Ferrostar Ltd

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Ferrostar Ltd employs 90 people and designs and manufactures electronics systems used in the pharmaceutical industry. Ferrostar was founded by an Irish engineer over 20 years ago and, during the early 1990s, was acquired by a larger European company. The firm designs and manufactures electronic instrumentation systems. A substantial software package is required to control the systems developed by Ferrostar, therefore the firm employs both hardware and software development engineers.

Ferrostar has two major product lines: 1) a customized system that uses both Ferrostar's own instrumentation and OEM equipment all controlled by proprietary software, and 2) a range of standalone instruments. The standalone instruments were not developed by engineers at Ferrostar's Irish facility but were introduced by the parent company during the early 1990s. In terms of the technology employed there is limited overlap between these two product lines. This means that the development department requires a broad mix of engineering skills – power, analogue, digital, mechanical, software and firmware.

Ferrostar operates within a niche market in a mature industry. Products are sold both by an in-house sales force and through distributors. Systems sales normally require a significant investment by customers and therefore the sales cycle is long. This has the advantage that new product deadlines are not as crucial as they might be. However, late delivery of new products is still a problem for Ferrostar.

In the early days, before it was acquired by its European parent, Ferrostar operated like a 'typical' small firm. There were few procedures, projects could be rushed through, employees were highly committed and had complete control of how the firm operated. After the acquisition the operation of Ferrostar became more formal and many key decisions were made by the parent firm also the company grew larger. However, the culture at Ferrostar is still influenced by the early days as the quotation below shows.

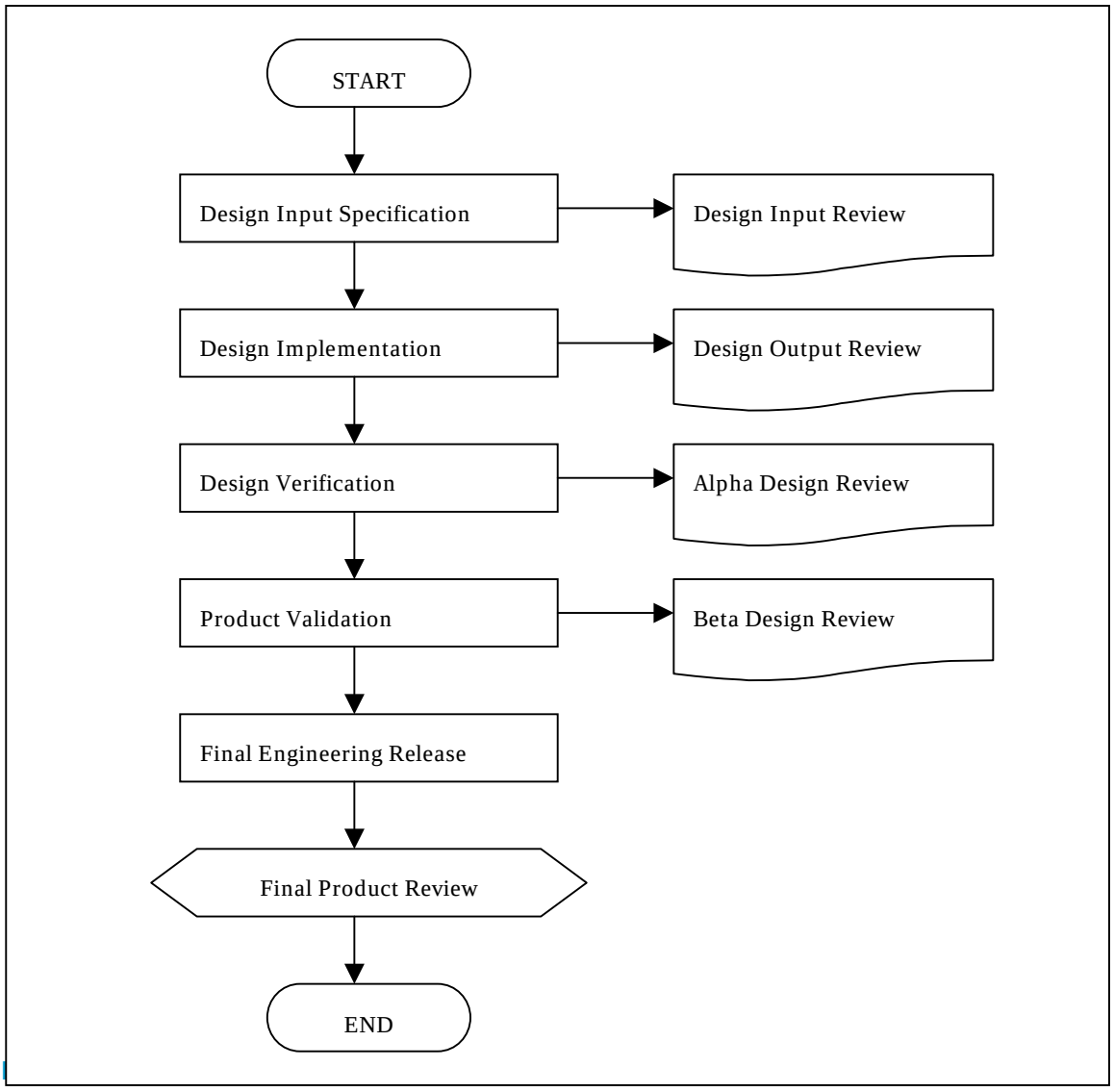
> *There is a lot of nostalgia about the 'old days' a lot of it relates to the small firm way of doing things, the ability to get things done. This is a double-edged sword; 1) it is possible to get things done quickly, 2) it creates a lack of respect for procedures and discipline. Sometimes the people who have a vision of how things can be done more quickly are actually blocking making things happen by not adhering to procedure. There are also some problems with the systems imposed by the parent company.*

Ten years on the firm is still adjusting to its new status.

NPD at Ferrostar

Since the acquisition in the early 1990s, several different management structures have been applied to the product development department at Ferrostar. At the moment the firm has a well-documented NPD process (see below) but this is not considered suitable by senior development engineers – 'The procedures we use at the moment are too complex, they are too prescriptive, for example we have 10 pages where 3 or 4 would do'.

Despite this misgiving the process defined in Figure 1 is adhered to for most NPD projects. The management team hold quarterly Project Management Meetings, PGMT, where decisions are made about which new products start – 'There is centralized control over new products but its between an ill-defined group of people'.



The first step in the NPD process is the development of a Requirements List. This is supposed to be done by a Product Manager, although when the interviews took place at Ferrostar there was no product manager in place and the Requirements List was being drawn up by sales and customer support. Therefore the first stage of the NPD process is not closely followed:

> *There is a deficiency in Product Management so that the first stages of NPD are sometimes blurred; adherence to procedure is about 50%.*

> *It's not working well, I don't think that anyone is happy with how it is working now – there should be a pull from the market but its not happening well now.*

The Requirements List is reviewed at a Requirements Review – 'these work reasonably well, they fall down when people don't turn up and then complain when the final product doesn't meet what they expected'.

The requirements list is the input for the development of a design specification this is the responsibility of the project leader who is appointed by the development manager. All engineers interviewed were happy with the manner in which design specifications were developed. However, the NPD process states that the project leader should work with a multi-functional group to write the design specification – in reality the specification is written by the project leader (a development engineer) alone. There is 'normally a formal meeting to get feedback on the design specification' but again this does not always happen:

> *We try to have formal meetings to agree design specs.*

> *Design (engineers) write the design spec and run it by the product manager and marketing.*

The next stage in the NPD process is the development of a project plan, again this is the responsibility of the development engineer. Project planning appears to be more rigorous for the hardware element of projects, where plans are developed and stored on the network. Software projects are only planned 'if there is hardware to go with it' and planning of software projects is less formal – 'we have white boards and draw schedules on them'.

The NPD process states that a Design Input Review should be held to review the requirements list, design specification and project plan. In general, it seems that the reviews outlined in Figure 1 do happen but it is unclear what actually happens at these reviews. For example, the following comments relate to a question about whether or not project plans are reviewed.

> *No, we don't use review groups to review the project plans, if a plan is reviewed it would be with (the R&D manager) and the project leader.*

> *No – just design reviews….*

> *Yes, other engineers would look at the plan… it's informal.*

Ferrostar's NPD process as shown in Figure 1 defines a number of formal reviews that should happen during the design implementation and verification phases; however these reviews are not described in detail within the NPD documentation. The hardware development process at Ferrostar involves: component specification, circuit design and test, mechanical design, schematic capture, PCB layout, and prototype build and test. The software development process is not defined in as much detail within the NPD process.

The final release of a new product at Ferrostar usually requires the integration of hardware and software, complete testing (verification and validation) and the writing of sales, support and user documentation. This is probably the most difficult part of the process. System level problems often come to light during the integration of hardware and software. Also, the handover from R&D to Applications Engineering and production can be difficult – 'the handover can take almost as long as the project'.

Time to Market

Releasing new products on time is a significant problem for Ferrostar. A new product that is being developed for a specific customer it is more likely to meet its release schedule than a product that is internally driven:

> *When it's for a customer order it's better but for a pure development project it's not particularly good. One or two high profile projects are years behind.*

On-time delivery of new products is cited by many at Ferrostar as a critical success factor:

> *On-time delivery is the main (success factor) emphasised.*
>
> *Get a product that works accurately to customer requirements – on time*
>
> *...timeliness is key, this is a major issue within the organization.*
>
> *A successful product must hit production on time...*

But there is no general consensus about why new products are usually behind schedule. Some of the reasons suggested are:

> *There is a reluctance to face up to how long things actually take; unexpected things turn up.*
>
> *Also because other work has to be done – the R&D department provide technical support to other parts for the organization.*
>
> *On a recent project there was no stick or carrot for engineering to meet schedules – no negative implications for not meeting schedules. I think it could be 'carefully' incentivized.*
>
> *Implementation of JDE – it has added layers of bureaucracy to the process.*
>
> *Engineering resources in Ferrostar can be tied up fixing historical issues.*

The negative implications of missing project deadlines are:

> *If the release is missed it makes you look bad.*
>
> *The implication of being late is extra time and pressure to meet a shipment.*
>
> *Doesn't create a good impression – gives excuses to sales people – doesn't look good personally.*

Yet despite an understanding that it is not good to miss release dates there is a culture of accepting that most projects are late. 'It is ridiculous how late some projects run, e.g. one project should have taken 18 months but took 3 years.'

There is some evidence that there is an improvement in the timely delivery of software projects – this has been achieved by 'postponing features to future releases'. Unfortunately this strategy is more difficult in implement on hardware projects.

Resources for NPD

NPD costs are not tightly controlled at Ferrostar. The total cost of the NPD effort at the company is budgeted and controlled on a yearly basis but there is no control over individual projects. Timesheets are not used to track project time and cost because 'no one looked at them when they were in use and the overhead was too high'. Additionally, the manufacturing cost of new products was highlighted as a problem – 'engineers have no concept of cost'. There appears to be no system for ensuring that the manufacturing cost of new products is controlled.

Organizing for NPD

Despite its small size there are communications problems at Ferrostar. The biggest problem is between engineering and production who blame 'each other for all problems, e.g. building prototypes, etc'. The engineering-marketing interface is better, possibly because some of the senior marketing people have come from engineering. However, some stereotypes still apply: sales and marketing feel that R&D are too isolated and that they should get 'more clued into the customer and market place, they are not reactive enough', while R&D feel that 'sometimes sales and marketing are too focused on the current order and might push engineering to develop things that aren't cost effective'.

Information is freely available at Ferrostar – 'the development department is quite open, and you can go directly to the engineer on a project and discuss a project'. But problems sometimes occur when people are not made aware of changes that are happening:

> *In the past I have had major problems with spec changes not being communicated to sales and marketing.*
>
> *We get very little feedback from internal marketing, we get feedback by meeting customers.*
>
> *Decisions were made and agreed at a meeting but reversed at a subsequent meeting – there were no minutes circulated and not everything was minuted – I was at the meetings but my input was not always taken on board.*

The regularity and formality of meetings varies from project to project but generally staff are happy about how meetings are conducted. The relationship between technical and commercial groups in making decisions relating to NPD is also good:

> *Decision-making is fairly balanced between technical and commercial groups – previously it was more technically driven. This was a problem with engineers changing specs.*
>
> *The requirements spec comes from the commercial people, there is a good relationship now, they have a good guy...*
>
> *Marketing probably have more influence - there used to be a problem, marketing was very far removed, didn't make decisions, R&D had to decide what to do.*

Top management meet once per quarter at a Product Management Meeting to decide what new product development projects should start. After this most of the decisions and the management input to the R&D process come from the R&D manager. The R&D manager agrees project schedules and specifications, selects project leaders and calls

review meetings. Senior sales and marketing and customer support managers are also involved in the process, providing inputs to product specifications and release dates.

Involvement of External Organizations

Ferrostar has made some use of external consultants in developing new products and their use is increasing. Typically they use consultants to take on part of a project or to 'answer fundamental questions'. External consultants account for approximately 10% of the R&D budget. Most of those interviewed felt that the use of consultants was an advantage to the company giving them 'access to specialist skills'. However, the disadvantage in using external consultants is that 'it is almost impossible to fully specify a new product so that you get exactly what you want' and 'it can end up costing more than required but this can also happen in house'.

Project Management Skills

The NPD process at Ferrostar describes the development of a full project plan including a task list, task dependencies, estimates of resources, time and cost of each task and a set of key milestones. This does not appear to take place. Project schedules are developed and stored on the engineering network – milestones are identified. Formal 'first meetings' are held for most projects. There are mixed opinions about the extent to which project schedules are maintained: engineering are happy with how schedules are updated - 'project plans are regularly updated, people will know if there is a delay' - while others are not convinced - 'if the scheduling was adhered to we would know of the delays sooner, this would give the impression that there was some sort of control on the process'. There is also a problem with project specifications changing - 'the sales people may change requirements halfway through so specs need to change'.

Some of the engineers have tried using more formal project management techniques, e.g. MS Project, but have not found them to be useful:

> *We used to be big into MS Project but found it didn't work – we spent most time managing the schedule – managing projects at a minute level is a waste of time.*
>
> *I used (MP Project) in the past but it takes a lot of time...*