



# Sloan Career Cornerstone Center

## Profiles of Mechanical Engineers



**Jeffrey P. Martin, P.E.**

**Product Design Engineer  
Ford Motor Company  
Dearborn, MI**

### **Education:**

MS, Mechanical Engineering, Washington University  
BS, Mechanical Engineering, University of Illinois  
BA, Physics, Augustana College

### **Job Description:**

Product Design Engineering, developing computer-based design tools used in various Ford vehicle development programs; works in a team of CAD specialists and engineers.

### **Advice to Students:**

"A lot of the courses that you have to take in school prepare you for thinking about problems in a certain way even though you probably suspect while you're in college that you're never going to use that stuff. And some of it you won't, but problem-solving skills, you always use those."

### **Comments:**

To broaden his education, Jeff majored in Physics in a 3/2 engineering program, transferring after three years into a mechanical engineering program.

### **Video Transcript:**

"I work on a team that's about 15 people and it's made up of engineers and designers, guys who are good at using CAD tools and regular engineers. If you're on a vehicle program, you're generally working on a small part of the car. You have to work with other people to make the whole car."

### **Interview:**

Martin: I did my first three years in a liberal arts college that guaranteed transfer into an engineering school. I came out with two degrees, in engineering, and in the physical sciences. I received a broader and richer education that I would have just in engineering school.

### **"Profiles of Mechanical Engineers"**

Prepared as part of the Sloan Career Cornerstone Center ([www.careercornerstone.org](http://www.careercornerstone.org))  
Source: "Careers for Mechanical Engineers" © American Society of Mechanical Engineers

**Q: OK. Do you want to tell me your name, who you are?**

Martin: My name is Jeff Martin. I work for Ford Motor Company. I'm a product-design engineer and I've been here three and a half years.

**Q: Could you tell me a little bit about what it's like to be a design engineer at Ford Motor and what does your day consist of?**

Martin: Well, I guess you're part of a team and usually your group is like ten, fifteen people. And you work on various projects. You might be part of a vehicle program which is what I did for the first two years here. I actually worked on a car that's going to go into production around 2000. And right now, I'm working in a group, a core group, where we work with tools, helping the vehicle programs to do their design work.

**Q: Who makes up this team? Is it all engineers?**

Martin: I work on a team that's about 15 people and it's made up of engineers and designers, guys who are good at using CAD tools and regular engineers.

**Q: How long do you work on a project in general, years, months?**

Martin: It can be years. One of the projects that I've been on since I came off the vehicle program that I was on prior to this, I've been working on that project for about a year and a half now.

**Q: On this team, do you work separately for a little while, then come together with them for ideas or constantly work together? During the day, I mean, do you sit by yourself on the computer? What is it like?**

Martin: It's a mix. I have to confer with other group members to try and figure out how to do things and I'm always working with the vehicle programs and the guys that are actually designing the cars to help them to do their job better.

**Q: Do you all work on a whole car, or are you working on a specific part, and then each of you works on a little part of that?**

Martin: If you're on a vehicle program, you're generally working on a small part of the car. You have to work with other people to make the whole car. In the area that I'm in, what we're working on are design tools to allow general-vehicle design to be done. We are working on the program to generate what's called a tire envelope. We follow the motion of the tire as it goes into a turn, as it bounces up and down, and as it goes down the road. We're simulating that to be used in design.

**Q: When you say simulate, are you doing all this on the computer or do you work with prototypes?**

Martin: In the past, it's been done experimentally and what we're trying to do is develop the tools so that we can do it all on the computer. And so it will be a lot quicker when we can do

**"Profiles of Mechanical Engineers"**

Prepared as part of the Sloan Career Cornerstone Center ([www.careercornerstone.org](http://www.careercornerstone.org))  
Source: "Careers for Mechanical Engineers" © American Society of Mechanical Engineers

that. We actually have programs in place on this project that can do this right now. What we're trying to do with this project I'm on right now is be able to simulate the movement of the wheel totally on the computer without having to do testing to see whether or not the wheel will actually interfere with the body structure.

**Q: What's it like -- you talked about your working on a car two years ago that will be out way in the future. What's it like working on something so far in advance? I mean, is it real to you?**

Martin: Sometimes you are totally bound up in the world of your design, you know, it's all only on the computer, and it takes a little while for the reality of it to, to come on. It's a while in the vehicle program before they actually start making parts that are car parts. The things that we see on the tube -- generally it's a bunch of numbers or it's these simulations that are only lines or presenting center lines of parts -- so sometimes it is pretty far from the real thing.

**Q: How did you get into this? When you were studying engineering, did you always want to be in this type of design or did you fall into it?**

Martin: Well, I've been in three different areas. I was in actual design on the board for three years and then I was doing testing for four years. And then I kind of got into this computer-simulation area of engineering and that's what I'm in right now.

**Q: Did you always know you wanted to be a mechanical engineer?**

Martin: I kind of figured that out, I guess, when I was in high school, that I wanted to be an engineer.

**Q: And at that point when you figured it out, did you make different decisions about your educational career?**

Martin: Well, I wasn't really sure that I wanted to do it, so my first three years I went to a liberal-arts college that had the option of going for two years after the first three and getting an engineering degree and an undergraduate in some liberal arts discipline. So, I wasn't totally sure but I decided while I was in school.

**Q: Did you think that was beneficial to have the three years of liberal arts instead of strictly mechanical engineering?**

Martin: Yeah, I really enjoyed the first three years that I was in just regular liberal arts curriculum.

**Q: Do you find it benefits you now on the job?**

Martin: I may have had more opportunity to work on writing skills, which helps because we have to write a lot of reports and memos. So that may have helped, the writing that I had to do in liberal arts may have helped with that.

#### **"Profiles of Mechanical Engineers"**

Prepared as part of the Sloan Career Cornerstone Center ([www.careercornerstone.org](http://www.careercornerstone.org))  
Source: "Careers for Mechanical Engineers" © American Society of Mechanical Engineers

**Q: What's your favorite part of either working on this now or being a mechanical engineer?**

Martin: Well, I guess when you actually are able to simulate something and you can show that it really is saving a lot of time, as this tire-envelope program that I'm working on right now will. That's satisfying because you see that, before, this took twelve weeks to do and now we can do it in ten minutes. So it's a big time savings.

**Q: Have you been able to see your products actually out and about and in use. You're out one day and you see something in the parking lot and you're like, "Yeah, I worked on that."**

Martin: Well, I've only been here three and a half years so actually the first vehicle program that I worked on is not going to be out for a few more years. And what I do see is the people on the vehicle programs using these tools that I've been working on here to help them do the job. So in that sense, I'm seeing the customer using my product.

**Q: Jeff, how old are you?**

Martin: I'm 35.

**Q: 35. And what did you get your degree in liberal arts?**

Martin: Physics.

**Q: Oh, that's interesting. Do you feel that you were prepared for your first job when you left school after five years?**

Martin: Yeah, actually my first job I was on the drafting board doing sheet-metal design at McDonnell Douglas. I had drafting courses in school and so those helped me right there. But I didn't do a lot of technical engineering those first two years.

**Q: Actually now, let's walk through. Give me your first job after school and kind of the progression. Like a synopsis of your career path thus far.**

Martin: OK. Right after I graduated from college, I went directly to McDonnell Douglas and I worked on the drafting board there for three years doing sheet-metal design for airplanes. And I transferred from that job to a job in the testing area of McDonnell Douglas. And what we were doing there was testing airplane parts for ultimate strength to see if they would fail in service, like a landing gear, part of a wing on an airplane, or actually the whole airplane. Then I decided that I wanted to make a change so I quit McDonnell Douglas. Then I went to a place called Sverdrup, which does civil-engineering design and I worked there for eleven months and the project that I was on was canceled. So I was laid off from there and I went to another company that does vending machines. I spent a year and a half doing vending-machine design. And then this Ford job came up and so I came up here to Detroit.

**"Profiles of Mechanical Engineers"**

Prepared as part of the Sloan Career Cornerstone Center ([www.careercornerstone.org](http://www.careercornerstone.org))  
Source: "Careers for Mechanical Engineers" © American Society of Mechanical Engineers

**Q: What do you think has been the biggest asset to you in terms of versatility?**

Martin: Well I guess being able to read a drawing and actually do drawings and use the CAD systems that we use today. That's probably the most basic skill that an engineer has to have. You should be able to read a drawing and to make a drawing also.

**Q: Can you explain to me -- I'm not an engineer -- what is a CAD? What's CAD systems?**

Martin: CAD is Computer Aided Design and that's basically designing on the computer all of your parts. So, say for a suspension, you would be designing a lower- control arm for a suspension in the computer and at this point, you would still be producing drawings for other people to use to make that part. In the future it's hopefully going to be more direct and we don't have to use paper at all but we're still not there yet.

**Q: Did you learn CAD in your undergraduate education or did you learn it on the job at McDonnell Douglas?**

Martin: I learned CAD on the job at McDonnell Douglas. It was pretty new back then. We had these huge tubes that were in a dark room and they were black and white lines and very primitive compared to what we have today.

**Q: OK. How much of your time do you spend on the computer per day?**

Martin: I'd say probably about half the time. And it's all split up because, you know, you'll get a phone call and you'll have to talk to somebody about something for fifteen minutes or half an hour. Or you'll have to go to a meeting for an hour. So, probably about half the time I'm sitting here doing things on the computer, checking my mail or working on a project.

**Q: What's computer-aided engineering?**

Martin: Computer aided engineering is using the computer to, to do engineering. Like this project, that I'm working on right now, what we're doing is suspension-design analysis, vehicle suspension-design analysis on the computer, looking at the motion of the suspension.

**Q: What's this system that you work on?**

Martin: I work on the Ford CAD system which is called PDGS, Product Design Graphics System, and what we're going to is a new computer system at Ford called the SDRC Ideas. And with that we'll do basically the same thing that we do with PDGS.

**Q: Jeff, just say what Ford does for me if you could. What you make and what the services are, just to kind of sum that up.**

Martin: Ford produces automobiles all over the world and I'm in a group or a division called Advanced Vehicle Technology and what we do is we do work on the actual vehicle programs, the actual cars that will be on the road in five years. We do work to help them do their job.

**"Profiles of Mechanical Engineers"**

**Q: What about hobbies, things like that? What are your hobbies?**

Martin: Oh, I play golf, I like to camp. I have a canoe and that's a good thing to like to do in Michigan, because there are a lot of good rivers to canoe on in Michigan.

**Q: Do you have a PE license?**

Martin: Yes, I do.

**Q: How long have you held a PE license?**

Martin: I took the test in 1990, passed the test in 1990.

**Q: What about in terms of continuing education? Do you still take any classes?**

Martin: I got my Master's degree part-time while I was working in McDonnell Douglas. Going to night school. Then, when I was working at another company, I took a semester course in finite-element analysis. And since then at Ford I've taken the courses available through Ford in various areas; writing skills, teamwork.

Martin: I get Ward's Auto World and I read that. And the SAE magazine, I get that.

**Q: What are your hours like, Jeff? I mean, do you work pretty much an eight-to-four or nine-to-five type of day?**

Martin: In the area that I'm in right now in supporting the vehicle programs, there are pretty regular hours compared to some of the other areas I've been in. Normally it's like 7:30 to 5:00.

**Q: What about any international aspect to your work here in this department or this division?**

Martin: These tools that we're working on in my group are used by Ford, all of Ford throughout the world, so we've taught people in Germany how to use some of these tools; we've taught some British people. And they use them to do car design in Europe.

**Q: What do you think about engineering as a career?**

Martin: It can be really an interesting, satisfying job. I've worked in design and I've worked closer to production. And I think it's probably most satisfying to be a little closer to production. That's probably what I'm going to get back into eventually.

**Q: You're speaking directly to mechanical engineering students right now, what could you tell them now that you wish you knew when you were in school?**

Martin: Well, a lot of the courses that you have to take in school prepare you for thinking about problems in a certain way even though you probably suspect while you're in college that you're never going to use that stuff. And some of it you won't, but problem-solving skills, you always use those.

**"Profiles of Mechanical Engineers"**

**Q: Did you co-op when you were in college at all?**

Martin: Yes.

**Q: You did. Can you tell me a little bit about that?**

Martin: Actually, I was a summer intern at Iowa & Illinois Gas & Electric Company. It's a utility company in my hometown.

**Q: And you interned all through college there?**

Martin: Three summers.

**Q: And how did that help you?**

Martin: By exposing me to what real engineers were doing and I guess that was the best part of it. You got to see what real engineers were doing.

**Q: So you would recommend co-oping?**

Martin: Yeah, I think that's a really good way to decide what area of engineering you want to work in.

**Q: Jeff, do you have to give a lot of presentations? Do you have to speak?**

Martin: Yeah. When I was on the vehicle program, you have a lot of these team meetings where you have to present your ideas to the rest of the team, where you'll post a drawing on the wall. Or, if you have a video screen, you bring up your drawing on the video screen and you can discuss that with the team that you're on. Now that I'm in this core area where we're supplying tools to the vehicle programs, what I spend a lot of time with is showing people how to use the tools that we use to design cars. And so we teach a class about once a month and I have eight students in there and we show them how to use some of the design tools.

**Q: Do you travel at all, Jeff?**

Martin: I haven't done any traveling for Ford.

**Q: What is it like working for such a tremendous company? Do you feel like you have better resources here?**

Martin: I think that because we have to go out and show the vehicle programs how to use these tools that, that we work on in my group, that we get a lot of exposure to all of Ford. And it's mostly on the design end, you know, we're pretty far from production in these tools that we're designing.

**"Profiles of Mechanical Engineers"**

**Q: Could you give us a quick explanation of what's on display there on the computer?**

Martin: What I have here is a side view of a vehicle tire and what this program does is generate a "tire envelope," a surface that will be the volume that the tire sweeps out as the tire goes into left and right turns and as it bounces up and down the road. So this thing out here is the tire envelope and this inside here is the tire. And I can animate that.

**Q: Can we see that again?**

Martin: This again is a side view of a vehicle tire going into a Johnson rebound, and a full left and right turn, and sweeping out this tire envelope is the grid-like surface that you see on the outside. The designers will use this surface to design the car. The wheel well has to stay away from this surface. I can go to a plane view on that thing. And you can see the tire going into left and right turn. This is a plane view. And the grid is the tire envelope. To do this tire envelope used to take a designer on the board weeks to make one tire envelope. Now we can do it in about five minutes.

**Q: How you found your first job.**

Martin: I got my first job with McDonnell Douglas through the on-campus interview system at University of Illinois.

**Q: And what about your second? How did that lead to your second job?**

Martin: Well, my second job, I found out about through a newspaper ad and I sent a resume in and applied for that job.

**Q: And what about after that? There was another one before Ford, right?**

Martin: Right.

**Q: How did you find out about that one?**

Martin: That one I also got through a newspaper ad.

**Q: And Ford?**

Martin: Ford I got through a newspaper ad.

**Q: Love those newspapers. They say people never get jobs through the paper.**

Martin: No, it's supposed to be the worse way but it's the only way I've ever gotten one.

**"Profiles of Mechanical Engineers"**

**Q: Well, that's good for people to know about. How do you balance your work and your personal life? Do you find that work takes a lot of time? You're on a fairly regular schedule. Do you find it challenging to balance both?**

Martin: No, I don't think it's that hard to balance it. Like I said, in this corridor that I'm on right now, the hours are fairly regular. If you're on a vehicle program, you'd probably have more erratic hours and then balancing personal and work life is a little more difficult.

**Q: And do you engage in any consulting? Do you act as a consultant at all outside of work, or have you previously?**

Martin: No, I haven't.

**Q: Jeff, why don't you just tell us a little bit about the corporate culture here? It's such a big company. If you could just kind of walk us through what it's like to find a niche in a place this big. Is it difficult?**

Martin: When I first started at Ford, it was very confusing to try to figure out where I fit in the whole Ford organization.

**Q: So now you've been here two years?**

Martin: Three and a half years.

**Q: Has it been easier, has this gotten easier, to fit in?**

Martin: Now I feel totally comfortable here with Ford and being at a huge company. I worked at another huge company, McDonnell Douglas, and so I guess that was my first exposure to that.

**"Profiles of Mechanical Engineers"**