford Land Corporation that owns the better part of Dearborn. And it is phenomenal. Now, something that big tends to break up into smaller subgroups. There are a lot of recreational clubs within Ford. They call it FERA, Ford Employee Recreational Association. And they have everything from archery clubs to antique-car clubs. And I'm not really involved with those. I've made a number of friends, typically people that are in similar situations with young families and we get together outside of Ford. As engineers go from job to job, you tend to meet different cross-sections of people.

Q: How old are your children?

Forbes: I have three girls, a 5-year-old, a 2-1/2-year-old, and an 8-month-old.

Q: Your wife is very busy.

Forbes: Yeah, oh yeah. She works harder than I do.

Q: She's got the tough job.

Forbes: Oh yeah.

Q: What is your neighborhood like? Tell me, what's your house like? Tell me a little about your neighbors, your neighborhood.

Forbes: I grew up and went to school on the east coast, and we find the cost of living in Michigan to be less in terms of housing prices. And the auto industry pays well. We're able to have a nice four-bedroom house, a colonial house on a fairly good-sized lot. We have nice neighbors; it's a residential area. It's maybe a half an hour commute, which is not a big deal.

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Q: Do you want to talk a little about this new computer system everyone is so excited about?

Forbes: OK. Ford is very interested in reducing the time it takes to make our vehicles -- what people want today, they don't necessarily want two years from now. So if it takes us five years to make a car, it's going to be very difficult for us to predict what people want. The only way we can make cars faster is to rely more and more on computers, so even mechanical engineers who definitely are not necessarily computer engineers still need to use computers extensively. We have C-A-D, CAD systems as well as computer-aided manufacturing, CAM, and computer aided engineering, CAE systems. Now, we'd like to combine all that work together, so that the people that originally designed the part in the computer can then transfer it to groups who, using the same data, will analyze it, using finite-element methods and other tools like that. And then, finally, just take the same data set and produce parts from that same data. And there are great efficiencies to be gained and we're thinking we can really reduce the amount of time it takes to make our vehicles if we do that. So, that's saying that, regardless of what kind of engineer you are, you need to be very well-versed in a wide variety of computer types and computer programs. It really should be as easy an operation as reading and writing.

Q: Other than the computer aspect, are there any trends that you see in the industry that someone who's going to be a mechanical engineer should be aware -- that this is where their job is going to go or that they should learn about this?

Forbes: I see engineering as becoming far more global. It's always helpful to have language skills and learn about foreign cultures. I see engineering as being more and more computer-oriented. The demands that the commercial world places on engineering are greater and greater. We need to be concerned with recyclability and the environment, which tends to maybe get into more environmental engineering and chemical engineering. So, as you learn your mechanical engineering, you also need to learn more about the other disciplines of engineering. And any one person will need to be -- the buzzword is "cross functional." You need more cross functionality in your day-to-day engineering jobs.

Q: Just to make a little switch, what kind of publications do you read?

Forbes: There are a number of publications geared to the auto industry like "Automotive Engineering," and SAE produces certain publications. So, of a technical nature, I probably read eight or ten of that variety. Of a non-engineering nature, I tend to read, you know, a number of different magazines.

Q: What societies or professional organizations do you belong to?

Forbes: When I was in school I was in ASME and I was in AIAA. Presently, I'm in the Society of Automotive Engineers -- SAE. And the Society of Experimental Mechanics --SEM.

Q: How do you see their role in engineering in general?

Forbes: If engineering wants to continue to be a profession, I think societies need to play a real big role in that. Some of the things that make a profession are the ability of professionals to gather outside of the work place and address issues of concern to that discipline. And that's really where the societies have to come in.

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Q: What would you say it means to be a "professional?"

Forbes: Professionals are able to evaluate their own work standards. They set the criteria for membership. Some of the best societies are in place for, like, medicine or law. Now, mechanical engineers have similar requirements through a professional engineer registration. Although it's not mandatory, I think strengthening those programs is a step in the right direction to maintain the profession.

Q: Just going back to what you said about professional societies, if you could tell the students how they can utilize their professional societies and what the societies can do to help them. Talk to us about the relationship there on the part of the student and on the part of ASME.

Forbes: Well sure, absolutely. I think it's very important to be involved with societies in school. Being involved with societies in school gives you an opportunity to interface with engineers, since there certainly are a lot of engineers in the societies. It's a great opportunity to present papers as a student, which is a great opportunity to build presentation skills and see what engineers actually do. There are opportunities for funding, for competitions, for lots of things that I think are very positive.

Q: Can you talk a little bit about how this location has a certain number of people, but they have people all over the world.

Forbes: Sure. We're in a building called the Advanced Engineering Center and that houses about 800 people, which actually makes it quite a small building by Ford's standards. You see in the background we have the Product Development Center and there are scientific research labs. And when you add all the buildings up just in this, what they call the Research and Engineering Center, there are at least 20-30,000 people right here. And then when you add up the greater southeast Michigan population and the engineering and support staff, there are 60 or 80,000. You add in the plant workers and I think we're up at 120,000 employees for Ford. And that's spanning the entire continent. We have plants in Mexico and Canada and everywhere, and that's just North American operations. To really get a grip on how you organize something of that scale is really a surprise. That was what surprised me when I came out here.

Q: Switching gears just a little big again. You talked about working in groups before. Who do you work with, who is not a mechanical engineer?

Forbes: Typically, we draw our management staff from the engineering staff. So, typically the people that I work for exclusively are engineers or have engineering backgrounds. Engineers work with mechanics, designers, technicians, skilled trades, assembly workers and people of that nature. They would come from specific trained backgrounds or associate degrees – sometimes, maybe, engineering technology degrees, but you know, people of that nature with specific skills.

Q: Do you find that mechanical engineering is a career where you're constantly learning new things? Or do you have to seek out to learn?

Forbes: You very much resign yourself to the fact that you will always be in school to a degree. I've taken a number of courses since I've been at Ford. Ford has great opportunities to allow you to take courses and they pay for them and everything. But, even if that's not your situation, you need to keep your education current. They say there's a "half-life" to the education you pick up in school and I think that's very true. You need to keep up on courses.

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Societies offer a role in that. A lot of colleges now are getting into the continuing- education theme. You take a college course now and then, work on a Master's part-time. That's I think very important.

Q: You mentioned your kids. So, I'm sure you know all about Bernie and Raffi and stuff like that.

Forbes: Sure.

Q: But other than that, do you find time to have more personal hobbies?

Forbes: Well, we try. It's not easy with three young kids. That's something that you certainly don't have any idea about if you're going through college and if you're this 19-year-old freshman or sophomore. I mean that's certainly a big revelation, regardless of what your major is. But, yes, we try to get the kids in bed by 8 or so and go out and go jogging. My wife and I will take turns, so we can stay in with the kids. We ride bikes. I used to play a little more golf than I do now. Things, work around the house. I'm trying to finish our basement. Things like that.

Q: Do you find in the type of work that you do, that when you come home, you want to forget about it? Or do you still consider yourself sort of an engineer at home?

Forbes: Well, I think so. I think engineering is a way of life to a large degree because it is a way of thinking about things. And certainly, I don't have a great deal of construction experience. But I'm relying on my engineering education as I decide where I'm going to put walls up in the basement. So, depending on whatever skills you have, I think engineering is a way of looking at things, that you take with you wherever you go. And it's an enjoyable job. I don't try to forget it when I leave.

Q: Do you have a PE license?

Forbes: Yes, I do.

Q: Are you proud to be here at Ford?

Forbes: Oh, there's no doubt that there are very few places where the engineering is more sophisticated than where we are now. This truly is state-of-the-art, and I know that for a fact. We give tours to people from all over the world. Delegations from China -- when Ford wants to do business with China -- they would like to see what they're buying, so they'll tour this building and other places. That's not engineering. But I still find it enjoyable. It's presenting the work that I do and I'm proud of the work I do. So I enjoy presenting it, too.

Q: Are you always worried about corporate espionage?

Forbes: I wouldn't say worried about it, but we do take measures. There are confidential locked garbage cans that you put your confidential garbage into. I worked in government or defense-industry places where the security is a lot tighter. Security is not terribly tight here, but we work on things in the far future. We would like our competitors not to know about that. At the same time, we feel a need to publish the work we do. As professionals, I think that's also something you need to do. So we balance those two factors.

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Q: Because you work on things so far in advance, do you always keep in mind that this is an actual thing? Or does it become numbers and images and things like that?

Forbes: In the early stages, it's not a natural thing. It's something that exists only in the computer, and when you learn to use the CAD systems and the tools we have, that really does give life to those electronic images. A very important skill for mechanical engineers is being able to see things in three-dimension. Things that are on paper, you need to be able to see how it would like when it's ten times bigger and made out of metal, and figure out how comfortable would it be to sit in this picture of a seat. And those are skills that you learn in school and you refine on the job.

Q: Do you think creativity is a big part of being a mechanical engineer?

Forbes: Yes. The stereotype might have engineers shown as not really creative. I don't think that is right at all. I've met very creative engineers. To be a good engineer, I think you have to be very creative. It's a marriage of science and art.

Q: What advice would you give to -- you're speaking directly to the students now, freshmen and sophomores -- ME majors -- what would you tell them?

Is there anything you would have done differently in your career path? Or is there anything you wish someone would have told you? Anything like that? You're being given an opportunity right now to speak directly to them.

Forbes: I think the only thing that I've had to pick up that I did not get out of school was some additional language skills. I took some French in high school. I don't have much call for French. I had more reason to use German, so I took a German course. As the world gets smaller, I think it's important to pick up some language skills. I didn't really travel overseas in high school or college. I think co-op is a good opportunity. There's also something to be said for blasting right through and getting out as quick as you can. It's important to focus on the computer skills, presentation skills. I think, more and more, that a Master's Degree is really helpful.

Q: Do you supervise other people?

Forbes: No, I don't have any direct reports.

Q: Is that something that generally would fall in a mechanical engineering career?

Forbes: Well, they typically talk about big companies especially having a dual ladder, and you can go up the management path and that's more of a supervisory role, or you can go up the engineering path, and at Ford they refer to that as a Technical Specialist program. And you have to realize that the two paths of the ladder will never be equal length. There always are more opportunities in management than engineering. But that's not to say you can't be very well-compensated in an engineering path. The advantage, too, is the work might be more enjoyable. You might not have to take it home as much with you. So, yes, there certainly are two different ways to go. You can have an entire career with no management responsibilities, or solely management responsibilities.

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Q: What about any mentoring programs? Are there any through Ford or any that you've been involved with in the past?

Forbes: Ford has a bunch. Ford's big into United Way. Ford's big into Junior Achievement. I've been thinking into getting into the Junior Achievement program at some point. As my kids start to get into school, it makes more sense. Ford's a very charitable company in terms of time and money. Yes, there are a lot of different programs.

Q: Did you have any mentors throughout your career?

Forbes: None official. Ford actually does have an official mentoring program. But yes, definitely. A lot of the senior engineers that I've run across, and professors in school, have really helped me out with my career a lot, and I still keep in touch with my professors from school. They invite me back for conferences and things like that.

Q: Does Ford encourage your membership in the technical and professional societies you belong to?

Forbes: It depends on the area. There are many different careers you can have as an engineer. Pretty much, you can have them all at Ford. Some of them are very non-technical. Others are very scientific-oriented. Typically, the more scientific your area, the more the society membership is stressed. My area right now is, I'd say, favorably disposed to it, but not very, very supportive.

Q: What is the most frustrating thing about your job?

Forbes: Most frustrating thing is realizing how long it takes to actually implement a change. If you see a car on the road today and you think, "OK, I know a way to make that car better in this way, if you just do this one thing." To actually see a change like that through the process is very time-consuming, and there are a lot of people involved.

Q: I think what you do at Ford is accessible to everyone -- produce cars.

Forbes: Certainly.

Q: How would you sum up the socially important aspect part of your job? Because there definitely is one. What is it to you?

Forbes: Well, society today is, no doubt in my mind, a product of what engineers have done. You look around. If you've got parents or grandparents that have had major surgery, or any relative -- medicine has been furthered greatly by engineering. Cars today allow people to be free and move around the country. The fact that you can be in a big office building is a function of the climate-control systems and the structures have all been products of engineering. So, engineering needs to be socially responsible, and I think it is socially responsible. It's something that does result in a better society.

Q: Did you always want to be an engineer?

Forbes: I think I didn't realize it when I was in high school because I really didn't know what engineers did, but as I started applying to colleges, pretty soon they want you to start thinking about majors. So you look down the list of the courses they offer, and you learn a little more about what engineering would be, and I liked mechanical things, and I was good at repairing

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things, fixing things around the house maybe. I was interested in construction, and from there that kind of guides you into engineering, I think.

Q: Did you enjoy college? Did you enjoy the whole atmosphere?

Forbes: Yes, I had a good time. It's a lot of work. Especially in grad school, it really was a lot of work. But I definitely think it was worth it. It's not easy. I wouldn't want to go back at this point, but I'm glad I did what I did. I think it's very important. It's nice to do it early in your life, and then you have more time to enjoy it.

Q: How do you feel, working for a large company like Ford?

FORES: I think there's a lot of talk about whether you'd like to work for a large company or a small company, and there are certainly advantages to both. With a large company you get stability, you get structure, you get resources. You get peer recognition, right within the company. With a small company, you get greater flexibility, possibility for maybe more compensation, but less stability and things like that. Both can be good. Obviously, this is a very big company.

Q: You always hear about two different theories about how work in the world is going. Everybody's going to be small, or everything's going to be one giant corporation.

Forbes: Sure, there are a lot of books written on the flattening of the organization. I think Ford is in that process now. The layers of management become fewer. I certainly feel I could write an E-mail to upper management at any point in time, if I had an opinion I felt had to be expressed to them. So, you certainly want to maintain that flexibility, regardless of the size of the company. But with this many people you have to have some structure. It's just a huge amount of people.

Q: Do they encourage a career plan? Do you have a career plan at Ford?

Forbes: There's a lot of career planning that goes on, and early on they ask you, "Do you want to go into management? Do you want to stay in engineering? What rotations do you want? There's a whole training period for the first couple of years. Most people who come into Ford, you'll rotate through a number of different areas. I bypassed that because in my master's work I did some specific projects that Ford was interested in. So, I came in directly for that. But in general, corporations have to take part of the role in training new engineers. I think that is unavoidable to a degree since this is a very different environment than what you'd have in school.

Q: Have you seen engineering change? Do you think you've seen it change? Have the climate and things changed here at Ford in the past few years since you've been here?

Forbes: I think that in the past couple of years, Ford has certainly become more international. The European operations used to be separate from North America to a larger degree. We're certainly very integrated now. I think that's definitely a positive thing. We interface more with people of different backgrounds, speaking different languages, from different cultures, and that's really a mind-opening experience. Engineers that have been trained in other countries are able to produce the same things by different methods, and to see how they do it is very interesting. There are some very good engineers in the rest of the world.

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Q: Back on the career thing, what's the process for review? You have a review every year?

Forbes: We have Annual Performance Reviews that early on in the year establish what you're supposed to be doing. And then, if there's a real deviation from what you're supposed to be doing and what you are doing, they'll mention it around midyear. And at the end of the year they assess how well you performed. And to an extent, that determines your pay raises, and again, I think that's one thing to realize in a big corporation. No matter how much you achieve or don't achieve, there are only certain brackets that your compensation will fall into. So, if you think you're working 10 times as hard as the guy sitting next to you, you have to realize that you're certainly not going to make two times his pay. And that's a fact of big corporate America.

Q: What do you think the coming trend is in demands of skills that are needed?

Forbes: "High-tech" is very important stuff. A lot of computer knowledge. I think now it is certainly mandatory to really understand computers. That should go without saying at this point. But, knowledge of environmental engineering as it applies to mechanical engineering and chemical engineering -- Ford's into recyclability to a great extent. I didn't have any specific coursework in that in school. You have to pick this up, either through courses offered by Ford, or college, or some outside organization. So you certainly do have keep on learning.

Q: I think we've run the gamut here. Thanks very much.

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