Personal and career development in engineering
Implementing New Technology - a Consultant's Perspective

I/V
Moyra, you're a consultant going into a company – could you tell me generally what you do?

Moyra
Generally I deal with two aspects of the one problem. One, I deal with companies who want to move on, expand their technology in the electronics field from conventional electronics to surface mount technology, and either on the one hand dealing with companies that have a problem know that they've moved in a materials problem, or a problem with the board in which case it's a straightforward analysis of a fault; or two, companies that are considering moving in or find that they have a problem with the systems aspect of what they're doing and how they're organising things.

I/V
So what does surface mount mean?

Moyra
Surface mounts technology?

I/V
Yes.

Moyra
Well basically we're using it now – I see something on your desk, a personal organiser, the computer that you're using – internally the electronic workings or the control systems for your car nowadays are built using surface mount technology. Terribly small, complex components placed on the surface of a printed circuit board as opposed to through holes in the printed circuit board, so through hole technology we consider to be conventional and then surface mount any form of components placed on top of a board, and it's allowed a huge reduction of size and weight.

I/V
So in the old-fashioned times you used to see boards with holes in and they dipped them to get the solder?

Moyra
Yes, that's right, they dipped them in the solder bath, you flow solder them and generally what happens is that we have a huge reduction in size but an increase in complexity, new materials and processes, everything's developed together, leading to the production now using surface mount. But in addition it requires robotics and atomisation and considerable expertise in handling systems. It's heavily dependent on IT systems, for example, and support systems, and inventory support sales, costing, you know things like this.

I/V
Oh okay. So can you tell me about a particular problem that a company might come to you with?

Moyra
Well I'm thinking about, I have in mind one company who came to see us about a year ago. There was one chap in the company who was eager to move things towards surface mount for a number of reasons, not least of which it would be a feather in his cap if he was seen to

be a driver in terms of moving the company forward. It was an American-owned company, very much under the microscope, the magnifying glass, in terms of its parent company had just taken over, and having to prove its worth to the parent company, so one chap in middle management was quite keen to move to surface mount and wanted to prepare a case to argue for this change to surface mount. They make control systems that are very complicated boards and he could see that within a year or two, to five years on the design side, designs would only be possible if they'd moved to surface mount, and at that time that he called us in he was actually sub-contracting the company so they did have modules with surface mount contained on them, but they handle it through the sub-contract group, and he wanted to prepare a case for arguing that there's now, came in in-house, and he needed to prepare a case for his MD, and the MD in question was more interested in the finance and the capital aspects. He thought he had a case in terms of the market, that was the chap who came to see us, and he felt there was a market justification, a market need for bringing it in-house and he wanted us to help him prepare the case.

I/V
How did your expertise help him to do that?

Moyra
Well it requires it, in a case like this, what we would generally do is we would go in and we'd do an audit, if you like, of the whole company and people's understandings, people's perceptions of what they're doing now and what they think surface mount is, and where they think surface mount can lead, namely that's from the MD down. So we would talk to the MD first, and well there's no general pattern, I mean every company's different so you're dealing with people and systems so on the one hand you have hard technology, but it's really dependent on the company and all these other factors, and as I say the MD in this case had no objections but he was after figures, hard figures, he was very much a money man, and we spoke to him first, and that's fine and we understand where the MD is coming from. And then the next important thing is we have this chap in the middle who's very keen, it's going to be a feather in his cap, you know raise his profile if he can bring this off, but we also want to talk to people like the inventory manager, purchasing, quality, for example, and see what their perceptions are, and production and design, and this is what we went ahead and did. It generally involves interviewing people if we can, and if we can we like to do it as a team, and in this case this is what we did, one taking full notes, the other taking short notes, and afterwards comparing your conception of the interview. You're really just trying to establish what people think is happening at the moment, and if they bring surface mount in what they think it's going to mean for them in the future, and then look at the perceptions and see if their perceptions actually match what we know can occur.

I/V
And what happened in this case?

Moyra
Well in this case, this is where it does get to be quite standard after you've been to a few companies, the two don't match. First of all because it's electronics a lot of people just get centred on the technology. To them it's a technology development; it's hard engineering as opposed to the soft issues, and all it's going to mean is something, some different materials and a few extra processes. The wider implications escape them and, for example, quality, the quality issues, recording quality issues, the use of SPC, for example, these are huge issues in surface mount which are quite easily handled with conventional, but are still unresolved in surface mount.

I/V
SPC is?

Moyra
Statistical Process Control, the need for training of staff, the multi-skilling needs, and conventional technology is renowned for its use of part-time female labour in assembly, and it's just a non-starter for surface mount, and it's a fully automated process. All those quality issues had not been recognised, hadn't even been thought of in what was often a comment

within interviews and towards the end, it was at the interview itself, raises issues for that person for the first time, things that, things they hadn't thought of, you know, in just being asked.

I/V
So you finished up saying this is going to be a big revolution rather than a small change?

Moyra
That's right, exactly. And then you leave, on to the next one, that's purchasing and the purchasing, the big problem with purchasing was the availability of components which is quite standardised on the conventional side and it's treated totally differently with surface mount, so somebody can be very, can be a very good purchasing manager and have beautiful policies that work and have worked for years with conventional, and that's all out of the window again with surface mount because, well I won't go into detail here, but the industry manufactures components to a totally different timescale in surface mount, you can have gluts and you can have absolute shortages where people have to down tools and not work because the whole industry is lacking a particular microprocessor, for example.

I/V
So what happened with this company in the end?

Moyra
Well in the end, having talked to them all, as I say the interviews themselves raised issues for these people that they were very keen to find out more about, you know, we then finished off again with the MD, we went back to talk to the MD and this was still on the same day, and gave him quite a sharp rundown on what people were missing in terms of their understanding, well our perceptions anyway, and he in turn was very keen and also we added on a nice hook for him which was basically, as I say, we cottoned onto the fact that he was a bit of a money man and that costing this was also going to need a change in his perceptions. Because costing to the conventional technology when you're using a great deal of direct labour is one thing, and costing for surface mount and trying to do a capital justification for the introduction of the technology using things like direct labour, and ignoring support costs, I mean support costs are tremendous, and training and things like this, and so it's ongoing, and that was going to need, his perceptions were going to have to be awakened to all this as well, so we left him with that hook slightly hanging and we came back, we wrote a short report. And then, of course, again this is where it does generally fall into a pattern, we got asked back to do a more detailed study, which we did, and then did detailed reports for each of the departments and then we gave a half-day seminar to all the senior and middle management on what surface mount would mean for them. The outcome was that the company decided not to go into surface mount at that time but, as I say, that's characteristic as well, and companies go round, usually I find a six month, maybe even three month horizon where they look at this as a possible development in that sort of timescale every six months or so, sometimes a year - is now the time to pull in from sub-contracting and go for in-house? OU like.