

# engineering sciences

## WELDING

### Flaws caught in the act

A monitor which can detect flaws which form in a weld during and immediately following a welding operation has been developed by Battelle Northwest, Richland, Wash.

The monitor makes use of the strong correlation between internal weld defects and acoustic emission during and for 20 minutes following welding. The sounds a welded material emits result from deformation or fracture as it cools.

According to Battelle engineers, it takes from 20 to 45 seconds for the acoustic emissions to become identifiable as the weld begins to cool. The acoustic emission rate in a defective weld increases as the defect region cools, reaching a peak at about 400 degrees C. The amount of acoustic emission is directly related to the size and number of defects in the weld.

In use, acoustic emission sensors are mounted on the material being welded, and connected to a chart recorder. Thus the welder can check his welds as they are completed to determine if any have flaws.

Battelle claims that the method will find flaws or cracks not detectable by radiographic inspection.

Other applications of acoustic emission monitoring may include: prediction of failure in pressure vessels and piping; in-flight detection of aircraft structural fatigue; detection of stress-corrosion cracking; quality control of spot-welds in aluminum, and crack detection in brazed and welded joints in various metals.

## AUTO SAFETY

### Penetration-resistant windshield

The penetration-resistant windshield safety glass installed on all American-made cars since 1966 has resulted in a marked reduction in the number and severity of head injuries sustained by front-seat occupants in auto accidents, according to Cornell Aeronautical Laboratory, Inc., in Buffalo, N.Y.

The safety improvement has been greater in standard-size U.S. cars that have continued to use a rubber gasket in mounting the windshield in its frame, rather than switching to an adhesive bonding installation as most automakers have done.

The windshield consists of a thicker (0.030-inch) plastic material, with controlled adhesion properties, sandwiched between two one-eighth-inch sheets of plate glass. The reduced adhesion of the plastic interlayer to the glass permits the interlayer to flex away from the glass when struck, rather than shear as the glass breaks on impact.

## POWER

### Commercial fuel cells

Fuel cells capable of generating electricity directly from natural gas in the home, factory and office should be available in the United States within a year, says a representative of the American Gas Association, which is supporting their development.

M. V. Burlingame told the annual convention of the Australian Gas Association meeting in Brisbane, that the fuel cells should be competitive in price with conventionally generated electricity within two or three years. Burlingame is president of the Target-Team Advancing Research for Gas Energy Transformation in the U.S., and is a former vice president of the Natural Gas Pipelines Co.

He says the fuel cells will combine natural gas and air electrochemically to produce electric energy. They are now being developed to use methane-based natural gas, but could be altered to burn other gases, including coal gas. The electricity produced is expected to be competitive with the average U.S. cost of two cents a kilowatt hour for conventionally generated power. Burlingame says the fuel cells would probably be leased to users.

## MOTION PICTURES

### Movies in 3-D

A new system permits any movie film ever produced, whether for commercial or home use, to be projected in 3-D. The image is formed on a conventional metallized screen by means of special projection equipment developed by Fairchild Hiller Corp., Germantown, Md.

The new system, said to eliminate the problems presented by earlier 3-D movies, uses only one projector instead of two, thereby precluding any concern for synchronization by the projectionists. A series of lenses and mirrors in a standard projector splits a frame image into three separate scenes and then combines the three into one image that is slightly off-register, and this gives the 3-D effect. Viewers wear injection-molded plastic-frame polarized glasses, with clip-ons available for persons using prescription lenses.

## MEDICAL ENGINEERING

### Portable isolation ward

A portable isolation ward for patients requiring complete isolation during military airlift operations has been developed by Chrysler Corp. in Detroit, Mich., for the Air Force.

The portable litter unit provides a bacterially isolated environment for patients who are susceptible to outside contamination or infection or who have contagious diseases.

Each unit consists of two basic parts—a disposable isolation enclosure for the patient, and a reusable self-contained environmental system. The disposable enclosure has a fire-retardant plastic covering and supporting framework fitted to a standard military litter. Special plastic endboards at the head and foot of the litter contain bacteria- and odor-removing elements. The inflatable sheath contains gloves and ports through which the patient can be reached by hand.

The self-contained environmental control system includes separate modules for air conditioning, oxygen therapy and electrical power. This system maintains proper temperature, humidity, oxygen and carbon dioxide levels.

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