

Technology Notes

SPACE ENGINEERING

Orbiting Factory Seen for 1990's

A gigantic, 400-man orbiting factory with more than eight acres of manufacturing area has been proposed by two space engineers for development by the 1990's.

As preparation for this super space station, a smaller, 32-man version would be launched a decade before to help find industrial processes which are only possible in, or which would benefit greatly from, the airless, weightless space environment. These might include vacuum refining of metals, cold welding, production of metals and sterile production of drugs. In addition, the earlier station could reap profits for its owners, whether government or private, by doubling as a huge natural resources satellite to spot fishing areas, water sources and agricultural features such as diseased crops.

The 32-man station, according to Robert L. Gervais and Vern D. Kirkland of Douglas Aircraft Co., Santa Monica, Calif., might consist of a 130-foot-long, 33-foot-diameter cylinder (the fattest that could be launched from a Saturn V rocket), owned by the Federal Government, to which four commercial, privately-owned laboratory modules would be added by separate launches.

The bigger factory-station, which might cost more than \$1 billion yearly to operate, could consist of six 80-by-70-foot core segments, with eight separate industrial sections extending outward like the spokes of a wheel. A population of 328 workers and 72 crewmen would be no more crowded than in a college dormitory, the engineers believe.

HYDRONAUTICS

Minisub to Study Fishing

A two-man minisub intended to help improve commercial fishing techniques is being built for England's White Fish Authority.

The battery-powered craft will follow trawl nets to see how they behave underwater and how fish enter—observations that could lead to improved techniques and better catches. In addition, nine North Sea oil companies are studying the sub, which will have a maximum depth of 600 feet and a top speed of six knots, as a possible means of examining undersea oil and natural gas pipelines.

The Hawker Siddeley-built craft will be able to remain submerged for a maximum of six and a half hours.

SOIL MECHANICS

Electricity May Right Pisa's Tower

Electricity may be the tool used to straighten out Italy's Leaning Tower of Pisa.

A current passing between iron electrodes planted in the ground on the side away from the tilt could draw the water out of the soil beneath the tower's high side, letting that side settle as the soil compressed, says Melvin I. Esrig, associate professor of civil engineering at Cornell University, Ithaca, N.Y.

The process has been used successfully in Mexico City to straighten out buildings up to 22 stories high that had been tilted by an earthquake. Next month an

international competition will open for proposals of ways to save the 179-foot Tower of Pisa, which now leans 14 feet 10 inches from the perpendicular. Estimates of how long it can remain standing without help range from 80 to 200 years.

Esrig calls his process electrical grouting, though grouting usually refers to stabilizing the soil by the injection of some hardening agent. A combined process, in which a hardener was pumped in to fill electrically drained soil, has been used on tunnels in Rumania and Israel, house foundations in England, and parts of Seattle-Takoma airport in the U.S.

STRUCTURAL ENGINEERING

Bridge Slabs Get Torture Test

A garage-sized torture chamber that can compress all the harsh conditions of an entire Illinois winter into 10 days is being used to test bridge materials.

Under the direction of Prof. Clyde E. Kesler of the University of Illinois' Talbot Laboratory at Urbana, slabs of prestressed concrete like those in bridge decks are subjected to three freeze-thaw cycles a day while being punished by static and cyclic stresses and washed with a salt solution.

The project is sponsored by the National Cooperative Highway Research Program of the Highway Research Board.

METEOROLOGY

Water-watcher for Satellites

A new type of weather satellite camera designed to measure the amount of water vapor in the air is being developed for the National Aeronautics and Space Administration by International Telephone and Telegraph Corp., Fort Wayne, Ind.

The instrument will provide new and important data on the vertical distribution of water vapor in the earth's atmosphere. Called a filter-wedge spectrometer, the device will base its readings on measurements of sunlight reflected from the earth and clouds during the day, and of infrared emissions from the atmosphere at night. Its first flight will be on the Nimbus-D weather satellite, now scheduled for launch in 1969.

By correlating vapor measurements with heat distribution information, calculations may be made leading to more accurate storm forecasts.

ELECTRONICS

World's Smallest FM Transceiver

An FM transmitter-receiver claimed to be the world's smallest, about the size of a shotgun shell, has been developed to test turbine impellers spinning at 100,000 revolutions per minute.

Mounted on the impeller shaft, the unit picks up signals from strain gauges cemented to the impeller blades, then broadcasts them to receiving and recording equipment a few feet away. Created to replace mechanical commutators that could not keep up with increasing test speeds, the set was developed by the Schwitzer Division of Wallace-Murray Corp., Indianapolis, Ind.