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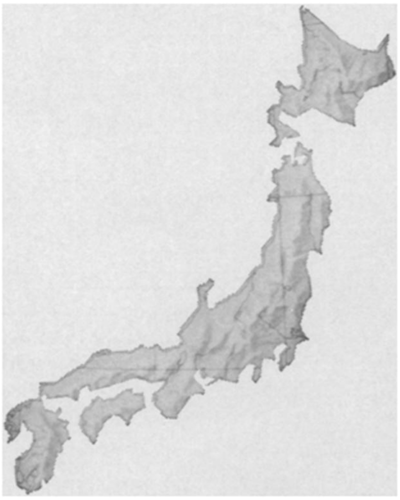

Pushing big-scale projects

Japan has picked four technologies that promise good rewards

by Stuart Griffin

Japan has been nibbling on the edge of a number of large-scale technologies for years without catching on. The Science and Technology Agency, aided by the Ministry of International Trade and Industry, is getting into the picture to see if it can stimulate industry with cash help to develop some of the most promising prospects.

Four fields that are receiving the most emphasis are the generation of electricity by magnetohydrodynamics (MHD), large computers, crude-oil cracking and jet engines.

The MHD technology has been on the borderline of success both in Japan and elsewhere for a number of years (SN: 1/6/68, p. 5). The technique sends a jet of burning gas, so hot it becomes a charged plasma, through a magnetic field, a process which generates electricity without heavy, friction-bound turbines.

The MHD technique promises higher efficiency and lower fuel costs, but because of the corrosive effects of the high-temperature gas special materials have to be developed for the plasma channels.

Japan began research in 1963; in 1967 Tokyo Shibaura Electric successfully built a 530-kilowatt electric generator. If the materials research is successful, a practical power generator could conceivably be built by 1975, according to present plans.

Japan, with 2,000 electronic computers, now ranks third in the world after the U.S. and West Germany, and demand from its growing industries is rising. In great demand are larger, higher-powered computers that can process more information more rapidly and selectively.

Firms have produced relatively large sizes, like FACOM 203-50, HITAC 8400, and NEAC 2200-500. These are still inferior to big U.S. computers.

The Government has launched a $28.8 million development program (SN: 3/1, p. 222) to manufacture during the 1970's high-powered computers. These will employ large-scale integrated circuits and a multi-access system by which hundreds of people can use a single computer at the same time. A five-year plan links Tokyo, Osaka and Tohoku Universities with Hitachi, Fujitsu and Nippon Electric companies.

Japan's petrochemical industry has relied for most of its raw materials on naphtha, but due to a global shortage prices keep rising. For this reason, a new technology is being developed, by which crude oil can be cracked into primary hydrocarbon compounds such as ethylene and propylene.

Since crude oil has a chemical composition more complex than naphtha and contains such impurities as sulfur, a new method must be found to obtain hydrocarbon compounds.

The conventional way is to run naphtha vapor through heating tubes at high velocity, applying heat to the tube by gas burner. But the new method—a process of cracking crude oil into the types of hydrocarbons needed—requires a cracking hearth. Two experiments are now under way.

- Catalytic cracking of petroleum using coke as a catalyzer. By circulating coke particles through a reactor and regenerator (for heating hydrocarbons) the system cracks crude oil at a temperature of around 850 degrees C.
- The oxidation method, where crude oil is cracked at a temperature of about 800 degrees C. by letting a mixed gas of molecules of a catalyzer (an oxidized metal), oxygen and steam to run through it.

A test plant with capacity of five tons of crude per day will be in operation by the end of March 1970, and a year later will be followed by a pilot plant able to process 120 tons of crude oil each day.

Japan's postwar aircraft manufacturing industry has fabricated the YS-11 and the MU-2 transport planes, but both needed imported power plants. Now that a plan to develop a more advanced type aircraft is in blueprint, aircraft circles are discussing the building of a domestic jet engine, not to match the trend of large-size engines used in supersonic transports, or of developing small-size jet engines for small aircraft now propeller driven, but to maximize medium-sized jet engine development.

The Government wants a jet engine with a 20,000-pound thrust, lightweight, powerful and economical in terms of fuel consumption.

The time permitted for this project is 10 years, divided into two stages. Stage one envisions disbursement of $13.5 million in research on and testing of such components as high-pressure compressor, burner, turbine and front fan, and on assembling a test model with a 10,000-pound thrust.

Stage two will witness the expenditure of almost $33.5 million to improve the test model's performance to 20,000 pounds of thrust.