

Japan Diary

Tanegashima: Japan's Largest "Space Port"

The island of Tanegashima, 250 kilometers south of Nagasaki, is the home of sugar-cane fields, sweet potato patches, fishermen, rocket systems, and satellite tracking specialists. Yet the traditional islanders have had their lifestyles disturbed only slightly during the past nine years since the initial boosting of a Japanese N-series launch vehicle.

The Japanese maintain two separate rocket launching centers in Kagoshima Prefecture: the smaller one at Uchinoura serving the needs of space scientists, and the larger center at Tanegashima operating as the launch site for applications-oriented satellites. In the mid-1950s, Japanese engineers from the University of Tokyo's Institute of Industrial Science experimented with small rockets at their Michikawa rocket range in Akita Prefecture, but, according to Dr. Hideo Itokawa, the range had to be relocated in 1963 to prevent the possibility of rockets accidentally striking the Asian continent. The predecessor of Japan's National Space Development Agency (NASDA) used a Defense Agency site on the island of Nijijima (150 kilometers south of Tokyo) in

the early- and mid-1960s to launch its first few small experimental rockets.

The second Asian satellite was successfully orbited in April 1970 from the East Wind space center at Shuangcheng-tzu in China (on the edge of the Gobi desert). The 173-kilogram spacecraft, boosted by a Long March 1 launch vehicle, transmitted the Chinese anthem *The East is Red*. Two months earlier, scientists at Japan's Kagoshima Space Center sent their 24-kilogram Ohsumi test spacecraft into orbit, though without the fanfare of a patriotic tune.

High on a hillside overlooking the sea, the Institute of Space and Astronautical Science (ISAS) range provides a magnificent view of the Pacific Ocean, a convenient graveyard for any rockets which



may go astray. From the vantage point of the Kagoshima Space Center at Uchinoura, the northern part of the island of Tanegashima can be seen on a clear day, but the southern part, where NASDA's Tanegashima Space Center is situated, is slightly beyond the horizon.

A taste for new technology

In 1543, Portuguese Jesuits landed on the island of Tanegashima and introduced a piece of advanced foreign technology: the firearm. Within a decade the craft of gun production was widely disseminated throughout Japan, and these new devices were referred to by the name of the island where they were initially seen. In the 1970s, the newest form of projectile technology, the launch vehicle and rocket engine industry, was introduced on the same island. Today large N-series boosters fire their first-stage American-licensed rocket engines and auxiliary strap-on boosters at the space port to blast delicate applications satellites into precisely determined orbits.

The Osaki launch complex at the Tanegashima Space Center was the site of the first non-superpower (American or Soviet) geostationary orbit satellite launch a mere seven years ago. Satellites in the belt of geostationary orbit appear to hover over a single point on the equator. At 35,800 kilometers in altitude they are maintained in parking places in which they orbit around the spinning globe once a day (thus keeping pace with the planet's daily rotation). With the assistance of McDonnell Douglas, Rockwell International, Aerojet, TRW, and other American aerospace firms, Japan regularly injects a variety of satellites into this high orbit, including those for communications, direct television broadcasting, weather monitoring, and engineering experiments.

"My job was to keep wandering reporters away from the flaming rocket exhausts," replied Dr. Hideo Shima, NASDA's retired first president when I asked him about his responsibilities during the early days at Tanegashima. In 1969, when the quasi-governmental space agency was established (in a reorganization of the National Space Development Center), a space center was already under construction at Tanegashima. Dr. Shima was appointed president of the new group because, as "father" of the *shinkansen* bullet train, he possessed well-proven credentials as the nation's foremost systems integration specialist.

Political undertones

More than a dozen satellites have already been orbited from each of the two

Japanese launching centers. Why is it, though, that the Japanese, so famous for efficiency in their industrial endeavors, maintain two separate and infrequently utilized launch centers?

There is a strict technical reason for the United States to operate two principal rocket launching sites. Geostationary and other satellites can be boosted with varying trajectories across the Atlantic Ocean from Cape Canaveral in Florida but only California's Vandenberg complex can accommodate the trajectories of "polar orbiting" satellites (and soon space shuttles) which are fired due south. Japan however, maintains two launch sites not for technical reasons but rather because of internal politics.

At more than 200 meters above sea-level, the Mu-series launch complex at the Kagoshima Space Center is unusually high: since rocket stages are bulky items, launching sites which face oceans are best situated at just slightly above sea-level so that excess handling can be avoided. But the ISAS professors do not want to launch their boosters from the Tanegashima facility, even though it is ideally situated only a few meters above sea-level. Instead, scientists at ISAS (under the Ministry of Education) desire to launch their own solid-fuel rockets (designed in-house and manufactured by Nissan Motor Co.) from Uchinoura so as to protect their autonomy from the larger applications-oriented NASDA group (administered by the Science and Technology Agency).

NASDA is now celebrating its 15th year of operation, and next year will witness the 10th anniversary of NASDA's first satellite launch. What sorts of satellites will be boosted from Tanegashima's Osaki launch site ten years from today? According to Dr. K. Yamawaki, manager of NASDA's planning and management department, the so-called H-II launch vehicle will be operational within a decade and will allow satellites of up to two tons (up from the current 350-kilogram maximum) to be projected into geostationary orbits from Tanegashima.

What will the local fishermen think about this new, and undoubtedly louder, launch vehicle which is presently on the drawing boards at NASDA's Tokyo headquarters? For that matter, does NASDA care what the fishermen think?

In fact, at Tanegashima, the fishermen could be described as crucial actors in the sub-field of guidance and control. Rockets need to be guided into proper trajectories and satellites in orbit are subject to occasional stability control maneuvers (done by very small thrusters). But the fishermen of Tanegashima are also specialists in the actual practice and implementation of control theory, since they exert a strong measure of control

over permissible launch times.

Although the pre-launch sea down-range of Tanegashima must be cleared of ships for safety reasons, the fishermen have said that they will only bother to comply with these restrictions during certain periods (which happen to coincide, conveniently, with bad-weather poor-fishing seasons). At Tanegashima, launch windows suit the preference of the politically powerful fishermen, and not necessarily the technical requirements of astronautics. During one of the early launches, Mr. Nobuyuki Arino, currently the executive managing director of TRW Overseas in Tokyo, was listening on headphones at one of NASDA's downrange stations when he heard the space experts at Tanegashima call for a temporary launch delay because an errant fishing boat had somehow cruised into the launch-danger zone close to the launch pad.

One satellite which experienced a launch delay was NASDA's second spacecraft, Ume (an ionosphere sounding satellite) which, due to a possible lightning interference incident, was postponed to late February 1976. The original launch window agreement with the fishermen called for the lift-off to take place by the end of the month. Finally after re-checking various rocket system components, the launch occurred on the last, and "extra" day, since 1976 was luckily a leap year.

In addition to the Tanegashima launch site, the island also boasts an array of big dish antenna units at the Masuda Tracking and Data Acquisition Station.

Natural resort

For those who are interested in surfing and swimming, or even just lounging on a beautiful uncrowded beach, Tanegashima is highly recommended as an undiscovered tourist resort. A wide variety of very fresh seafood is available at the island's many restaurants (courtesy of the local fishermen—who will soon be assisted by the Marine Observation Satellite-1) and the ferry ride to or from Kagoshima City is just the right length at four hours: not too long and not too short.

The islanders appear to have adjusted to the advent of Japan's space age, imported from Tokyo to the usually-serene island by the conspicuous subculture of space experts, who remain a minority high-tech force on the island. As Japan's major gateway to space, Tanegashima has accommodated the "invasion" of spacemen from Tokyo, Tsukuba, Nagoya (site of the main Mitsubishi Heavy Industries aerospace factories), California, and elsewhere, and yet the island has maintained its unique heritage. The native islanders go about their business of raising sugar-cane, selling fish, or attending

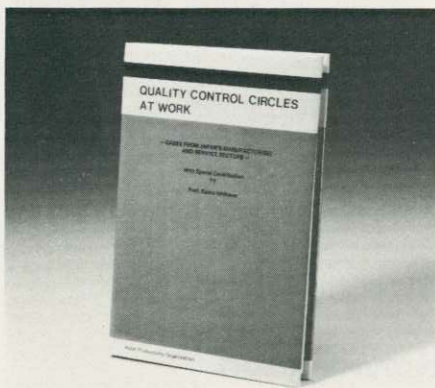
to summertime tourists, while the spacemen, buried under thousands of tons of concrete, monitor the looming countdown: *san, ni, ichi, hassha* (blast-off)! (Neil W. Davis, Japan correspondent for *Aerospace America*)

Bookshelf

Quality Control Circles At Work

—Cases from Japan's Manufacturing and Service Sectors—

By Kaoru Ishikawa (ed.)
Published by the Asian Productivity Organization
1984, Tokyo
232 pages



One of the problems in introducing Japanese-style quality control (QC) activities overseas is that most of the books on the subject are written by experts, primarily academic experts. And being experts, most of them think they have to sound like experts. The result has been a proliferation of abstract theorizing that leaves boredom, confusion, and despair in its wake.

The inability of American management and labor to develop a clear understanding of and firm commitment to QC is then cited in both the business and popular press as one of "the troubles with managing Japanese-style." As *Fortune* recently noted (April 2, 1984), "Even when workers in quality circles have been properly trained and motivated and union officials mollified, there remains the problem of getting managers on board." *Newsweek*, in what was basically a rehash of the *Fortune* article, said (July 2, 1984), "The principal roadblocks to the circles' success are union resistance and,

often, a lack of genuine commitment by corporate management."

QC Circles at Work should go a long way toward clearing up these difficulties. Although it has an excellent introductory chapter by Dr. Kaoru Ishikawa—the dean of the Japanese QC movement—explaining exactly what QC circles are and why the management commitment is so essential, the bulk of the book consists of translations of actual reports written by QC groups.

These reports—16 of them altogether—explain how the groups decided what to do, the problems they encountered, their analyses of the causes, the steps taken to solve the problems, and, most importantly, the way these solutions were institutionalized to ensure that the problems did not recur.

While the chance to see how the groups progressed is instructive, it should also be eye-opening to see some of the problems that the groups took up. These are not major issues with earth-shaking ramifications. Rather, they are little things such as improving radiator inspections or shortening telephone operator response time, yet it is the cumulative impact of these seemingly minor improvements that has given Japanese industry its competitive edge.

QC circles often encounter interpersonal problems, since it is easier to blame the poorer-performing individual than it is to sit down and work out solutions to process-related causes, and the reports also explain how they were able to maintain solidarity and group identification among all of the people working together at a shop.

The reports are supplemented by running commentary by a panel of QC experts drawn from the monthly magazine *QC for the Foreman*. In these comments, the panel is quick to point out a group's failings but just as quick to praise its successes. These comments are models of the supportive management attitude that is needed if QC is to work. It is typical, for example, that methodological mistakes are met with comments such as "This group might have done better to consider..."

It is one of the axioms of QC activities that the worker knows best. The people who actually use the equipment are in the best position to decide what equipment and routine works best. This realization is why QC is sometimes referred to as bottom-up management. QC cannot be imposed from above, yet it can be stifled from above. Management, and especially *Journal* readers, should read this book to see what QC is really all about. Sometimes the material successes appear trivial, yet the investment is so small and the intangible benefits so great in terms of job satisfaction that QC more than pays

for itself.

While QC is very often assumed to be purely for people in manufacturing or assembly, the book includes reports of QC group activities in sales and other service-sector industries. Would you believe a caddies' group? Clearly, any company can benefit from QC, and *QC Circles At Work* shows the way.

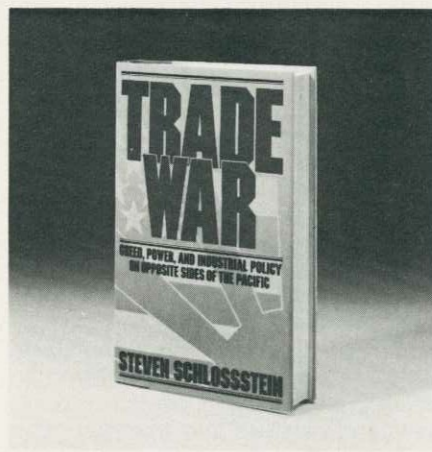
These are reports from the frontlines of QC, recommended reading for anyone—workers or management—who wants to know what QC is really all about.

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President, Japan Research Inc.

Trade War

—Greed, Power and Industrial Policy on Opposite Sides of the Pacific—

By Steven Schlossstein
Published by Congdon & Weed, Inc.
1984, New York
296 pages; \$17.95



Japanese-American economic relations have grown very close, and there is now a great flow of goods, people, and capital between the two countries. However, with the United States accounting for one-fourth of the total world GNP and Japan another tenth, it should surprise no-one that trade friction develops from time to time. Yet while some natural friction is inevitable in the course of this broad economic relationship, it is crucial that this be friction caused by legitimate trade interests and not by misunderstanding and ignorance.

Once ignored except as a curiosity, Japan and things Japanese have become a major subject of world interest. Over the last several years, there has been a spate of books in the United States analyzing the secrets of Japan's success, outlining Japanese industrial policy, and reporting on Japanese management. Some are uncritically laudatory of Japan; others bitter-