engineering sciences

ILLUMINATION

Solar simulator with quadrupled output

A stable, high-intensity light with four times the output of previous solar simulators has been developed by Union Carbide Corp., New York, N.Y., and Genarco, Inc., Flushing, N.Y.

The solar simulator utilizes a 120-kilowatt carbon arc light source that can irradiate an 8-foot diameter circle with energy that all but duplicates that of the sun outside the earth's protective atmosphere. Heretofore, the maximum power levels of such light sources have been approximately 30-kw, and the lamps have used arc carbons with a diameter of 16 millimeters. Union Carbide developed a 30-mm diameter arc carbon, with the result that one solar lamp can irradiate an area four times that previously possible.

In addition to testing spacecraft, the arcs might be used to light an entire football field with only four such lamps; making beach resorts independent of cloudy weather; or building searchlights that would illuminate large parking lots. Such uses are technically feasible, but not yet economical.

SHIPPING

Brakes for ships

How to put the brakes on ships has always been a problem. It is now becoming critical as ships, particularly oil tankers, increase in size. A 100,000 ton tanker, for example, takes miles to stop. Putting propellers into reverse can, of course, reduce the stopping distance, but this cannot always be done quickly. In any case, there is not much reverse power available on turbine ships.

The Ship Division of the National Physical Laboratory, Teddington, England, has developed a device to cut down stopping distances. The purpose of the device is to slow down a ship going at full speed to a speed at which reversing the propeller will have the most effect. The device consists of a duct built into the bow of the ship. Braking is accomplished by two sets of vanes in the duct that turn the flow of water from the bow through 180 degrees.

COMPUTERS

Shipboard digital computer system

A shipboard digital computer system for calculations required for optimum cargo loading has been installed on a 97,600 ton ore-oil carrier built at Nippon Kokan Kaisha's (NKK) Tsurumi yard, Tokyo, Japan. The system was developed jointly by the NKK, Japan Steel & Tube Co., Ltd., and the Oki Electric Co., Ltd., Tokyo.

The system automatically computes various strength calculations, including bending moment and shearing force at the bulkheads, trim and draft, vessel stability, displacement and deadweight. Input of data is made by push button, and calculations are displayed on a readout panel. Data can be recorded by either an electric typewriter or data logger.

Conventionally, vessel loading calculations are computed by a ship's officer and require a high level of training and experience, plus considerable detailed computations. The computerized system is easily operable after only a few hours of training. It is faster and more accurate.

AVIATION

System warns of wet runways

Wet runways are a well-known danger to landing aircraft. The presence of an undispersed film of water under the aircraft's tires can cause loss of braking effectiveness and directional control—a process known as aquaplaning—and can easily lead to disaster.

There are various measures a pilot can take to minimize this effect, such as landing heavily, or waiting until there is less water on the runway. But he can only make this decision if he has accurate knowledge of all the runway conditions when he wishes to land.

A runway water-depth monitoring system has been developed by the College of Aeronautics, Cranfield, England, which enables pilots to be given full minute-by-minute information on runway conditions. Six or more height measuring devices are installed on each runway. The devices continuously measure the depth of water and relay this to a remotely situated control unit which displays the information on a strip chart. The exact condition of any section of runway at any given time can thus be broadcast to the pilot.

BEARINGS

Technique distributes bearing stress

A bearing raceway that considerably reduces wear, friction and fatigue has been developed at North American Rockwell Corp.'s Autonetics Division in Anaheim, Calif.

The technique relieves bearing stress at the point where the ball rides on the raceway, creating an even distribution of load over more of the bearing. Load distribution is achieved by redesigning the channel in which the bearings move and removing a small amount of material from the raceway. This changes the stress pattern from one of localized stress to one of distributive stress. Thus, the raceway is less subject to failure and can carry greater loads. Lubrication problems also are reduced.

AMMONIA

Production from nuclear energy

The massive future demand for synthetic ammonia for fertilizer in developing countries may require the use of every economically and technologically feasible ammonia process available.

Glenn M. Blovin of the Tennessee Valley Authority, Muscle Shoals, Ala., says the production of ammonia from low-cost electrical energy via the electrolytic hydrogen route is a technologically sound process by today's standards. Using low-cost nuclear electrical energy, this process may well be economically sound soon. Far-term prospects with breeder reactors and gas-phase electrolysis appear even more attractive economically.