

SPACE

Space Spending Pays Off

Billions of dollars invested by the United States in space and missile research have paid off in numerous benefits on earth, Lillian Levy reports.

► THE BILLIONS of dollars spent by the United States for the national space and missile program have paid off in unexpectedly rich benefits on earth.

In less than five years, national space spending has developed new industries, spawned new communities, introduced new consumer products and advanced medical research, patient care and diagnostic techniques to an amazing degree.

Astronautics in the Home

Astronautics now ranks with aviation as one of the nation's foremost commercial ventures. From this young space-age enterprise have sprung factories and corporations to produce new and unique consumer products.

These include such items as temperature-resistant pots, pans, dishes and glassware made from pyroceram, a ceramic originally developed for missile nose cones. Teflon, a plastic used as a heat shield to protect space vehicles from the searing temperatures encountered during launch and reentry, is now produced to coat pots and frying pans, making it possible to fry foods without grease and cook without water.

Tools operated with a mere squeeze of the fingers, designed for repair work in space under zero gravity (weightless) conditions, are making repairs simpler for the handyman at home. One such space tool is the "plench," a combination of pliers and wrench developed by Ling-Temco Vought, Inc. By squeezing the specially designed handle a man can perform functions which ordinarily require pulling and turning.

Home-owners now may get an inexhaustible hot water supply from a new inexpensive electronic heating unit. Carbonized material, a product of missile research by the National Carbon Company to reinforce plastics exposed to hot erosive rocket gases, acts as the heating element.

Vigorous new communities have sprung up in once sparsely populated areas as a result of the national space program. Perhaps the best example of these new space boom towns is Cocoa Beach, the lusty, lively expanding community near Cape Canaveral, Fla. Construction and building trades are doing a multi-million-dollar business on a narrow strip of land that five years ago was largely populated by sea gulls and pelicans. It is a booming resort area that attracts tourists from all over the world who come to sit on the beach and watch the spectacular missile launches.

However, among the richest bonuses from the U. S. space investment has been the application of research and technology, particularly that concerned with missiles, to

medicine. In fact, missiles for space have meant better medicine on earth.

A derivative of hydrazine, developed as a liquid missile propellant, has proved effective in treating tuberculosis and certain forms of mental illness. Another chemical used in missiles has been adapted to produce a means for rapidly lowering blood temperatures. A small efficient valve developed for missiles now can be used to replace a defective valve in the human heart.

Another medical aid from missiles is a viscometer, a tool for studying blood, developed from the guidance system of the Polaris missile. Studies with the missile viscometer have upset previously held theories that blood plasma, like water, is a Newtonian fluid in which viscosity is unaffected by a change in rate of flow. It now appears that blood is a non-Newtonian fluid, similar to fluids such as catsup or mayonnaise, in which viscosity changes with rate of flow.

This discovery is expanding knowledge of the curious mechanics of blood circulation involved in heart disease and other circulatory disorders.

Telemeter Applications

Space age telemetering devices are being applied to vocational rehabilitation problems. In Abilities, Inc., a modern Long-Island factory where more than 400 handicapped workers are employed, each worker wears a tiny telemetering device smaller than a pack of cigarettes to monitor his heart action, pulse, breathing, blood pressure, skin temperature, energy consumption and other bodily functions. This "living laboratory" is observed on closed-circuit television by medical researchers seeking a better understanding of the physiological and psychological traits of disabled and non-disabled workers.

Pressure suits used by astronauts to maintain normal blood pressure and circulation in space are giving new hope to bedridden victims of strokes such as that suffered by President Kennedy's father, Joseph P. Kennedy.

When a stroke is severe, the tone of the blood vessels is affected, causing a drastic lowering of blood pressure. This makes it impossible for the stroke victim to stand or even sit without blacking out or losing consciousness.

Medical researchers in the Office of the Surgeon General of the U.S. Air Force adapted the lower half of outmoded space suits for stroke victims considered hopeless invalids. The space trousers have enabled these people not only to walk but to work again.

Medical diagnosis also has been advanced by space-developed technology. Computers

used to formulate the telemetered data from the astronauts during space flights indicate it is possible to convert the entire medical diagnostic process into mathematical models which will provide more accurate and complete diagnosis.

These are only some of the returns from our total \$5 billion investment in space which, as Vice-President Lyndon B. Johnson, who is also chairman of the National Space Council, observed, is an amount equal to that spent annually for lipstick, face powder and nail polish and less than the \$7.5 billion spent annually on cigars and cigarettes. But great as these current pay-offs are, they will be dwarfed by future benefits.

Before the end of the century, commercial rocket transport may make it possible to travel from coast to coast in less than an hour. Commercial rocket travel will not only cut down on time, it will cut down on cost of travel because of advances in production and materials.

Miniature Power Plants

Vice-President Johnson recently predicted that today's space research will bring power plants no bigger than a coffee can to operate tomorrow's automobile; new fuels to provide energy at lower cost; pocket television receivers; and advances in rapid data transmission that will permit sending transcriptions of every book in the Library of Congress anywhere in the world in two weeks.

Communication satellites will permit face-to-face television communication at any hour between heads of states. Major international conferences on science, technology and politics could be held without participants ever leaving their own country.

Sensors now being used on satellites to learn more about energies in space may be adapted to explore the oceans and probe under the earth's crust.

Advanced space computer systems will be adapted to design and plan the construction of large buildings and massive housing developments.

Space medical research will eventually "increase man's life expectancy here on earth and improve the state of his health during that lifetime," Dr. James N. Waggoner, a member of the medical and engineering team that built the life support system for Project Mercury, has predicted.

Electronic nurses will monitor patients at home around-the-clock, eliminating the present need for expanded hospital space. Within the next decade, medical experts will be able to consult and advise patients thousands of miles away from data telemetered directly from the persons during their examination.

Human growth may be controlled as a result of current studies demonstrating how gravity affects the growth rate.

• Science News Letter, 81:374 June 16, 1962