

Order Processing Case Study

Herbert Engineering

The board of Herbert Engineering were reviewing the future development of the company in order to create an integrated strategic and financial plan for the company.

The company

Herbert Engineering was a small manufacturer of generating equipment. Manufacturing generators involves the integration of a number of separate components: an engine - normally a diesel, with an alternator and control systems. The entire unit is then placed within an overall frame which includes cooling systems, fuel supply and electrical supply panel. The prices for such systems ranged from around £12,000 for a 40KV (kilovolt) unit, to £50,000 for a 250KV unit which was the top of the range unit that the company could supply. The company had also started to gain a reputation in the design and construction of sophisticated control systems. Over the past 5 years the company had seen sales grow rapidly, though profitability had been erratic as Table 12A indicates.

Table 11A. Five years progress of Herbert Engineering with year 5 most recent (all in £000).

	Year				
	1	2	3	4	5
Sales	1550	1757	1950	2605	3340
Cost of sales	1540	1700	1870	2610	3000
Profit (loss)	10	57	80	(5)	340

The company was privately owned - all the 100,000 £1 shares were held equally by the managing director and his family and the other partner in the business who worked as the research and development director. The company had not paid any dividends since its formation, 12 years previously.

Fluctuations in the cash flow and other operating factors had meant that the company needed to look at future operations very closely so that it did not run into liquidity problems over the planning cycle. Company directors considered that an effective financial planning horizon would be 4 years - 2 years for the decision cycle, and a proposed payback period double the decision period. Generator companies were a relatively high risk stock sector because of the exposure to international operations, with a risk premium of 1.5. Returns on government stock in the current planning cycle was 7.0 per cent. Inflation was low and likely to remain low over the planning cycle. The progression of the balance sheet over the past 4 years is in Table 11B.

Table 11B. Balance sheet movements, last 5 years with year 5 latest - all in £000.

	1	2	3	4	5
Assets					
fixed	120	115	130	135	155
equipment	55	67	60	55	50
debtors	200	250	300	700	450
inventory	110	140	150	170	280
cash	50	25	70	85	135

Total assets	535	597	710	1115	1070
Liabilities					
trade creditors	35	75	100	150	200
short term debt	210	250	300	450	400
Total liabilities	245	325	400	600	600
Net assets	290	272	310	515	470
Financed by					
Equity	100	100	100	100	100
Share premium	190	172	210	415	370

Typical competitors achieved 35 per cent gross profit margins, 5 per cent net, and maintained a return on capital employed that varied between 12 and 18 per cent. Stock turns tended to be around 15 times a year, debtor lengths around 30 days and creditor lengths around 60. Liquidity ratios tended to be above 1.0.

The market

The power generator market had several segments, some were not open to Herbert Engineering. The largest sector was power station engineering for background power generation where generators were designed to supply over a million watts of power. These were manufactured by the largest engineering companies with sophisticated technology and low cost project finance and were open to international competition. Herbert Engineering could not provide such services and was limited physically by the current production site to the smaller generator systems.

Overseas, there was a substantial market in many countries for background power generation for companies and individuals, where central authority had broken down or there was limited investment in national electricity supply systems. Developing countries were the main markets here. In the more advanced economies, changes in the management of national power systems, with the introduction of privatisation, or increased competition, had led to significantly increased costs of supply to rural customers. Customers in distant rural areas would be more likely to install individual power generation systems, a trend that was well established throughout continental Europe.

With the increase in the level of capital investment in many organisations, continual supply of power became more and more important. Companies with large computing facilities, or sophisticated manufacturing plants could not afford interruptions in the supply of power.

Environmental and safety legislation had also strengthened the demand for standby power systems. Companies had to make sure that they could maintain pumping systems, heat and light, as they would otherwise face large fines in addition to possible jail sentences. All these pressures created a substantial market for the supply of emergency generators. Customers included large financial services companies, wholesale and distribution outlets, medical and nursing centres, manufacturing companies with substantial investment in sophisticated equipment or involved in the movement of liquids, and a variety of agricultural and leisure centres. These customers did not demand immediate delivery of generator systems as they planned for the integration of stand-by power systems. Credit problems in this area of the market were far less pronounced, and Herbert Engineering had not suffered any bad debts from such customers over the past 5 years.

As energy costs increased, there was also an increasing demand for more complex control systems which could minimize power use in large buildings by integrating thermostats, vents, and heat pumps. These complex control systems would cost around £12,000 for a large building but would pay back costs within the year. The future trend in the industry suggested that large sophisticated companies would invest in combined heat and power systems to reduce the ever rising cost of energy. Companies were prepared to pay a high premium for systems that worked and could provide the required savings.

For the majority of customers, price was all important. There were many companies producing low cost diesel engines and alternators, and second-hand systems were also available in very large numbers. For example it was estimated that there were over 150,000 broken down generator systems in Nigeria alone, which could be re-furbished and brought back into the market. In this market sector, margins were low as the analysis of the source of profit indicate, but order sizes were relatively large with an average £25,000 per order. Another problem with this sector was control over payment. There had been a high level of bad debts for Herbert Engineering and other companies in the sector, which was reflected in the profit and loss account for the previous 4 years. Poor controls over payment had been responsible for the loss of around £110,000 over the past 5 years. Many of the customers in this market sector also had a record of slow or delayed payment, which meant increasing pressure on working capital requirements.

For other customers, especially those in Europe, reliability and sophistication were more relevant. Herbert Engineering had developed an automatically controlled generator system. The customer could specify how frequently the machine would self-test. The standard package was to start on a weekly basis, top up the batteries and carry out a range of self testing functions and advise the customer in a liquid display panel if there were particular problems, and the company or its local representative could be called to resolve the issue before the equipment was needed in earnest. In this sector, the company could achieve substantially better margins as the analysis of the source of profit indicates. One drawback of this sector was that individual order sizes tended to be small at around £10,000 per sale.

Direct business between supplier and customer made up the greatest percentage of the market, though there were a number of intermediaries both in developed and developing economies. In the developed world, electrical contractors were the most important intermediary for the more powerful equipment. They were involved in the specification and installation of systems as part of an overall solution to an end user problem. The package normally involved the complete re-wiring of a particular establishment. These contractors provided a complete service - including repair - for all their installations. Most provided an annual inspection service for all the equipment, and an emergency call out. The average cost of such services was £150. Herbert Engineering used a number of contractors throughout the UK market to provide the 24 hour service cover that many of the customers demanded. Overseas, agents provided the same level of service in many markets.

Competition

Most of the competitors were local companies that provided low cost supply to the local market. They also competed savagely for export business, providing the lowest price possible for basic equipment. Such sales were also dependent on the US dollar/ pound sterling ratio. When sterling fell against the dollar, sales to the developing world expanded rapidly. The relationship between the two currencies and the size of this particular export market are in Table 11C (increase in index figure indicates that sterling is weakening

against the dollar). The future trends suggested that the index would continue to rise, with a further strengthening of the dollar, though no economic forecast could provide accurate figures with which to work.

Table 11C \$/£ index and movements in low cost generator market size by year with year 5 most recent.

	1	2	3	4	5
Index	100	120	130	105	145
Market size (£ mill)	50	70	80	45	90

Expansion in developing world markets was an option that the company had considered. Its main sales area were Syria and the Lebanon and these core markets could possibly be expanded via the recruitment of further overseas agents. On the basis of past experience overseas business would only slowly develop, and the directors considered that it was unlikely that the new markets would grow more rapidly than £40-50,000 per year. The costs of recruiting and maintaining a new, technically trained, international sales representative would be around £40,000 a year, taking into account the very high travelling costs that would be involved.

Herbert Engineering had the expertise to provide more sophisticated equipment than local suppliers and competed against the medium sized integrated power supplier manufacturers. However, these companies tended to concentrate on servicing medium and large customers. By concentrating on smaller customers, such as nursing homes, hotels and leisure centres, large private homes, and plant nurseries, Herbert Engineering provided a specific and profitable service. The market size for these services was growing slowly but steadily throughout Europe, as Table 11D shows. The most rapid growth had been in the eastern part of Germany. In the longer term, though the market would continue to grow, it was not likely to show significant volume increases, but rather to be more demanding in the sophistication of the control systems that were available; and how these would be integrated into overall company energy management.

Table 11D. European market growth by year and country, all figures in £ million, year 4 the most recent.

Country	Year			
	1	2	3	4
UK	25	27	30	35
Germany	15	32	47	69
France	31	37	43	41
Italy	24	18	16	22
Spain	45	60	80	62
Other	91	90	83	111

Herbert directors felt that they could do substantially more business in Europe than currently. However, this would mean further investment in European sales representatives who could improve the amount of direct business for the company; instead of relying on architects and other intermediaries. To effectively exploit the European market, the directors thought they would eventually need three further sales representatives. Each would cost around £30,000 in salary and expenses. On the basis of the business that the company had so far developed in Europe, the directors felt confident that each sales representative could sell 10 sophisticated systems in the first year, 20 in the second rising

to 30 in each subsequent year.

At the top end of the market, Herbert competed with electronic systems designers. However the company's increasing expertise in the integration of power generation with power use meant that it had substantial competitive advantages. The market throughout Europe for integrated systems was growing rapidly (Table 11E). Though the overall figures hid the trend, it was at the more sophisticated end of the market, for systems in excess of £20,000, that showed the most rapid increase in demand.

Table 11E. Integrated systems market by European country in £ million by year, with year 5 the most recent.

	Year				
	1	2	3	4	5
Germany	25	45	70	120	140
France	15	20	30	35	50
Italy	10	12	15	22	35
UK	10	12	15	20	22

Herbert Engineering management thought that one vital area of investment, that should be considered, would be further research and development in integrated control systems. The market opportunity was a new one and one, - if not exploited in the short term - that would be dominated by other companies.

The company would need to recruit an additional 2 personnel; rent new facilities away from the current plant - unless they moved to larger premises; buy laboratory equipment; and carry out an 18 month development programme for a new generation of control panels. The cost of the additional staff would be £40,000, the premises £20,000 - including the property taxes, and equipment would cost an additional £70,000. The two directors had estimated that they would be able to enter the sophisticated energy control panel market via this development, though the company would have to also invest in a skilled sales engineer; and promotional support - using a combination of magazine advertising and exhibitions. The main alternative promotional channels, monthly magazines and annual exhibitions are in Table 11F.

Table 11F Promotional channels for sophisticated panels

Magazines	Circulation	Cost of ad £
Energy Management	35,000	2500
Control	40,000	3500
Power International	60,000	6500
Exhibitions	Attendance	Cost of stand £
Powerex	35,000	12,000
Control Systems	18,000	15,000
Environ	75,000	22,000

Manning costs for exhibitions would be very high, at around an extra £7000 each. The company considered that with this investment it would be able to sell, on its own, 5 more sophisticated systems in the first year, 8 in the second - rising to 14 in the third, and 20 in the fourth.

Production

The company occupied ageing premises near the South Coast of England. These premises cost £35,000 per annum on a 25 year lease. As with almost other leases, the lease was subject to a 5 year uplift. Previous rent reviews had meant a 10 per cent increase. With the next review - one year ahead - management were considering whether the investment in a rent review negotiator, at a cost of around £3000, would be appropriate. It was anticipated that the potential saving would be approximately one half of the likely rent increase. The company also paid £10,000 per annum on local property taxes. This was likely to increase at around 5 per cent per annum. There did not appear to be any method by which this obligation could be reduced. Nearby on the same industrial estate, larger premises were available at an annual rent of £47,000, with a property tax of £12,000. At present, the total heating and lighting bill was £5000 per annum, and this would not rise with any move to larger premises as they were better insulated with more efficient systems. Investment in a new integrated heating and lighting system was regarded as an important promotional device for the company

The company received sales enquiries from its direct mail activity or via directories and from previous customers. Herbert Engineering then produced a quote based on the creation of manually generated drawings. On average each design took 12 hours of work, followed by a quotation process which took a further 2 hours as the specification was manually converted to costs. On average the company received 200 projects to quote on every year. Because of staff limitations, the company was only able to handle around 100 a year.

Investment in a sophisticated computer aided design system would cost around £12,000 in addition to the four weeks training that would be necessary - suggesting an overall direct cost of £15,000. Herbert Engineering had been offered a 3 year lease on the basis of £600 per month, with no residual value. Once the system was fully installed it was estimated that drawings could be produced in 2 hours, with the automatic production of costs on the basis of the specified components. The managing director then took the finished drawings to negotiate with the customer in the majority of cases - the overseas agents acted as intermediaries in other markets. Each customer took a further 5 hours negotiation on average to finalise the contract, whether it was successful or not. Over the past 3 years, the percentage success rate had remained static at 40 per cent, with the company gaining a far greater share of the more sophisticated end of the market. As many of the contracts for basic generator systems were won on the ability to supply at short notice, the company continued to hold a basic stock of engines and other components. This made up a substantial proportion of the inventory. Eight staff worked in assembly, which involved welding and a substantial amount of physical movement within the factory. The costs to the company of the shopfloor staff - including the one supervisor - was £120,000 per annum. Wage costs in this area of the company had grown, on average, by 10 per cent per annum.

Two staff were involved in the design, development and manufacture of the control panels, both for the existing generator systems and for the new venture into integrated heat and power units. These staff, one director and one skilled worker, cost the company £40,000 per annum. Currently the company bought in all the components including the circuit boards. This made the control boards very expensive to manufacture as almost each unit had to be hand-built by subcontractors. On an index figure of 100, the three product areas of the company had a cost breakdown provided in Table 11G.

Table 11G. Cost component of product range by type, index figure of 100.
System

	Basic	Sophisticated	Control panel
Engine	65	45	-
Alternator	20	15	-
Radiator	10	5	-
Control panel	-	20	70
Electronics	-	10	30
Base	5	5	-

The company could invest in a computer controlled numeric lathe, which could produce the wide variety of control panels required by customers. It would cost around £100,000, with an anticipated production life of 6 years. This would halve the production cost of the control panel as well as significantly reducing - by about 65 per cent - the inventory of basic materials (around £25,000) that the company needed to hold. This equipment was available on a 3 year lease at £43,000 per annum.

Once the generator system had been built and tested on site. Further tests were often carried out on the customer's premises. These extra costs would be negotiated at the contract completion stage. Historically, the company always had problems with payments, documentation, delivery to ports and so on. These were a major cause of the high level of stocks and debtors.

Two secretarial staff kept track of all the components, correspondence with current customers and potential clients, and the mailing list. They cost £10,000 per annum and used manual typewriters and card indexes for correspondence. The introduction of a computer, which could handle all the correspondence and the mailing list would make it possible to employ only one secretary. The cost of the computer and associated software was £2000 to buy, or £55 a week to lease. The existing staff had no computer experience, and would be entitled to a minimum of £1500 severance pay each. Computer training would mean around 30 days at £120 per day.

The two accounts staff were also employed at a total cost of £12,000 per annum. At present, Herbert Engineering used a manual accounts and order processing system. A computerised system could be introduced at a cost of £1500, which would include all software and training for the one member of staff that would then be required. As neither of the accounts staff had been employed for long, no severance pay would be required. The cleaning staff cost £5000 per annum and the security guard £10,000. Subcontracting both services was possible and would reduce the cost by 50 per cent.

Promotion and salesforce

The company currently used direct mail for the majority of its promotional investment, while relying on directories for much of the low cost export work. It also traditionally took part in three of the major power exhibitions. The managing director carried out all the sales contact, though the company used sales agencies to support the three exhibitions that the company normally used.

The existing budget

Management at Herbert had split the business into revenue and cost centres to provide a base for future analysis. They had broken down the revenue centres by geography, customer type, and product line, and had separated out a wide range of cost centres (Table 11G).

Table 11G. Revenue £'000 for Herbert Engineering by year with year 4 the most recent

and average profit margin over the 4 year period.

By area	1	2	3	4	Margin %
UK	550	250	500	700	45
Eire	100	120	55	150	42
France	200	250	300	540	48
Germany	200	100	150	650	52
Syria	307	600	800	650	15
Lebanon	200	630	800	650	20
Total	1757	1950	2605	3340	

By customer	1	2	3	4	Margin %
Contractor	300	300	400	300	32
Architect	400	170	205	640	40
Direct	600	250	400	1100	46
Agent	507	1230	1600	1300	18
Total	1757	1950	2605	3340	

By product	1	2	3	4	Margin %
Basic	750	1250	1700	1100	19
Sophisticated	757	400	705	740	32
Control					
system	250	300	200	1500	48
Total	1757	1950	2605	3340	

Table 11H. Cost centres £'000 by year - 4 most recent.

	1	2	3	4
Premises	45	45	45	45
Heating and lighting	5	5	5	5
Equipment costs	20	15	15	15
Material costs	1365	1403	2100	2603
Labour - production	100	105	113	120
Labour - R&D	35	37	39	40
Labour- administration	23	24	25	27
Labour - management	20	25	25	35
Vehicle costs	5	3	2	2
Warehousing	15	25	20	20
Distribution	55	65	70	90
Order processing	2	3	4	5
Salesforce	5	5	5	5
Promotion	30	30	30	30
Bad debts	10	30	50	20
Bank charges	25	30	32	28
Misc (inc telephone)	15	20	25	30
Total	1700	1870	2610	3000

Financing opportunities

Leasing. The company could lease the new computer controlled numeric lathe equipment and the computer aided design systems at a cost of £4000 per month. It could also lease

vehicles when these came up for renewal. The lease costs for a basic model costing £8000 was £300 per month, with no residual value.

Pension fund. The company had over-funded the pension fund over the previous 3 years. It was estimated that there was around £25,000 that could be brought back into the company finances.

Factoring. The company had been approached by a large number of financial services operations who would be prepared to handle the collection of all invoices for Herbert

Engineering. They would provide 80 per cent of the invoice value immediately, and 15 per cent on collection of the payment from the customer. They would not deal with business outside Europe, nor would they take on existing bad debts.

Local government funding. There were several grants available for companies setting up in particular towns within the local area. At present, Herbert Engineering did not qualify for any. However if it was prepared to move 50 miles, it would be entitled to a £100,000 grant to establish itself in an enterprise area. Rents within this enterprise zone were approximately 50 per cent of commercial rents in other areas. The management were not sure what the additional costs of re-location would be; whether it would have to pay staff for house moves, and whether there would be any problems selling the existing lease in their current premises.

National government funding. The national government had announced, 2 years previously, the availability of grants for high technology funding. These grants were for up to £75,000, on a pound for pound basis, for companies prepared to invest in specific high technology projects, of which energy management was one. The application procedure was complex and lengthy, and the experience of other companies suggested that Herbert Engineering had only a small chance of getting one of these grants, with a realistic estimate being 20 per cent.

Transnational government funding. The EEC had established a programme called EXTOC to accelerate investment in environmental management. The grants were substantial; up to £250,000 was available for suitable projects, though the average grant for a small to medium sized company was normally in the area of £40,000. Specialists in EEC funding suggested that the company had a 50 per cent chance of getting one of these grants, though it was likely to be 18 months before the decision would be taken.

Franchising. One possibility that the company had considered was the creation of energy control franchises. This would be based around geographical areas in which franchisees would develop business based around the integrated control panel that Herbert Engineering were developing. The company would provide the panel on a cost plus basis to the local individual or organisation, which would also pay a royalty of 10 per cent of sales together with an initial franchise fee of £12,000. The management estimated that they could set up around 50 franchise centres throughout Europe over a 5 year period. The investment required would be an additional sales representative and promotional investment of around £40,000 per annum in magazine and exhibition activity. For individuals or companies in the energy management business, Herbert Engineering considered that the sale of 8 systems in the first year, rising to 12 in the second, and 16 a year thereafter would be feasible.

Supplier financing. The main supplier of the electronics for the control panel was

Accelerator Systems, a company which mainly specialised in panels for lifts and reservoirs. They had little knowledge of power systems. Herbert Engineering had approached Accelerator to investigate whether it would be prepared to invest in advanced control panels. Accelerator had been prepared to lend £100,000 at 5 per cent, over 3 years, on the understanding that Herbert would enter into an agreement to only use Accelerator systems in their panels for a 10 year period, providing that the costs of Accelerator equipment was no more than 10 per cent above the average of competitive systems.

Bank borrowing. The bank had become increasingly concerned about the level of debt that the company was carrying. It refused an expansion in the borrowing limit, and proposed that Herbert reduced its debt by 10 per cent in the coming year. Though the pressures on the company were not yet severe, the two directors thought that the new financial plan should include a reduction in the borrowing levels on that basis.

Local investors. Other companies had been successful in raising finance through advertisements in the local newspapers. Typically these deals had involved selling around 20 per cent of the equity of the business on the basis of a price earnings ratio of 12. One of the most active local investors had indicated an interest in taking such a stake in Herbert in return for appointment as a director and a semi-active involvement in the company. The local investors would expect to receive a 5 per cent dividend on their investment per year.

Venture capital. Herbert Engineering had finally considered the option of venture capital to provide the finance that would be required for the development of the control systems. Venture capital firms would be looking for around 35 per cent of the company in return for an investment of £400,000. They would expect to be able to sell this investment at the end of 5 years with a target capital gain of 120 per cent. The venture capital firms were not interested in receiving any dividend payment - they expected to make all their gains in capital growth over the period of the investment.

Action

What should Herbert Engineering do to develop an effective marketing policy?
What controls need to be introduced?