Personal and career development in engineering

The Work and Background of a Female Automotive Engineer

I/V
Could you tell me – how did you get where you are in engineering?

Penny
Well basically, from a fairly early age of about 13 or 14, I decided I wanted to go into engineering. I'd always been good at maths and physics, but liked the idea of applying it, you know, understanding how things worked, and making things work, and engineering seemed to be the right sort of thing for me. My family were reasonably encouraging in that once I'd decided what I wanted to do they sent me off to various friends and friends of the family to spend days in factories, and find out more about what engineering involved and what sort of things I might be doing. So even though my father wasn't very happy about me going into industry, once I'd decided that's what I was going to do they were quite helpful, and I think that was very useful. I'd recommend visits and days in industry to anybody, I think it's very useful to find out what you actually do on a day-to-day basis.

I/V
Is that easy to arrange?

Penny
It was fairly easy to arrange, yes. Lots of people were quite willing to be followed around by a teenager or, you know, somebody who was interested for the day so, so yes, I would recommend that.

I/V
What sort of things, you said the family helped you, what was the thing you had to overcome, do you think?

Penny
Well I suppose it was a bit of an issue being female. I was the first girl from my school, which was an all-girls school, to go into engineering so that took a bit of, well I had to persuade the teachers that I really knew what I wanted to do and I was heading in the right direction, that I hadn't just picked up on something that was different, to be different so yes, I suppose that was something to overcome.

I/V
How have you handled the obvious minority that you were in as a female?

Penny
Well it's not something that I ever really think about. It's just a matter of getting on with the job and doing what's required. I think there are some situations where I suppose I feel more confident about asking what some people think of as silly questions, because you get the usual response of oh well, you know, she's a woman, she won't know that sort of thing. But equally, you have to accept that if you make a mess of it then everybody's going to remember, because you stand out from the crowd. So, there's good points and bad points, but generally it's just a matter of getting on with the job regardless.

I/V
And how would you describe your sort of skills and attitude as a practising engineer? What is it that you have to offer to the job you're doing?

Penny
I think my main skills are in organisation and making things happen, whether it be through people or through technology, or whatever. I'm very action-centred, action-orientated, I want to make things happen, and I'll take whatever steps are necessary to get the desired results, I suppose that's part of attitude as well.

I/V
And what about interests? You were obviously interested in taking cars to pieces, and did you put them back together again?

Penny
Well I take cars to pieces and put them back together again now, but as a teenager it wasn't something that was encouraged, and my father has always done his own car repairs, but I wasn't encouraged to get involved with things like that. But as a teenager I was very much into needlework, and making and designing my own clothes which some people felt was, you know, a sort of female outlet for engineering skills.

I/V
Has it been always a sort of doing well, or going upwards, or have you had significant failures that you've had to overcome?

Penny
I suppose I was a reasonably bright child and I won a free place to a girls' grammar school but having said that, after I did quite well in my 'O' levels I rather messed around in my sixth form years and enjoyed the social life, so my 'A' levels were a great disappointment, and I didn't get to the university I wanted to go to, and I ended up going to a polytechnic. So I suppose that I was the first time I'd ever really failed at anything, but it was quite a sort of liberating experience looking back, in that everything seemed to be mapped out for me before I failed my 'A' levels, but then the day I opened the card and the results weren't what they were supposed to be, suddenly there were all these different opportunities opening up that I'd never really considered before, and I was fortunate in that my original plan was to have a year off and go to Imperial College, sponsored by Rover, and when I realised my 'A' level grades weren't good enough I contacted Rover and I said, you know, I won't have a place at Imperial, but are you happy to continue sponsoring me anywhere else or, you know, what do you think I should do? And they said that if I could get a place at Coventry Polytechnic they'd continue to sponsor me. So I rang up the Polytechnic straight away and I had an interview that afternoon, and was offered a place, and again everything got back on course and carried on.

I/V
Did you have an engineering family? You said your father was.

Penny
Yes, my family background is very much automotive-based, I mean ever since there's been a car industry my family's been in it, I mean even to my grandmother sewing leather saddles for BSA motorbikes for World War I, you know things of that nature, so well I wouldn't say we were really an engineering family, I really come from a blue collar background. I am the first in my family to get a degree. We're very automotive-based and we do have this history, and these connections with various companies in the Midlands.

I/V
So that's where you've got to, but another question is what it's like being an engineer? Could you describe a project that encapsulates some of the best things about your particular engineering?

Penny
Right well, I think the most interesting project I worked on was probably seven or eight years ago now when I was at Rover. I was recruited to be a programme manager which is somebody who's responsible for the development of a new vehicle right from the concept, right through to the production and, as such, I then recruited a small team to work under me, and we set off developing what at the time was going to be the Metro replacement. It was a

codenamed vehicle and we were only making very early prototypes, but the excitement of running a whole project and actually seeing prototype vehicles and driving them around when you'd had a hand in making them and designing them, and being able to make significant decisions about what the vehicle would look like, and you know how it would work, I mean that was quite fascinating.

I/V
So was it a mixture of the hard side of engineering and organisation that fascinated you?

Penny
Yes, part of it was the technology, you know starting off with a clean sheet of paper and investigating what the competition were doing at the time, so I remember that the Peugeot 205 GTi was the best vehicle in its class at the time so we had a couple of those to strip down and take to pieces, and look at different systems within it, and work out what made it such a good vehicle, and then try and copy and improve some of the measurements that we took from those vehicles so that our car would be better than anything that had existed on the road at the time.

I/V
And how did you get started? If you can remember that 'Day 1' in the office and you'd get this problem.

Penny
Day 1 in the office. It was a completely empty office and the first problem was trying to find a desk and a chair, but even from then on the biggest problems were trying to find out all the different systems within the company, and who was responsible for what, and who had what information, so trying to get a team together of the appropriate people with the right background was a really big problem, and trying to find your way through the masses of systems and paperwork, and so on, that were necessary to make things actually happen.

I/V
And how did you do that? How did you set about doing that?

Penny
Well I think, you know I just set about it by just walking around and asking questions, and my way of learning is very much about diving in and having a go at things, and if I can see that somebody might be helpful to me then I'll try and get them to sit down and spend some time explaining it to me, or showing me how to do it, or something of that nature, and I think generally I just sort of dive in and if it goes wrong, well I'll sort it out later.

I/V
Did that work at polytechnic? It sounds very people-orientated and not terribly lecture-orientated.

Penny
I suppose at university a lot of the things I did I succeeded in because I'm quite good with numbers, so I didn't have a great deal of problems with the numerical subjects that I had to take. My final year project was very much sort of people-orientated so I suppose when I was allowed to choose work for myself I tended to go that way, and I've always been interested in how the people or the users interface with the engineering or the technology, so my final year project was very much about designing and testing seats for cars, and how people felt about the seats they were sitting in, whether they were actually comfortable, whether they were good seats, and then how they performed on an engineering basis, and how they were actually built, so I was looking at the people side and then relating it to the engineering side.

I/V
If you had to sum up the buzz of engineering for you, what would that be?

Penny
Oh, making things work. I mean, to me, whether it's an organisational system or a machine, or a piece of technology, actually getting something to work the way I want it to work is a buzz. The satisfaction of seeing something work the way I had planned it to work is important, and then maybe it's a, maybe it's a power thing, I've got this power to make this machinery work the way I want it to.

I/V
Okay, we'll go on to – what about engineering as a career, can you describe the scope? I suppose the automotive industry is the one that you know?

Penny
Yes, my background is very much automotive engineering with experience in the car manufactures, and also the component engineering side of things. In terms of scope there's a whole range of jobs and backgrounds that are required to support the industry and it's one of the largest employers, if not *the* largest employer in the world, right from on a sort of admin organisation level, there are a lot of engineers employed in areas such as purchasing, scheduling, people who arrange for parts to be in the right place at the right time, then to the other end of the scale which is those people who actually sit down with a blank sheet of paper and design the components, and work out how they're going to be manufactured, how they're all going to fit with all the other components, how they're going to be assembled on to the vehicle, so there's a whole range of different degrees of engineering skills required. I suppose some of the people I come into contact with are very much technical specialists, people who have got a very deep knowledge of a particular area, such as flow of liquid through a radiator or something of that nature. They may well be doing research that's years ahead of anything that we'll actually see on a car in production.

I/V
Okay, and same sort of thing, but career prospects.

Penny
Career prospects I think are very good. The automotive industry is very cyclic. It has its ups and downs, peaks and troughs on about a five-year basis, and at the moment we're coming towards the top of a peak, but looking in relevant journals, like the *Automotive Engineer*, there's pages and pages of jobs at the moment, and salaries in the automotive industry are supposed to be towards the top for people with various qualification levels and age span, so I think it's quite well paid and there are good prospects.

I/V
Is being a Chartered Engineer important?

Penny
It was important for me on the basis that being female I felt that it gave me more acceptability amongst the people that I met for the first time. Obviously once people know that you're capable of doing your job it's not such a big issue, but at the first meeting it's nice to be able to hand over a business card with CEng on. Generally throughout the industry Chartered Engineer is becoming more necessary, and it certainly gives you something that raises you above people who haven't got that sort of status. Also being chartered gives you access to *Automotive Engineer* magazine with all the latest technology and articles in, as well as access to automotive division meetings of the Institute which can be very interesting and very useful.

I/V
If you were a new graduate and tomorrow you started a job, what could you expect to be doing?

Penny
When I was a new graduate the first job I had was as a climatic test engineer. I was working in a large wind tunnel facility at Rover and within the first couple of days I was shown how to operate various bits of test equipment, and then I was set a task schedule and very much left to get on with it, so I think as a new graduate it's very interesting that you can actually get

quite a lot of responsibility given to you very early on which is very interesting and stimulating. I know from some of my friends in other fields that as new people into their jobs they were given photocopying and, you know, those kind of jobs to do, the menial sort of jobs. But certainly in my experience within engineering, once you've got your degree you're classed as somebody with experience and knowledge, and your employer is happy and willing, and very keen to make use of that knowledge as soon as possible.

I/V
So what does a test schedule comprise of?

Penny
Within the job that I was doing it was, we were testing vehicles for use in very high temperature countries and very low temperature countries. It's a process of what they call homologation which is making sure that the vehicle you sell is fit for the market that it's going into. So each prototype or each type of vehicle we made had to be tested down to minus 20 degrees centigrade and plus 52 degrees centigrade, so you'd be given a new prototype of vehicle and you'd have to arrange for it to go into the cold chamber to be soaked overnight at minus 20, and then the following morning you'd go in and put on a thermal suit, go in and sit in the car, simulating it having been out in the Arctic overnight, and then check that within, oh I think it was, it was twelve minutes, that you could actually demist the windscreen and clear the rear windows so that you could be able to see front and back so the car would be safe to drive. You'd have to check that the engine would start, you know within a certain amount of time, and then you'd have to check that the heating unit of the vehicle was powerful enough to be able to warm up the interior of the car within an acceptable amount of time, and various other statutory tests. And then similarly once the car had been through the cold test you'd have to take it out and leave it in a hot chamber overnight ready to do similar tests the following morning to simulate if it had been in, you know, desert conditions overnight so you're working from both extremes of temperature.

I/V
Any advice, last thing really, to someone entering the profession?

Penny
Oh crikey, that's a difficult one. It's been fascinating so far, and I hope I've still got a few more years to go, it's been a fascinating career, and I find the automotive industry a fascinating industry to work in, so I would unstintingly recommend that anyone who was interested in cars, or who had a bent in that direction, went into automotive engineering. I think as a first post on graduation it's quite important, or it's useful if you can work for a relatively large company in that there are lots more opportunities to widen your experience base, and to help you get your chartered status, and help you to get onto further training, whether it be a Masters degree or particular training for the company. And generally people spend three, four or five years with a large manufacturer, and then they go off into smaller companies where perhaps their experience is more rewarded in salary terms but there are less opportunities for sort of personal development and that seems to be the way that the industry goes.