

Ingredients for Success

A case history of a successful technology transfer arrangements; hints for establishing beneficial relationship

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I shall first introduce the main character of my case history, SPS Technologies of Jenkintown, Pennsylvania, formerly Standard Pressed Steel. SPS is a multinational company with sales in 1978 of \$196 million. Certain of its foreign operations are wholly-owned subsidiaries, while others are joint ventures. SPS manufactures and sells precision fasteners, fastener installation systems, precision metal parts, industrial adhesives, and materials handling and storage systems. Its main customers are manufacturers of airframes, aircraft engines, motor vehicles and capital equipment and companies which handle and store parts and the like. A substantial amount of SPS's sales are through distributors. SPS has a commitment to technology leadership. Its products may be characterized as engineered products. SPS's competitors and customers know it to be the most technically qualified company in the precision fastener field.

I am very familiar with SPS because I was employed by the company for 11 years and managed the Patent and Licensing Department 1968-1977. The company is a client of my firm, so I still have much contact with SPS. However, any statements made by me are my statements and not to be attributed to SPS.

We all know that case histories are useful educational tools because we learn from our prior experiences and those of others. We find it worthwhile to analyze and evaluate what factors contributed to prior successes or failures. As I indicated previously, my case history is a success story. While it is more pleasant to relate a success story, it is difficult to identify with any degree of certainty those aspects of the overall business program or subordinate activities which caused them to be successful. I will identify what I consider to be the ingredients for a good technology transfer arrangement.

One is successful if he achieves his intended purpose. Thus, if we are to determine if we are successful in our technology transfer ventures, we must determine first the purposes behind attempting to establish and implement these ventures and second if the purposes were met. Clearly, the purposes will be different for different types of organizations or individuals. My

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view is from a manufacturing company whose main purpose is the manufacture and sale of an engineered product and an engineered system.

I can identify six major aspects of technology transfer which should be considered as we analyze the interests and needs of a manufacturing company such as SPS. First is the direction of flow of technology. SPS is both a seller and buyer of technology. It has technology

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to sell as a result of its R&D and engineering efforts. It acquires technology as part of its commitment to a proprietary product line.

The second aspect is the nature of the technology. SPS deals with technology relating to product and system design and technology relating to methods, processes and machinery for manufacturing products.

The third aspect is the form of the technology. SPS sells and buys patent rights, trade secrets and technical assistance.

The fourth aspect is the degree of commercialization of the technology being transferred. SPS deals with both proven and unproven technology.

The fifth aspect is the form of the transfer. SPS deals with licenses, both exclusive and nonexclusive, options, purchases, and various other arrangements or combinations.

The sixth and most important aspect is the specific purpose behind the technology transfer venture. For the most part, technology transfer at SPS is conducted in direct support of its main purpose of manufacture and sale of products and systems. Deriving licensing income generally is not SPS's main purpose behind licensing, although there have been a few instances when SPS licensed strictly for licensing income.

Common Purpose

Considering first the licensing out of technology, the most common purpose for SPS is to establish multiple sources of SPS fastener products. In such instances, we often might characterize SPS's position as that of the "reluctant licensor". SPS would rather be the sole source of its fastener products and satisfy its main purpose of manufacture and sale of these products to the exclusion of all others. But because of customer demands or limited capacity to supply the product, SPS licenses its competitors.

Another reason for SPS to license out its technology is to obtain assistance in gaining acceptance of its products. With certain customers or in certain markets, a competitor-licensee may be able to give an SPS product greater exposure. This ultimately insures to

SPS's benefit through increased opportunities to manufacture and sell the product.

SPS also licenses out its technology to subsidiaries and joint ventures. The purpose in doing so is to enhance SPS's investment position by providing the subsidiary or joint venture with the technology required to manufacture and sell products in the most effective ways.

Finally, SPS licenses its technology for the initial and sole purpose of deriving income. Typically, in such situations, we are dealing with by-product technology in which the company has no direct interest in the manufacture and sale of products or with a dominant patent directed to a fastener construction that has application beyond the particular fastener product line interests of the company. Besides deriving added income, the utilization of technology which might otherwise remain dormant and on the shelf may be a very valuable morale factor to the R&D and engineering staff.

SPS has identified two purposes behind being a buyer of technology. First is to fill needs in the established product lines of the company. The technology may relate to new products or to new manufacturing methods or machinery for making existing products. In these instances, SPS may be the licensee in a multiple sourcing program by a competitor-licensor or SPS may be the competitor who is being asked to help the licensor gain acceptance of his product. SPS has purchased byproduct technology from noncompetitors and inventions from individual inventors. It should be noted that technology falling within an established business interest of SPS need not be commercially proven. Because of the expertise in SPS's established businesses, SPS personnel are able to form judgments on the potential of unproven technology falling into this category.

Diversification

A second reason for SPS to be buyer of technology is for diversification. A very practical and viable way of diversifying is to identify a business area of interest and then buy the best available technology to enter that business. With respect to cost, this approach toward diversification typically is cheaper than buying a going business but generally more expensive than developing the technology internally. However, getting the new business going will take more time than when making a business acquisition but is quicker than when developing the technology internally. Technology being bought for diversification should be commercially proven, because the company acquiring the technology, lacking experience in the new business area, is not able to judge the potential of unproven technology falling outside of its expertise.

What factors cause or contribute to the successes and failures in the technology transfer ventures of a manufacturing company? What makes a manufacturing company achieve the purposes of its technology transfer efforts or fall short in achieving these purposes?

First, let us consider attempts to strike a deal rather than the efforts to implement a deal. When the purpose behind licensing out technology is to create multiple sources, we should have a fairly easy time

granting a license. Probably the main compelling factor, on the part of the prospective licensee, for taking the license is that the business opportunity is easily identified — the customer already has indicated that there is a market. Both the licensor and the licensee have a better handle as to the magnitude of the opportunity, whereby there is likely to be less disagreement on the financial terms. When, however, the prospective licensee feels that too many licenses have been granted, whereby the opportunity has been diluted, the likelihood of consummating a deal will be reduced.

If the purpose of licensing out the technology is to obtain assistance in getting a product accepted or to derive licensing income, the ease or difficulty in making the deal is dependent upon how apparent it is to the prospective licensee that the subject matter of the license is useful and the terms are justifiable. Thus, the prospective licensor must do his homework and must be willing to disclose the basis of his proposal. Although the prospective licensee will develop his own business justification for taking or rejecting the license offer, the prospective licensor must be able and willing to project a good picture, first, to catch the prospective licensee's attention and, second, to provide a basis or reference from which to negotiate on the worth of the proposition. Since the appropriate analysis of the opportunity needs to be done before one decides to embark on a licensing program why not disclose to the party with whom you wish to deal the basis which brings you to him? Short of making the necessary analysis and dealing openly with the prospective licensee, the likelihood of consummating the license is greatly reduced. Even if successful in making the deal, difficulties may very well develop during its implementation if the deal was made without adequate business justifications.

Subsidiary

Striking a technology transfer license arrangement with a subsidiary or joint venture should be fairly easy. In the case of a subsidiary which is controlled by the source of the technology, the arrangement is merely the formalization of a relationship with a captive party which is otherwise conducted on a less formal basis. In the case of a joint venture, the very coming together of the two parties is based upon the fact that the technology source is known for the technology he possesses and his ability to impart this technology and the technology recipient has the other favorable attributes which are likely to make the joint venture a success. The difficulty, when dealing with a subsidiary or joint venture, arises if foreign governmental approvals are involved. The problem is not so much the application of the local laws, rules and regulations to the arrangement being fashioned, but rather acceptance of the idea that a government is so intimately involved in regulating business dealings between private parties. As a result, the deal may not be made simply because of philosophical differences on how business should be conducted.

SPS has been active in acquiring technology to fill its product line needs. Its successes, in this respect, probably are due to many reasons, most of which fall under the heading of "good reputation". In multiple

sourcing situations, SPS's customers indicate to our competitor-licensors a preference for having SPS as a source. SPS's competitor-licensors know that the licensed products will be promoted and supported. Noncompetitors wishing to license their byproduct technology and individuals wishing to sell their inventions approach SPS quite frequently because of its reputation. SPS actively solicits outsiders to submit their inventions, developments and the like to SPS for evaluation. SPS does not suffer from the NIH syndrome.

I can think of one particular situation when SPS, to its detriment, failed to consummate an exclusive license with an individual inventor who had an aircraft fastener invention. SPS dismissed his idea too quickly. SPS did not make the appropriate analysis. As a result, one of SPS's competitors picked up the product and has made quite a success from it. SPS eventually obtained a limited sublicense which has been quite rewarding.

However, the rewards would have been considerably greater had SPS picked up the exclusive license. It should be noted that the receipt and evaluation of this fastener invention occurred prior to the time that SPS established its in-house patents and licensing department. Outside submissions were handled locally, often on a personal and informal basis. Today, such a situation is handled quite differently by SPS. The licensing activity is organized for the receipt and evaluation of outside disclosures. This includes not only the execution of confidential disclosure agreements or waivers, but also a formalized routine for conducting the required technical evaluations and financial analyses which lead to either a business justification for acquiring rights to the subject matter or rejecting it. Although much of the input comes from other staff functions and the operating divisions, the licensing manager is responsible for putting it all together.

I shall make one further point regarding the situation just described. The limited license granted to SPS permitted us to make this product out of titanium. SPS did the early development work in titanium aircraft fasteners. The competitor-licensor granted SPS this license so that we would help expand the application of this product into an area where we were stronger than our licensor.

Good Faith

Now I shall consider the factors which contribute to the successes and failures of implementing a technology transfer arrangement. Happily, nearly all of SPS's technology transfer arrangements, both as a seller and buyer of technology, have been implemented successfully. I believe that the main ingredient contributing to these successes has been the good-faith fulfillment of the obligations by the parties. Other factors include making the proper analysis prior to striking the deal and a willingness to renegotiate if there is a change in circumstances not contemplated by the parties at the time they made the agreement. One of SPS's vice presidents put it very well when he said that licenses should be viewed as being dynamic and not static. Very little goes unchanged for 10 or 20 years, especially with the way technology is changing today. Therefore, the parties to a dynamic license must be ready to change

their arrangement to meet changes at the marketplace.

Also, from my experience, the simpler the arrangement, the easier the implementation. SPS has been most successful with its straight patent licenses which require little more than payment and collection of monies. SPS has had most difficulty with those technology transfer arrangements involving technical assistance. No matter how much discussion precedes the contract and no matter how many words are used to describe the technical assistance obligations, there is still likelihood that the technology source and technology recipient have different things in mind when the contract is signed. The situation gets stickier when licensing a competitor for any of the purposes already discussed. We specifically intend to limit our obligations to the particular subject matter of the license. We do not intend to include technology which is basic or applicable generally to fastener manufacture. As you can imagine, the gray area can become rather fuzzy as to what technology should be delivered to assist in making the particular product without giving away basic information which may be broadly applicable across an entire fastener product line.

I shall now present my case history. As I do so, I will make specific reference to certain of the technology transfer aspects just covered and point out how they apply to this case history.

In 1963, while the DuPont Company was in the metals business, it was developing an alloy which DuPont personnel believed could be applied to fabrication of high-strength fasteners. The alloy was still in the technical development stage — far from being ready for commercialization.

DuPont contacted the contract research group of SPS to evaluate this alloy. SPS's contract research group takes on various types of assignments. In some instances, it functions like an independent testing laboratory evaluating designs and developments of others, whether or not in the field of fasteners. Other times, the SPS contract research group is hired to render design, development or engineering services, again within or outside the fastener field. The assignment from DuPont was to test and evaluate the alloy. SPS received the assignment because of its reputation as the technical leader in the fastener field. The most readily identifiable application of the alloy was for fasteners.

Relationship

The initial relationship between SPS and DuPont was simply that of a testing facility and client, whereby for a fee the client received from the testing facility comprehensive data regarding the alloy being tested. DuPont owned the data.

The early testing was to evaluate the mechanical properties, such as tensile strength and ductility, of test specimens furnished by DuPont. In time, SPS fabricated fasteners from the sample material coming from DuPont and tested these fasteners. Thus, the SPS testing was on two levels: general properties of the alloy and specific capability to be a fastener material.

With time, the SPS-DuPont relationship changed. SPS began collaborating with DuPont in the develop-

ment of the alloy. There was no longer a fee coming to SPS and there were no strings attached to SPS's involvement. SPS continued to evaluate the material and offered advice to DuPont on how to overcome problems and enhance the chances of commercial acceptance of the material. For example, SPS encountered a great deal of difficulty because of variations in the properties of the alloy resulting from different heats which were being melted in rather small batches. This fact was reported back to DuPont. SPS indicated that, at least for high-strength fastener fabrication, the alloy could become commercially viable only if it could be made on a large scale to have truly consistent properties. Thus, while SPS was testing the material, it was working with DuPont at developing melting and fabrication methods.

From its testing, SPS found that the DuPont alloy had the required attributes of aircraft fastener material:

1. Great fatigue strength.
2. High ultimate tensile strength.
3. Superior corrosion resistance.

As SPS could see the potential for this alloy development, it began telling its airframe and aircraft engine customers about it. It provided test data and sample parts. DuPont gave SPS support in this regard by furnishing material for the sample parts.

Cooperation

I have gone into this detail about the SPS-DuPont relationship to emphasize the closeness of the association and the cooperation between the two companies. There were frequent meetings at which detailed information was exchanged. As I already indicated, much of this took place at a time when no strings were attached to SPS's participation. Undoubtedly, this highly effective relationship was a factor in subsequent dealings between SPS and DuPont.

At about the time the DuPont alloy was developed to the satisfaction of DuPont and SPS, DuPont decided to withdraw from the metals business. As part of this withdrawal, DuPont decided to separately sell all of its rights and interests in the alloy, which by this time had been named Multiphase. DuPont invited a few specialty steel fabricators to make bids. SPS requested of DuPont the right to bid for the Multiphase alloy in competition with these specialty steel fabricators. Although SPS has a steel mill in Sheffield, England, which, for the most part supplies raw material to SPS fastener operations, SPS is not considered a specialty steel supplier engaged in trade sales. Nevertheless, SPS asked if it could participate in the bidding because, by this time, SPS could identify the potential of the Multiphase alloy to aircraft fasteners. In view of SPS's prior involvement with DuPont in the technical development of the Multiphase alloy, DuPont invited SPS to present a proposal. DuPont placed only one condition on the proposals — an up-front payment of a specified amount. Otherwise, the bidders were free to price and format their offers in any way.

SPS arranged with Latrobe Steel Company to have Latrobe become the source of the alloy if SPS was the successful bidder. Latrobe was a supplier of raw material to SPS and had been a supplier for quite a while.

SPS had good experience with Latrobe and the personnel of the two companies were familiar with each other. SPS agreed to grant Latrobe exclusive melting rights upon SPS acquiring the the rights to the Multiphase alloy. With the terms of the Latrobe license fairly well established, SPS presented its proposal to DuPont and advised DuPont that Latrobe would be the melting source of the Multiphase alloy.

Accept Offer

DuPont chose to accept SPS' offer. SPS acquired United States and foreign patents and patent applications, manufacturing know-how, marketing information, and the Multiphase trademark. Although ownership of the patents and other property passed to SPS, the form of the payments from SPS to DuPont was fashioned after an exclusive license. Besides the down payment, the license provided for royalties on sales and for annual minimum royalties starting with a certain number of years.

Let me make some quick points. SPS bought technology to fill a product line need. The technology was unproven commercially, but we could identify and quantify a need for at least one business segment in which we were deeply involved and we judged this alloy to be able to fill that need. DuPont, SPS and Latrobe had good reputations and there had been a very favorable relationship between DuPont and SPS and between SPS and Latrobe prior to the negotiation and consummation of the deals.

After the acquisition by SPS of the Multiphase alloy assets, Latrobe was given technical information and assistance available from SPS and DuPont to melt the alloy. The exclusive license granted by SPS to Latrobe permits sales of the alloy to anyone for non-fastener applications and to fastener manufacturers who have first been licensed by SPS to manufacture and sell fasteners from the alloy. Over the years, SPS has licensed three fastener competitors.

The first license was granted to the competitor which I mentioned earlier who had taken the exclusive license which SPS dismissed too quickly. I mentioned that SPS was permitted under its license from this competitor to make the proprietary fastener from titanium. When we determined that we wanted to fabricate this fastener from the Multiphase alloy, we licensed our competitor to make this fastener from the Multiphase alloy and had our license extended to permit our manufacture and sale of this fastener from the Multiphase alloy.

SPS granted the second license to a competitor to broaden the promotion of this alloy with airframe and aircraft engine customers.

Quick Points

The third license was granted to satisfy a customer requirement for multiple sourcing. All three licenses granted by SPS to the fastener manufacturers included trade secret and technical assistance provisions because a special knowledge is required to fabricate fasteners from the Multiphase alloy. Besides having to meet the needs of our licensees, we wanted to assure

that the products made by our licensees would be of such high quality as to support the acceptance and broadening applications of the alloy.

Some more quick points. The royalty income from Latrobe sales for non-fastener applications is analogous to licensing byproduct technology for the purpose of deriving licensing income. The fastener manufacturers were licensed to obtain greater acceptance of the product and satisfy multiple sourcing requirements.

I will not go into great detail about SPS's efforts in promoting the Multiphase alloy for fastener applications. It will suffice to state that much time and effort went into engineering evaluations of potential applications, distribution of technical reports to potential customers, and general advertising. Slowly, but surely, SPS penetrated the aircraft fastener market with this new alloy. Nevertheless, in the early 1970s, SPS owed DuPont a substantial balance on a minimum royalty. One of our fastener licensees also owed us a substantial balance on a minimum royalty. The acceptance of the Multiphase alloy for aircraft fasteners didn't happen as fast as SPS had anticipated. A significant contributing factor was the drop in aerospace business. We approached DuPont to renegotiate the minimums to reflect a change in circumstance which had not been anticipated. DuPont granted our request. SPS also renegotiated the minimum with its licensee.

SPS and its fastener licensees have been very successful with Multiphase alloy fasteners. Sales have grown nicely and the products yield SPS a good margin. The licensing of fastener manufacturers has been a happy compromise between satisfying the customers' demands for multiple sourcing, yet not diluting the situation for SPS and its licensees.

Meanwhile, Latrobe has been active promoting the Multiphase alloy for other applications. Because it cannot supply all forms of mill products, Latrobe has arranged for one company to supply the Multiphase alloy in wire form and another to supply the alloy in flat rolled form. The Multiphase alloy is now used for medical implants and heart pacer cases in the United States and abroad. Latrobe has worked hard with medical implant suppliers, surgeons and medical standards groups to promote these uses. In addition to creating royalty income, these developments have resulted in a new business for SPS. Because of SPS's familiarity with the alloy and its metal working capability, SPS now makes medical implant devices for a company in the implant business.

Other new applications of the Multiphase alloy are in gas wells where sour gas attacks metallic components. The corrosion resistance of the Multiphase alloy

makes it especially useful for tubing in gas wells and as cable material for holding instrument packages which log the structures of the wells. Some of these wells are 25,000 feet deep. Here again, Latrobe expended a significant amount of time and effort in promoting the alloy for these uses.

Yet another new application for the Multiphase alloy is as industrial spring material in chemical pumps.

Some more quick points. DuPont and SPS reacted reasonably on the question of minimum royalties. Something unexpected occurred, or failed to occur, and relief on the minimums was granted. In view of Latrobe's success in broadening the applications of the alloy, our selection of Latrobe to melt the alloy was justified. SPS was fairly comfortable in selecting Latrobe because of the prior relationship and personal knowledge of this company.

Not long after SPS acquired the Multiphase alloy assets, it was recognized that, as good as it was, this alloy would not satisfy certain applications of aircraft engine fasteners. It became evident that for these applications, a new alloy was needed which had higher temperature resistance and could be hot forged, rendering it less dependent on cold working, at least for the larger-size fasteners.

With the need identified and the envelope of the solution to the problem quantified, SPS and Latrobe embarked upon a joint development program. The agreement under which the two companies operated defined the respective responsibilities and the rights to results flowing from the program. SPS again was collaborating with a metals company in the technical development of an alloy. The joint development program involved continuous alloying efforts by Latrobe, testing by SPS, and exchanges between the two of technical information relating to product specifications, alloying and forging and other manufacturing procedures.

In advance of commencement of the program, SPS and Latrobe agreed to fashion rights to any new alloy developed under the program after the arrangement in the SPS-Latrobe Multiphase alloy license. After three years, the program bore fruit. The product of the program satisfied the predetermined requirements and it has been a commercial success. As with the original Multiphase alloy, sales of fasteners made from the new alloy have grown nicely and the margins on these fasteners are good.

I have given you the highlights of a 16-year success story. While from time-to-time there were difficulties, the overall activity went very well.