engineering sciences

HYDRODYNAMICS

Microorganisms affect testing

Continual monitoring of the water in hydrodynamic testing facilities to ensure that microorganisms haven't changed the water's resistance or cavitation properties is recommended by Dr. J. W. Hoyt of the Naval Undersea Warfare Center, Pasadena, Calif. He reports that data refinements resulting from such precautions "may open new aspects of precision in hydrodynamic testing."

Long-term data from some hydrodynamic testing facilities reveal that frictional resistance of a towing-tank model can drop by 20 percent over periods of time. Similar variations have been found in cavitation inception pressure.

Dr. Hoyt says that many aquatic microorganisms exude high molecular weight polymers into water. These compounds reduce friction. In fresh water, several algae families secrete drag-reducing substances. The algae cells themselves have no role in friction reduction; the active agent is the polymer dissolved in water. Many bacteria, as well, can produce sizeable amounts of high molecular weight compounds capable of lowering friction.

ELECTRICITY

Advance in lithium-chlorine battery

Experimental lithium-chlorine battery cells have now operated in the laboratory for over 2,000 hours with current efficiencies well over 90 percent in repeated charge-discharge cycles.

In a paper presented to the third annual Intersociety Energy Conversion Conference, Thompson Bradley of General Motors Research Laboratories, Warren, Mich., notes that the lithium-chlorine system offers potential advantages in power output and energy storage capacity. Such a battery combines molten lithium with gaseous chlorine to generate electric current and also produce lithium chloride; the lithium chloride serves as the battery electrolyte. During recharging this process is reversed. Bradley described the development of the present cell as a step in the direction of a high-performance battery for electrical vehicles.

PRODUCTION

Vacuum control for moving sheets

Braking of moving sheets, such as films, textiles and paper, is usually accomplished by passing the sheets through sets of rollers where the sheet movement is slowed down by pressure.

But it is difficult to obtain precise control of the braking effect and the sheets tend to tear.

A device that provides vacuum braking control of moving sheets has been patented by Rudolf Bade, Hamburg, Germany, and assigned to W. R. Grace & Co., New York City.

The sheets are passed over stationary openings; adjustment of the amount of vacuum regulates frictional engagement of the sheet and thereby controls its movement. The sheet is guided in such a way that it covers all suction ports and thus seals them against loss of vacuum.

The patent number is 3,396,887.

AUTOMOTIVE SAFETY

New height for seats

The front seatbacks in automobiles should be 28 inches high—several inches higher than most are now—to provide protection against whiplash injuries in rear-end collisions. This height prescription grows out of a series of collision experiments at the Institute of Transportation and Traffic Engineering, University of California at Los Angeles.

The institute also says that the width of the seatback near the top can be reduced to allow increased visibility without significantly reducing the support's protection.

In the rear seat, the study found that in a 30-mile-per-hour collision, a bench seat, heightened from the customary 21 to 25 inches provides good protection for the average-sized passenger.

PRODUCTION

Diamonds from methane

A process demonstrated at Case Western Reserve University, Cleveland, Ohio, grows diamonds from methane in only one thousandth of atmospheric pressure. Until now diamonds have been made under pressures of some 70,000 atmospheres.

In the new process, methane gas is slowly passed over a diamond seed crystal at temperatures of about 2,000 degrees F. The gas decomposes and gives off carbon, which deposits on the crystal. The carbon atoms arrange themselves in the same atomic pattern as the original diamond and the seed grows.

The diamond-growing process at present is quite slow and is used only to increase the size of industrial diamond abrasive powder. In the process the diamond powder grows at a rate of about one-half of one percent per hour.

A potential application is the production of diamonds which conduct electricity for use as semiconductors at high temperatures. In this process a thin diamond layer which will conduct electricity will be grown on a larger diamond. A long-range goal, not yet attainable, is the growth of a synthetic diamond of gemstone size and quality.

METALWORKING

Casting and forging combined

Basic methods of forming metal include casting and forging. Conventional casting produces a precise, low-cost, but relatively weak structure, while forging gives strong, but dimensionally inaccurate products.

A new metal-forming process that combines the advantages of casting and forging is being developed by Anadite, Inc., South Gate, Calif. In the process a shell the shape of the finished part is lowered into a vat of molten metal. The shell is drawn out slowly and the metal clings to it and cools as it is drawn from the vat. The metal retains its tensile properties as though forged. This produces exceptionally strong, thin-walled castings, which are expected to find initial use in the aerospace field.

The process is expected to be used with ferrous, nonferrous, and exotic metals.