

Technology Marketing Rewarding

Steel wire manufacturer finds reasonable return despite cost of licensing network, promotion

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Australian Wire Industries may not be well known so it seems appropriate to begin this presentation by briefly describing what AWI is and does. AWI is a wholly-owned subsidiary of BHP and manufactures a wide range of steel wire ranging from basic low carbon wires such as those used for welded mesh in concrete reinforcement to highly-processed wires for such products as springs, tire beads, tire cords, and prestressed concrete tendons. AWI also produces wire products such as ropes, netting, barbed wire, nails and welded fabrics.

These products are either supplied as uncoated steel wire or as galvanized, oil-tempered, bronze-coated, brass-coated, coppered or plastic-coated wire. Last year, AWI produced 580,000 tons of product. The company holds the major share of the Australian wire market and also exports on a worldwide basis. Although its primary markets are within the Pacific basin.

As a producer of steel wire and wire products, AWI ranks as one of the five largest companies in the world in terms of volume. This is, of course, of some significance when we come to consider the development and marketing of technology in that, among other considerations, AWI has the capacity and resources to mount a fairly substantial effort compared to most of its counterparts around the world. It has its own research and engineering departments and can call upon the various research facilities within the BHP Group.

The primary area in which AWI has developed an international technological leadership has been in the field of hot-dip galvanizing of steel wire.

TECHNICAL BACKGROUND

It is helpful to give some general technical background at this point. Galvanizing of wire means imparting a zinc coating to the steel primarily to prevent corrosion. Bare steel is susceptible to corrosion through oxidation when exposed to the elements, and this can eventually lead to failure in application. The zinc coating is there to prevent such an occurrence. It does this by sacrificing itself, preventing steel corro-

sion while in near proximity to the steel.

The predominant method used throughout the world to coat steel wires with zinc is hot-dip galvanizing, and in Australia this is the only method used.

On a typical hot-dip galvanizing line a number of wires go through the following stages at the same time.

- Payoff (i.e. coils of wire on rotating bases).
- Heat treatment (to obtain wire strength).
- Acid cleaning to remove scale.
- Zinc coating in molten zinc.
- Coiling on takeup blocks ready for shipment or transfer to other processes.

A typical line running, say, 40 parallel wires would be about 180 meters long, 20 meters wide and would cost in the order of \$2-3 million, depending on the special features incorporated on the line.

Now, the various methods of achieving the required thickness of zinc coating are our essential focus of interest.

Varying thicknesses of coatings are required for different market applications, determined usually by the degree of corrosion resistance needed. Light zinc coatings are achieved by tight-wiping of the wire with a pad of asbestos or some similar material after the wire emerges from the molten zinc. We call these standard galvanized wires.

The next range up in terms of coating thickness are heavily galvanized wires which require typically in the order of three to four times the coating mass of standard galvanized wires. The problem with the traditional methods of producing such wires from AWI's point of view was that running speeds were very slow if a satisfactory surface quality was to be achieved.

The traditional methods are known, broadly, by the term "Oiled-Charcoal Wiping".

It was the desire to produce heavily galvanized wire at much faster speeds and therefore greater productivity that led AWI into a major technological breakthrough in the industry.

EARLY RESEARCH DEVELOPMENTS

The traditional method of wiping such wires is to run them vertically through a loose bed of oiled-charcoal which rests on the zinc surface at the exit end of the bath. The wires run so slowly that forced cooling is not usually required, the purpose of such cooling being to solidify the molten zinc coating as quickly as possible to retain a good surface finish and uniformity of coating. (Strictly speaking, "wiping" is not a correct description of this process, because coat-

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ing thickness is essentially a function of gravity and the speed of the wire).

AWI had tried for a long time to improve running speeds substantially. Our earliest research records go back to 1935.

Around 1964, experimentation had concentrated on testing various gas atmospheres for wiping without a bed of charcoal, but the results were poor.

In the mid-1960s extensive research work was undertaken in Newcastle combining gas atmospheres with beds filled with various heavier-than-charcoal materials. Then an important key to the whole exercise was discovered by careful analysis of a variety of results. That was the critical importance of a certain component in the gas atmosphere, a constituent that, insofar as it had been considered by other researchers, had been regarded as undesirable.

Disappointments

Through this period there were, of course, many disappointments and blind alleys. At that time, a number of people aware of the project felt, quite reasonably, that these efforts might be directed more fruitfully elsewhere. The then general manager, Mr. Jenks, continued to give his personal support to Mr. Sciffer, the project leader, and this support was probably crucial to the eventual success of what came to be called AWI's gas wiping process.

The conclusions reached were revolutionary. The new process appeared theoretically capable of wire speeds 10 times those of the traditional process and, given operational constraints elsewhere in the galvanizing process, speeds up to four times greater appeared quite feasible. This was in the context of previously considering gains of 20% as "breakthroughs".

The process was developed within the technical department of AWI's Newcastle Wiremills, and there was a considerable period devoted to proving the process commercially. Since 1968, the basic patent for "improvement method of and apparatus for wiping galvanized wire or strip" has been applied for and granted in nine countries.

MARKETING OF THE GAS-WIPING PROCESS

In the period of marketing the technology, which began seriously in 1970, 10 licensees have been established around the world in the U.S.A., Canada, the U.K., France, Japan, South Africa and New Zealand.

The first overseas license was sold in 1970, earning the distinction of being the first major patented technology to be sold by a BHP company.

In the course of promoting the technology, AWI has held detailed discussions and negotiations with 60 to 70 overseas companies, in many cases at their home location. This gives some indication of the considerable promotion costs involved in the marketing of the technology. On the other hand, AWI has earned revenues of several million dollars to date, with considerable future income still in prospect from existing license agreements and prospective new agreements. Some features of the early period of this activity may be of general interest.

By 1972 the technical aspects of the process were

occupying considerable resources, two full-time and five part-time officers. Three major aspects of successful marketing of the technology became apparent in this period.

First, there was a need to understand more clearly the basic science of the process. Simply put, we knew it worked, but *exactly* why did it work? Knowing this, as we know it now, strengthened our patent establishment and made the application of the process in different environments and circumstances a great deal easier to manage.

Second, the major breakthrough in wiping put pressure on the capabilities of other aspects of the line such as wire steadiness at higher speeds, effective forced-water cooling and so on. It was necessary to upgrade these aspects to gain the full benefit from the technique while giving opportunities to strengthen the security of our proprietary rights through the development of associated patentable technology. Four such patents have been established extensively overseas in up to 24 countries.

Third, we had to combat what we considered to be exaggerated claims being made by some potential licensees with respect to the capabilities of the traditional oiled-charcoal process. This pointed to shortcomings in our data base and led to a program of controlled tests. Consequently, a better knowledge of the *existing* techniques was developed in building the technical case for the *new* technology. In particular, it was found that many claims for the conventional technology — for instance, standard deviations of the coating mass — were rationalizations of general observations rather than conclusions drawn from the analysis of actual data.

Crucial Period

The ability to wield this technical strength at a crucial period in marketing the technology underlines the advantage of AWI being a major practitioner in the relevant industrial arts and being recognized as such overseas. Moreover, market and historical factors had led to AWI producing a diverse product range — generally wider than our overseas counterparts — and therefore the company has an impressive breadth of practical experience to draw upon.

The establishment of our technical credentials was vigorously pursued through speeches and seminars at international wire industry conventions and publications in technical journals.

A factor that should be particularly stressed is that by the 1970-1973 period, AWI had made a total commitment to gas wiping in its own heavy galvanizing operations. Today, AWI produces a total of approximately 45,000 tons of wire from the process each year on five installations in Newcastle, Sydney, Geelong and Perth. This total commitment also allowed the emphasis on patent protection in license negotiations to be somewhat reduced in favor of the technical expertise and assistance AWI was able to bring to potential licensee.

Then, during 1974, there was a perceptible abatement in the marketing of the technology. This appears to have been due to a combination of circumstances.

There had been an intense period of activity in the

early 1970s with visits to well over 30 potential licensees, and several licenses concluded. Most of the obvious market had therefore been contacted. In addition, there were one or two key retirements and resignations of people closely associated with the project. Moreover, the world recession caused a marked excess of galvanizing capacity. New concerns and aims were also emerging among some potential licensees with respect to better control of zinc coating mass, concentricity on the wire, and smoothness of the surface.

In addition to these factors, the project probably lacked a suitable structure in which to adjust to changing circumstances.

ORGANIZING FOR TECHNOLOGY MARKETING

This raises the difficult question faced by many companies interested in licensing their technology overseas of how to organize for such activities. At AWI, for instance, prime responsibility for these tasks has been taken at various times by the finance manager, the operations manager, the marketing manager, the assistant to the general manager and the planning and technology manager. So far, the personnel manager has not been given the chance to demonstrate his skills in this field of endeavor!

This reflects the problem of incorporating the objectives and activities of technology marketing with those of a functionally-oriented organization, the prime purpose of which is the production and marketing of a tangible industrial product.

A few words on the objectives of the exercise are therefore appropriate at this point.

OBJECTIVES OF AWI TECHNOLOGY MARKETING

In the early days, the organization for these activities was clearly "ad hoc". Three distinct objectives are apparent from that period:

1. Ensuring that individual contracts were profitable.
2. Better understanding developments in the wire industry worldwide.
3. Establishing AWI's reputation as a leader in wire galvanizing technology.

In later years, a further objective has gained importance while not diminishing the significance of the original ones, that is:

4. Maintaining an effective licensing network for the long term.

And latterly, increasing importance is seen in a fifth objective:

5. Maximizing the exchange and "feedback" in the licensing network.

I think it is worth saying a few words about these latter objectives which were not so apparent in the earlier period.

To establish an effective licensing network one needs to dispel the myth that patents are a cast-iron safeguard to a monopoly situation.

First, if the techniques being patented are of value, imitators are almost certain to spring up. Given that the products we are dealing with are very similar to

products produced in large quantities throughout the world, it is reasonable to assume that parallel development work will be going on in other places.

Commitment

Consequently, an effective licensing system will not be built without the commitment to monitor and defend the integrity of the system.

Second, we are seeking to build a long-term relationship with our licensees, because we believe the more the licensee gains benefit from the technology and is happy with it, the more benefit is likely to flow to AWI through customer loyalty, royalties and the attraction of new licensees.

Conversely, if we are not closely in touch with our licensees, practices may develop which bring the technology into disrepute. Therefore, we seek to be:

1. Consistent in the terms we seek from one licensee to another, and to relate those terms to performance and benefits derived.
2. Supportive to the licensee in passing on new developments and advice on a regular basis.
3. Inquisitive about the licensees' progress, market situations, and experimentation with the process.

To achieve all these objectives consistently there is a need for structure in the organization of our technology marketing — the "ad hoc" approach will no longer suffice. Our solution has been to create what might be termed a "business unit" within the function of Planning and Technology. Although members of the business unit have outside responsibilities, their roles with respect to technology marketing are defined. The business unit works to an objective plan, with budget targets and a programmed set of activities.

This structural arrangement in fact covers technology transfer overall — it includes purchase as well as sale of technology.

SPECIFIC FEATURES OF AGREEMENTS

I would like to turn, finally, to some specific aspects of our agreements, or "technology packages", which may be of general interest, but which do not compromise secrecy or confidentiality.

First, it is important to define precisely what is the specific subject matter of the technology transfer. In our agreements, we tie this down to the wiping area of the galvanizing line. In practice, it will be necessary to advise the licensee on other aspects of the operation of the galvanizing line to obtain the full benefits from the process, but this advice is essentially gratuitous. What we are offering is a unique and commercially-successful approach to the wiping of the wire. Moreover, we do not guarantee the licensee successful operation of the line. Not, indeed, that licensees ask for such guarantees, as there is the evidence of our own extensive operations to demonstrate that a line set up correctly will bring the benefits we are claiming.

Having said this, we build into our agreements the condition that an AWI expert attends the commissioning period of the process when it is first put into commercial operation on the licensee's plant. At such time, advice to the licensee inevitably extends beyond the

strict wiping area of the galvanizing line. Our motivation is to make sure, insofar as it is in our power, that the commercial operation is commenced on the best possible footing. This is analogous to the sentiment behind a TV commercial for one health club that occasionally disturbs my evenings: "If you don't look good, we don't look good".

Relate Terms

I don't intend to spell out the terms which we seek in our agreements. However, I will say that we relate the terms to the benefit which the licensee will receive in his own particular situation with the caveat that those terms must be consistent with our existing licensing agreements and that the body of benefit flowing to AWI must be significant enough to make the license worthwhile from our point of view. These points are made quite clear as soon as we enter serious discussions with a potential licensee. Consequently, the inducement for both parties is to maximize the total benefit flowing from the use of the process and, as a general principle, it is important to have an agreement which is fair and reasonable to both parties.

This, in part, leads on to a further point. Generally, we had adopted the principle of nonexclusivity in our license agreements. The concept of exclusivity may not induce the licensee to work the process to maximum benefit. Nonexclusivity, on the other hand, is more likely to provide such an inducement. Moreover, exclusive licenses may be an encouragement for non-licensees to seek means of circumventing the patents. There may be situations where exclusivity is appropriate, but we would regard them as very exceptional.

Last, provisions are built into the agreements for mutually passing on improvements to the techniques concerned. As I suggested earlier, we see this interchange as a major ongoing benefit of being involved in technology marketing. To be successful, there has to be a perception by both parties that such exchanges are to their own benefit. We find that regular service visits to licensees assist in facilitating this interchange as well as confirming our position as an actively-supportive licensor.

CONCLUSIONS

In conclusion, I would say that AWI has found technology marketing a demanding but highly-rewarding activity.

The rewards arise in a number of ways. Despite the costs involved in promoting the technology and maintaining an effective licensing network, there is a reasonable return on our efforts. We have developed a widespread network of contacts and a flow of marketing and technical interchange which, in the long run, is probably of more importance than the direct financial returns. We estimate that all our licensees combined now produce at least twice the amount of relevant product that AWI does, yet there is no evidence that AWI has lost sales of its own product as a result.

Consequently, we have been able to demonstrate our ability to contribute to wire technology at an international level in one area of wire processing while drawing income from markets that would otherwise not be available.

Moreover, success with gas wiping has encouraged other new process and product development which are in various stages of fruition. Perhaps these might be the basis of some future presentation.

I shall, as a final offering, make some general observations on AWI's experience.

- First, this case study is further evidence that it is possible to be a successful exporter of industrial technology from Australia to developed as well as developing countries.
- Second, there are some very considerable lead costs involved not only in providing internal resources and new skills within the organization, but also in establishing and maintaining an effective licensing network. These costs are difficult to assess at the outset.
- Third, the returns from such activity, particularly when viewed on an opportunity cost/benefit basis, can be attractive if the significance and marketability of the technology have been accurately assessed.
- Fourth, it is of great benefit in technology promotion to be a substantial practitioner of the art and greater still, as is AWI's case, to be totally committed to it in the relevant activities.
- Fifth, licensing activities can lead to enduring technical partnerships with one's counterparts overseas, either directly or indirectly.

This last point seems to be of particular importance in manufacturing activity in Australia where high wage costs, an appreciating currency, and reducing tariff protection make it imperative to remain on the leading edge of technology.