

Sir Martin Wood and Oxford Instruments



Martin Wood says his was “a classic, non-entrepreneurial Victorian middle class family”. There is, however, striking evidence of earlier entrepreneurship. One predecessor, Robert Wood, led an expedition that discovered Palmyra in 1751. Another, under Peter the Great, set up the largest woollen mill in Russia. And Martin’s brother started the flying doctor service in East Africa: “They do set up things, that family,” says Martin’s wife, Audrey.

Early lessons

Martin says he has “always enjoyed making things.” As a result, when only fifteen, he had “a traumatic experience”. A local agricultural machinery factory employed him during the school holidays, because wartime labour was scarce. After half a minute’s induction and fifteen minutes working a drill press, Martin realised he could triple production by drilling three pieces of wood at once. Yet, in the evening - instead of congratulating him - the foreman said, “Martin, you are only fifteen, so you will get less than half your sister’s pay. She is eighteen.”

That still rankles, as does another post-war experience, when Martin worked in the coal mine as a ‘Bevin Boy’. The whole attitude – before nationalisation - was confrontational”, he says. “You sought to gain the maximum for minimum effort and took pride in dodging the system. It was absolutely awful. One day, I thought I shall start a company and do far better.”

Even so, Martin felt he might “make something of the coal mines” and took an engineering degree at Cambridge University and a mining degree at Imperial College, London. After 18 months back in the coal industry, however, Martin realised mining was not for him.

So he left industry, but had “learned two lessons. First, there is almost no job in the world that cannot be made much more efficient by good thinking. Second, look after your staff.”

The Clarendon

“More or less by accident” Martin claims, he became “a kind of service engineer” in the Clarendon Laboratory - Oxford University’s physics department. It was specialising in very low temperature physics, requiring very strong and stable magnetic fields. Martin’s role was to run its “powerful but ageing” engineering facility and design equipment for research scientists. Quite soon, former students who had left Oxford persuaded him to use university technicians in their spare time to produce equipment for their new laboratories. Soon there was too much work for this; Martin saw an opportunity and told his university boss he wanted to start a commercial company to carry it out.

The boss was Nicholas Kurti “a remarkable man”, a Hungarian Jew who left his position in Germany to escape the Nazis in 1933.. Martin was impressed because, when he explained his plan, Kurti’s first remark was: “Great, what can I do to help?”

Because his company was established to provide equipment for scientific experts, people think of Martin as a great scientist, but he denies it. “I’m a hands-on engineer, better with my hands than my head and I get great tactile pleasure from the equipment we produce. I am rather good with machinery and enjoy making things.” But he has a real interest in science and enjoys combining it with engineering.

The Woods and Oxford Instruments

Martin Wood founded Oxford Instruments (OI) in 1959 with Audrey’s help. The university accepted this, provided Martin did not leave his tenured position there for ten years. He has therefore “never had a defined executive job in the company and at first worked only in evenings and at

weekends, doing much of its marketing." He now sees himself as "a rather good salesman. Once I got over my middle class aversion to the role I rather enjoyed it."

Martin has "a great partnership" with his wife who "has an innate and intuitive feel for finance, law, PR and office administration". She is also "a good writer and reads a balance sheet like a conductor reads a score", he says. "We did not borrow to start the company, but put in £200 of our own – about £2000 today." They "told a number of our contacts around the world, and were off." Martin is ironic about today's start-ups. "Starting a high-tech company now, you have to write a business plan and get investors to put in half a million quid . Some make good and some do not, but it was not that way with us."

Initially, the Woods accommodated the company in part of their home in residential North Oxford. Then they built a garden shed and when the work expanded and before the neighbours got to know what was really going on inside it they moved to a disused slaughterhouse in Middle Way, North Oxford - for Martin "a wonderful place".

The company grew slowly. Its possible market in those days was only ten or twelve well-financed laboratories worldwide. Martin insists, "I don't automatically understand the imperatives of big companies. I like being involved in the product itself and using our instruments for scientific work. A much bigger factory is not for me, though I admire people who thrive there."

Superconductivity

However, events were soon to intervene. Martin had become an expert on magnets and, to keep himself abreast of world developments, in 1961 he and Audrey attended a conference on magnets in MIT in Cambridge Mass. where news broke of a major advance in superconductivity. Materials with no resistance to electric current were becoming available, but only if operated at temperatures near absolute zero, which meant cooling by liquid helium.

Stimulated by excitement at the conference, Martin and Audrey at once took the momentous decision that OI would make superconducting magnets. Forty years on, OI is still a world leader in the technology.

I find it astonishing that a company still operating from a shed in an Oxford back garden, and with only one part-time employee, should have taken on the world magnet industry, but when I suggested this to Audrey, she was unrepentant. "When superconductors arrived, so few people in the industry knew about them. They all knew about electronics, but not low temperatures or magnetic fields. We did not know about superconductors either, but we did know about magnetic fields. It was our existing market, shared by only a handful of other companies."

Between 1962 and 1970, OI grew rapidly – from no full-time employees to about 100, and from annual sales of £2,000 to £ 350,000. "It was breathless", says Martin. "We were moving into a new technology, so there were no teachers". Producing the first superconducting magnet required significant decisions, with no evidence to draw on, but was 'a real turning point'. News spread and ten orders for magnets were taken in 1962. At first OI was in competition with giant US businesses, but "with the arrogance of youth that prospect did not daunt us."

Helium

This "arrogance" was exemplified by the way they tackled the problem of obtaining helium, which was expensive then, and not always available. They decided to produce it themselves and set up a new company - Oxford Cryogenics Ltd - in a disused Oxford laundry. To their surprise, they could borrow enough from their bank "to buy the best liquifier available; fly it from Massachusetts; and "have it running within twelve frenzied days".

Since OI could not use all the helium it could produce it, not surprisingly, decided to sell the surplus, but in a surprising way. Using only two drivers they delivered helium, *anywhere in Great Britain*, within 12 hours and at a uniform and lower price than the much larger British Oxygen. This

arrangement worked, British Oxygen became 'more user friendly', and the price of liquid helium fell rapidly. Yet Oxford Cryogenics made a profit in each of the next four years and, in 1968, was sold to Air Products Ltd, British Oxygen's biggest UK competitor. "We had solved the liquid helium problem".

Technical problems over superconducting wire remained. For example, its producers often "improved" its quality and "upgraded" their plants, causing unexpected small changes in performance of the wire, which had to be rectified. But there were benefits too. Big competitors lost interest and small ones failed, while Martin was convinced that "innovation was our lifeblood", and determined to press ahead with technically first-class products.

Managerial and financial challenges

There were other offsetting factors. Concentration on technical performance, together with a failure to realise the importance of other aspects of the business meant that too many managerial and financial problems were tackled late. Martin Wood fairly argues that increasing OI's commercial skills rapidly enough was difficult when output was rising at over 90% compound per year" and the focus of most of our effort was on production", but the situation was unsustainable. As Audrey reports, "forecasts for monthly budgets and cash flow rarely seemed to coincide with outcomes". OI was close to failure because of "the low priority we gave to business as opposed to technical matters, and our tendency to put off unpleasant personnel decisions." OI did use one-day management courses sporadically, but the need for training was insufficiently grasped by management.

In the end these problems were surmounted, but it was close-run. Martin Wood left Oxford University in 1969 to work full-time for the company. He and Audrey were not happy with the situation in OI but in 1970 Frank Thornton, the managing director, announced that he was going to leave to start his own company. The Woods "decided to bring in management consultants from the ICFC (now 3i), who had invested in the company in 1967". They were very helpful over the reorganisation, which was quite extensive as Frank had taken several close colleagues with him because he wanted "a more intimate management style". Thornton claimed his company would not compete with OI, but it did. It was, says Audrey, OI's "unhappiest time".

Barrie Marson and diversification

To improve the position, Martin and Audrey moved right back into the company sharing the top management roles for six months, and OI was stabilised. For the future, the calibre of the remaining managers was good. The urgent need was to appoint a first-rate managing director and one was found. He was Barrie Marson, who had successfully created from scratch a division of Kent Instruments which he expanded until it was about as big as OI. His "prudent realism and business insight" took OI - between 1971 and 1982 - from 100 to 1,300 employees; from a turnover of £500,000 to one of £100 million; and from a loss of £20,000 to a profit of nearly £20 million. It was, says Audrey, "a Herculean accomplishment".

Problems with superconducting wire gradually abated, solving "the most troublesome of our technical problems". OI could produce superconducting magnets "to the quality and delivery schedules we needed," and this technology "has been the principle engine of our growth." Barrie Marson also began deliberate diversification, taking OI into medical, electronic and industrial-analytical equipment.

Feeling more certain of OI's future, in the late 70s the Woods moved to a company-wide employee shareholding scheme which distributed to them a fixed share of each year's profit. Satisfying a desire for participation throughout the company, this created "informed interest and understanding of the company's affairs." Martin was applying lessons learned during the war.

Unusually, the outside shareholders accepted Martin's conviction that OI could exploit leading-edge research successfully. Because tough financial controls had been needed for several years to ensure survival, managers had become too risk averse. They now agreed with Martin that the company

must not “minimise risk to the extent of killing the goose which occasionally laid a golden egg”. It was a well-timed pronouncement because two major, high-risk, projects were developing.

First, Nuclear Magnetic Resonance (NMR). NMR spectroscopy uses the ability of magnetic nuclei to behave like microscopic magnets to obtain insights into the structure of complex molecules. NMR was becoming increasingly important as a research tool, particularly in biochemistry, and sales were soaring. From the late seventies came the second development, Magnetic Resonance Imaging (MRI), based on the same principle as NMR, and leading to whole-body scanners. These developments meant that events inside OI began to repeat themselves, because “the pull of the medical market was fantastic.” Sales grew very fast in the early eighties; new buildings were needed in a hurry; OI was working and talking with giant companies; and more capital was necessary although profits were also climbing.

Martin Wood points to two lessons. ‘First, diversification creates management complications but, if successful, provides very welcome stability to a high-risk technology company. Second, in niche research markets, there is a robust place for products of the highest specification and reliability.’

The floatation

To resolve the problem of finance, OI was floated in 1983, by issuing OI ordinary shares to the public. Not surprisingly, this focussed attention both in the management of OI, and in the City, on the need to establish the compatibility of the two objectives – adequate longer-term investment in product development and adequate shorter-term profitability. The task of convincing the City that this could be done fell to Peter Williams, who had taken over as chief executive in the run up to the floatation, while Barrie Marson became Executive Chairman and Martin Wood stepped down to be Deputy Chairman.

As floatation approached, the financial press teased Martin over his “Senior Common Room air”. He was “a Boffin who wears sandals”. Indeed, some in Oxford still feel the early company never decided whether it was a business or a university research laboratory. Nevertheless, the company persuaded the City that its objectives were “compatible and acceptable” and the share issue was oversubscribed nearly seven times. It raised £13.7 million, spent on completing a factory for manufacturing MRI magnets and on paying off all company borrowings.

The Siemens link

Life as a public company began well and for four years sales and profits both rose. But Oxford Magnet Technology (OMT), the highly profitable MRI arm of the group, then held an unsustainably high percentage of the world market for MRI magnets. In the late eighties there was a shake-out, and OMT lost its largest customer, the US company General Electric, to in-house production. The solution came in 1989 through an agreement between OI and Siemens, another major customer, to make OMT into a joint venture company. OMT had already started to introduce new management techniques, and, with a growing part of its market assured and new investment in manufacturing capacity and quality, it forged ahead. Over the next five years OMT aimed for ‘continuous improvement’ and as Audrey Wood notes “the transformation was breathtaking”. The profits of the joint venture attributable to the group were a vital support for Oxford Instruments plc through the dark days of the early nineties recession. The hunger of the medical profession for MRI scanners kept the profits up while other markets declined.

Taking the story further

This is not the end of the story of Oxford Instruments, which Audrey Wood’s lengthy history (1) takes through to the end of the century. By 2003, sales had reached £231million. Then, in November 2003, OI agreed to sell its 49% shareholding in Oxford Magnet Technology to Siemens for £9 million, thus making OMT a wholly-owned Siemens subsidiary.

Over the years, OI has been recognised nationally, being awarded six Queen’s Awards between 1967 and 1986, and many since then. These covered their whole range: innovation, exports and technology, and the company has received several international awards. Martin Wood was knighted

in 1986, was elected a Fellow of the Royal Society in 1987, and has received honorary degrees in eight British universities.

Sir Martin is now Honorary President of OI, with an ambassadorial role. He and Lady Wood are no longer key players, but that is not the whole of the Woods' story. Case studies of Audrey Wood and the Oxford Trust are also on the website.

Douglas Hague, November, 2003.

Audrey Wood, *Magnetic Venture*, Oxford University Press, 2001.
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