Soviet Technology for American Companies

Technology exchange between East and West is growing, taking advantage of strengths in each economic system

BY JOHN H. DOUGLAS

Whatever happened to detente? Somewhere along the way to the last election the word got dropped from the lexicon of official Washington, to be replaced by speeches urging military superiority and headlines proclaiming the cooling of East-West relations. In fact, what may be the most important aspect of detente—day-by-day cooperation in business—is quietly and steadily growing.

Cultural exchanges, of course, get more public attention. The American tour of the Bolshoi Opera—complete with a white stallion carrying the hero across the stage—was a spectacular contribution to the Bicentennial. But at the same time, around the country, products of Russian research were beginning to touch people's everyday lives.

American surgeons are implanting hip joint replacements manufactured by an American company following a design developed in the Soviet Union. In Texas, an energy exploration company is experimenting with a Russian process for gasifying coal while it is still underground. Kaiser Aluminum has licensed a Soviet-developed process for casting aluminum, which produces ingots by means of pulsating magnetic fields, increasing productivity and quality of the metal. And another American company has bought rights to Soviet laboratory data for production of a new anticancer drug.

Such increased exchange of technology represents more than just an easing of government restrictions or a normal extension of trade. It reflects what many believe are imbalances in the two economic systems—imbalances that apparently complement each other enough to promote cooperation on an even larger scale in the future.

According to a report prepared by the Rand Corp. for the Department of Defense, the Soviet Union has a "large stock of unused applied research," which has the potential of providing "moderate improvement in products and processes" of American companies. The reasons are not hard to find. The report quotes figures showing that the United States puts only about 22 percent of its R&D funds into applied research and a whopping 63 percent into development. The Soviets, on the other hand, put 47 percent of their funds into applied research and only 43 percent into development. Also, about 55 percent of Soviet scientific personnel work in research institutes, while only 8 percent work in industry.

This Soviet emphasis on applied research, performed in relatively isolated government laboratories, has resulted in a backlog of unused technology. The problem is further complicated by other bottlenecks, including weak incentives for development and a centrally dictated policy for pricing new products, which discourages their introduction to the marketplace. American companies, on the other hand, are often criticized for putting too much emphasis on short-term development and modifying existing products, rather than supporting the research necessary to make newer and better ones.

The Rand report thus concludes: "The relative investments of the two countries in activities represented at the extremes by research and by production indicates that . . . the United States might seek to import more basic and applied ideas and inventions, while the USSR might seek to import finished products and production facilities."

Several barriers, however, stand in the way of such an East-West technology exchange. Although the United States and the Soviet Union signed a new trade agreement in 1972, the Russians have postponed implementing the agreement because of recent American legislation tying trade incentives to Soviet emigration policy. Also, U.S. companies were not allowed to barter finished products for raw materials for fear that the United States might become too dependent upon the Soviet Union for natural resources.

Critics of these restrictions point out that instead of the Soviet Union relaxing emigration, the exodus of Russian Jews, for example, has been sharply cut back. These critics also claim that U.S. restrictions on taking payment "in kind" rather than "in cash" has simply sent more Russian business to West Germany and Japan at the expense of American jobs.

Another subject of intense debate is the question of which goods are "safe" to sell to the Soviet Union. Computers are one area of technology in which the United States has a clear edge. But computers are a matter of strategic importance since many weapons systems are either designed, controlled or monitored by them. Thus, permission has been denied to several proposed major sales of computers, such as an IBM travel reservations system for Russia's Intourist agency.

A final major obstacle to technology exchange is simply the difficulty American companies have in trying to find out what the Soviets have to offer. Far fewer American engineers read Russian than Soviet engineers read English. Also, except for the specialists who translate Russian publications for military technical groups, little effort has been made to provide American engineers with material from Soviet technical literature.

Here, at least, is where the situation may be changing. Such industrial giants as the General Electric Co. and Occidental Petroleum have recently entered extensive exchange agreements with the Soviet Union (which has pioneered some new long-distance power transmission technology and has vast untapped petroleum resources). Several licensing firms deal directly with the Soviet government agency *Licensintorg*, to introduce Eastern Bloc inventions to American corporations. One of the largest and best known of these licensing firms, Dr. Dvorkovitz and Associates of Ormond Beach, Fla., reportedly maintains extensive computerized files of foreign technologies for distribution to their clients. And most recently, the Control Data Corp. has launched a major East-West information exchange program.

The CDC program involves bringing Russian and American engineers and scientists together face to face through a series of seminars, with additional exchange of information facilitated by the company's international computer network. The first seminars in the series were held in late January in Pittsburgh, Houston and San Francisco. Three Soviet experts in industrial process control (chemical factory automation and such) reported on their latest accomplishments to representatives of American companies, who paid $250 a day to attend.

Future topics in the seminar series will include "Higher Education Systems," in March; "Welding Technology" (an area in which the Soviet Union reportedly leads the United States), in April; "Hydrometeorology," in June; and "Use of Econometric Models for Forecasting and Planning in the USSR," in October.

To further cash in on what the company sees as a growing market in technology transfer, CDC has created two computerized systems to help businesses locate the information or professional contacts they need. A subscriber to the TECHNOTEC information system, for example, sits

down at a Control Data computer terminal in any of 20 countries and enters key words for some technology he needs—say a process for preserving milk cheaply in a tropical climate. After a dialogue with the computer to exclude extraneous information, the subscriber might receive a description of how a mixture of yogurt and bulgur serves this end in the Middle East. If the technology requested is so complex that no known solution is presently available, the WORLDTECH system could supply the subscriber with the names of researchers in the specific area.

Two fundamental assumptions obviously lie behind CDC's latest gamble in a particularly tricky market—assumptions that say much about the changing status of East-West relations and the expanding role of technology in business.

First is the assumption that the usual course of attending meetings and reading journals is no longer adequate to tell an industrial engineer all he needs to know about what is going on in his particular specialty. Indeed, the most common complaint one always hears at meetings—aside from the usual grousing about the economy—is the increasing inability of conscientious professionals to "keep up with the literature." Communications experts have been predicting for years that computers will soon be needed to help scientists and engineers supplement their general reading with specific information about their narrow specialties. These predictions may now be coming true.

The second assumption is that American industry can no longer afford to "go it alone"; that international competition is now so keen that U.S. businessmen need all the help they can find—even from the Russians. Again, a common complaint concerns the decline of American productivity and competitiveness in world markets. Technology exchange with the Soviet Union is already old hat to some other countries. West Germany probably has the most extensive East-West exchange program of any nation and has apparently profited for its initiative.

The need for more American interest in technology exchange is perhaps most bluntly summarized by CDC's chief executive officer, William C. Norris. "In a crowded elevator in Moscow, Bucharest or Paris," he grumbles, "you aren't elbowing Americans, but Japanese who are looking for technology and other business opportunities." The result, he says, is a loss of American jobs.

A growing recognition of the need for more international technical cooperation—regardless of the current political "climate"—is reflected in the Soviet willingness to enter more exchange agreements, to participate in seminars and to submit their new technologies for dissemination through systems like TECHNOTEC. That may say a lot more about the status of detente than any pronouncements in Washington or Moscow. □

OFF THE BEAT

Gene-splicing research: Some safety advice from virus scientists

By now almost all have had at least their first say about recombinant DNA research. We have heard from the scientists who are and are not engaging in experiments using this tempting technique. We have heard from political groups interested in protecting public health and the environment. We have heard from drug companies eager to exploit the pharmaceutical possibilities.

Discussants have locked horns over such difficult questions as whether the speculative potential for good outweighs the speculative potential for harm, what the consequences of this research might be on evolution and how the right to free inquiry balances against a scientist's responsibility to protect the public.

While these questions certainly must be discussed, there are also some very concrete issues worth considering. Bacteria containing spliced genes are not suddenly endowed with magical powers for good or evil. They are still living organisms that will behave in familiar ways. The worst immediate disaster I can imagine from recombinant DNA experiments is an organism causing a terrible human disease. Yet there are laboratories that study viruses and other organisms known—with 100 percent certainty—to cause severe diseases. So when the topic of recombinant DNA research came up among some of these researchers at the Gustav Stern Symposium for Perspectives in Virology last week, I was interested to find out what virologists had to say.

"Until the relevant animal experiments are performed [to demonstrate whether a new hybrid will cause disease], containment is our safeguard," Thomas Weller of the Center for Prevention of Infectious Diseases at Harvard School of Public Health said in an after-lunch speech. "A common and rigorous technique must be applied."

Of the two types of containment required for recombinant DNA experiments, the more novel approach is biological containment. The DNA researchers use experimentally disabled organisms unlikely to survive outside of defined, laboratory conditions. Virologists, however, are experts at physical containment—wearing gloves, decontaminating glasswear, working in defined areas—because in their work it is all the protection they have.

Weller is concerned that in the excitement of the DNA research, the rigorous physical safety measures might not be followed religiously. "The bubbling ferment of discovery in science is a unique intoxicant that when quaffed is at once a stimulant and a depressant," he said. "The stimuli of discovery are self-replicating, induce an intensified investigative drive and a lowered threshold of irritation for interfering constraints, particularly those that impinge on intellectual freedom and the design of experiments. Meanwhile, receptors attuned to the realities of the *in vivo* [whole organism] world are depressed." The virologist's realities are tumors that develop in a newborn hamster inoculated with a virus benignly coded SV40 or the fever caused by another virus called VSV. He worries that young investigators trained only to work on cells grown in the laboratory or molecular biologists accustomed to *E. coli*, the standard research bacteria, have not been impressed with these disease possibilities. Because classical sterile techniques have not been necessary for their previous work, the young investigators pour and splatter protected only by what Weller calls "a tutor-induced psychological gown and mask."

Edwin H. Lennette of the California State Department of Public Health agreed: "Weller said with humor what I've been trying to say for years." Lennette suggested that recombinant DNA researchers be required to work in a clinical microbiology laboratory for about three months, until they learn to react correctly, without thinking, to a spill or dropped test tube.

A recently trained molecular biologist, admittedly defensive, counters that prior training in "sloppy" *E. coli* work shouldn't be considered an automatic handicap. "Individuals vary a great deal in their approach to lab safety, and that is not correlated with the area of their training, but with some more basic aspect of personality or concern for others, or general responsibility," he says.

Whether or not molecular biologists and young investigators are initially unprepared for the rigors of protective laboratory techniques, Weller believes that enforced adherence to the standards set up in the NIH guidelines will narrow the safety technique differences between investigators. "The guidelines are an operational bible, and the new commandments should be honored in spirit and in fact," Weller says.

In the meantime, Weller offered some advice from his own experience in a laboratory equivalent to the guidelines' P3 level. Even a conscientious scientist, he warned, may not notice an air filter inadvertently mislocated, a broken fan motor in a distant location, or insects and rodents in the building. Says Weller: "Until the present generation of investigators becomes skilled in the science and art of high-level physical containment, some mechanism should be developed to provide recurrent inspection and certification of facilities by experts from without, as well as within, the sponsoring institution."

—Julie Ann Miller