Technology Notes

SPACE ENVIRONMENT

Spacesuits Hamper Spacework

The Lockheed Missiles and Space Co., which has spent four months studying the problems of working on the moon, reports that it takes 3.22 times as long to tighten a bolt while wearing a pressurized space suit as it does in shirtsleeves. Reducing gravity to the moon's one-sixth-normal adds still another 26 percent to the original time.

Lockheed's nine test subjects, all of whom had previous pressure-suit experience, threaded and tightened hex nuts and wing nuts and operated push-pull connectors while wearing Apollo A4H space suits. The A4H was replaced in the Apollo program in June 1965. The current operational suit, three models later, has considerably improved shoulder, hip and wrist joints.

Nevertheless, lack of maneuverability is a severe problem. "If you divide the amount of money it takes to get man on the moon by the amount of time he can do useful work, you see we're paying quite a premium," says Richard Shavelson, in charge of the Lockheed tests, "so we'd better be able to predict accurately just what and how much can be done."

Next month Lockheed plans to continue the experiments with a few more difficulties, such as illuminating the work with glaring light like that of sunlight on the moon, and by having the subjects stand on a rough, simulated lunar surface.

MINING

Halide Extraction of Gold

The key to economical mining of vast low-grade gold deposits in the United States may come from a study now beginning at the Colorado School of Mines, Golden, Colo.

Metallurgists there will examine the characteristics of gold halides—intermediary compounds in an extraction process proposed by the Bureau of Mines.

In the process, ore would be crushed and treated with halogens such as chlorine, forming gold halides. The halides, which vaporize at much lower temperatures than pure gold, would then be distilled out. Finally, the halogens would be recovered for reuse, leaving pure gold.

ADHESIVES

New Glue Is at Home Underwater

Army researchers looking for ways to close wounds without sutures have developed a useful side-product: a glue that can be used underwater for bonding both metallic and nonmetallic substances, including steel, aluminum, glass, wood and rubber.

Developed at the Army's Medical Biomechanical Research Laboratory in Washington, the adhesive has produced underwater steel-to-steel bond strengths of up to 700 pounds per square inch, and appears to be equally effective on corroded, painted and clean surfaces. Samples exposed underwater for a month at a tensile loading of 100 psi showed no deterioration of bond strength.

TRANSPORTATION

Marines to Get Swamp Buggy

A special Marginal Terrain Vehicle for use in the swamps, rice paddies and inland waterways of Southeast Asia is being crash-developed for the Marine Corps by the U.S. Army Material Command.

Called the XM-759, the vehicle carries 3,000 pounds of cargo or a fully-equipped Marine squad of 14. Its two-man crew can drive it at seven miles per hour on water and 35 mph on land. Delivery of 200 MTV's is scheduled over the latter three-quarters of 1968.

SATELLITES

ATS-2 Awry, but Working

The second Applications Technology Satellite succumbed to a malfunctioning rocket engine shortly after its launch on April 5, and ended up in the wrong orbit.

Planned to test communications, weather-watching and other techniques from a 7,000-mile-high circular orbit, the satellite ended up in a greatly elongated, egg-shaped path, 115 by 6,947 miles. Although almost all of its experiments were working, the low perigee will greatly shorten its lifetime, NASA said.

METALLURGY

Alloys Extruded at Room Temperature

Room-temperature extrusion of high-temperature alloys is moving out of the laboratory toward commercial use, in the wake of developments at the Army's Watervliet (N.Y.) Arsenal.

Although used in very small presses ever since the 1940's, and therefore not patentable, the process has now been applied to products up to an inch in diameter—and soon will be tried with bore size up to three and four inches.

Squeezing a billet of a nickel-based superalloy such as Iconel 718, Rene 41, or Udimet 630 through a forming die requires pressures of 200,000 to 300,000 pounds per square inch, report Charles J. Nolan and Dr. James Uy of the arsenal. The metal is formed without heat, and therefore without the problems of hot extrusion, which include distortion, expansion and loss of strength. The use of a lubricant such as molten glass, and the clean up problem this entails, are also avoided.

The metal billet is forced through the die by a column of fluid—75 percent glycerine, 25 percent ethylene glycol—pushed by a piston powered by air pumps.

The developers foresee use of the process in the extruding of high strength turbine blades and vanes, as well as innumerable military uses such as producing stronger mortar barrels.

Among the metals investigated with the process, in addition to the nickel alloys, are three steels: type 4320, type 4340 and a high-strength maraging steel, 250.