

## TECHNOLOGY

# New Rubber for New Tires

Radial-ply tires, the European standard for 20 years, are making their debut in the United States and may cause radical changes in the rubber industry—By Jonathan Eberhart

➤ A 20-YEAR-OLD European way of making tires is starting to stir the vast U.S. rubber industry.

European tire manufacturers have been making radial-ply tires, in which the plies are arranged at right angles to the direction the tire rolls, since the 1940's. Only in the past few months, however, have American companies taken tentative steps away from "bias-angle" tires, which have plies running at about 36-degree angles from the centerline of the tread.

Firestone marketed a few radial-ply tires in the smaller sizes last January, and B. F. Goodrich, Goodyear and U. S. Rubber are joining in on a limited scale.

The rubber industry shakeup began with the discovery that the synthetic rubber, which makes up 75% to 80% of any bias-angle tire, may not be the best thing for radial-ply tires. The synthetic now used for most domestic tires is called styrene-butadiene rubber (SBR), and it accounted for more than half of all the rubber used in the United States last year—real or synthetic.

The main problems with SBR are that it has poor "building tack" (a measure of how well the rubber sticks to itself) and relatively low "green strength" (the strength of the unvulcanized rubber). Rubber with low green strength tends to rupture while a radial-ply tire is being built, causing the cords in the carcass, or body, of the tire to become disarranged.

Several other synthetics appear to be in a position to challenge SBR for the huge tire market, if radial-ply tires are agreed upon by manufacturers as the way to go. The problem was outlined in *Chemical and Engineering News*, 43:16, 1965.

Goodyear and B. F. Goodrich favor polyisoprene (Goodyear calls it Natsyn). U. S. Rubber Co. is spending vast sums in the development of its ethylene-propylene terpolymer (EPT), although other tire makers have criticized U. S. Rubber's type of EPT. Firestone does not face as pressing a problem as some other manufacturers, since a large part of their rubber plantations are in politically stable countries, such as Liberia. (Politics is often a critical problem for the rubber industry. Goodyear, for example, has lost several plantations in Indonesia.)

Firestone's large use of natural rubber means that they may be able to forestall the selection of a synthetic for several years, at least until general industry trends are clear. General Tire and Rubber Co. will make no statement.

The advantages of radial-ply tires are not vague scientific factors visible only to engineers with batteries of instruments. All of these advantages stem from the fact that radial plies let the tire roll more easily. To

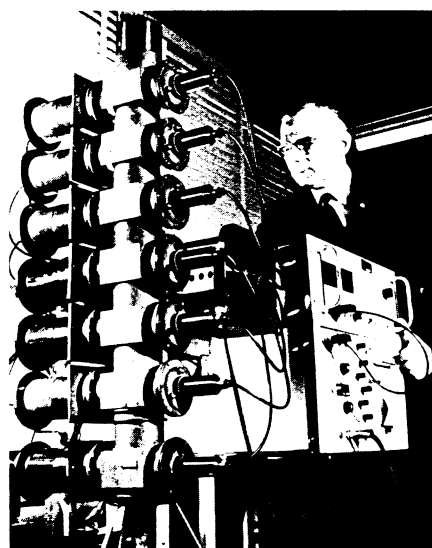
see why, roll a pencil across a table. Then turn the pencil at an angle, but try to keep it rolling in the same direction. The result is a sort of half-roll-half-skid. This is the effect on the plies inside the tread of most American bias-angle tires.

The free rolling radial-ply tires have as much as twice the tread life of conventional designs. Fuel consumption goes down, and safety and comfort are improved. Directional stability, such as when driving in a cross-wind, often increases.

There are two disadvantages that are causing auto and tire manufacturers to think twice, or even three times, before making the switch to radial plies.

American drivers are used to extra-soft, luxurious rides on soft springs and resilient shock absorbers. Radial-ply tires, however, give a somewhat harsher ride at low speed than conventional tires, unless changes are made in the suspension system of the car. This is why early marketing efforts by domestic tire makers have been limited to small sizes for compacts and imported cars that already have suitable suspensions.

The other reason for industry reluctance is simply that radial-ply tires cost more to make. They cannot be made on the same



Battelle Memorial Institute

**FOG 'SCREENING'**—The seven-chambered device developed by the Battelle Memorial Institute, Columbus, Ohio, for fog researchers of the U.S. Air Force is demonstrated by Earl J. Schulz of Battelle. Called a "light-scattering cascade impactor," the unit screens fog droplets by size as they pass through the chambers. It also measures fog concentration.

equipment used for bias-angle tires, and an additional step is necessary in the manufacturing process.

What will rubber companies do? Once the design and manufacturing problems have been licked, the rubber industry will find itself sitting on the hot seat. If costs can be reduced, which seems likely at least within the next decade, radial-ply tires may dictate the elastomer that will be the primary material for the entire industry. Consequently, the tire and rubber companies want to be ready in advance with the right choice.

EPT, polyisoprene, or even ordinary old SBR with a few additives are all candidates for the job. Bias-angle tires will no doubt be around for some time, but as soon as one automobile manufacturer provides radial-ply tires as original equipment, the rest will be close behind, and the tire-and-rubber folk have quite a guessing job ahead of them to be ready when the time comes.

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## GEOLOGY

## Mine Disaster Warnings Forecast by Geologists

➤ GEOLOGISTS are coming closer to telling when the earth might shift in mines and cause future disasters from falling and bursting rocks.

Safety precautions were taken in the Sunnyside Coal Mines, Sunnyside, Utah, last November after a warning was received several days in advance from geologists with the U.S. Department of Interior's Geological Survey.

By analyzing the shift of the number and intensity of earth tremors from one area to another, survey geologists Dr. Frank W. Osterwald and C. R. Dunrud predicted a series of spontaneous rock bursts and falls in the coal mines.

The violence of individual bursts of rocks generally increases shortly after a decrease in the numbers of earth tremors recorded on sensitive seismic instruments, the geologists told the 94th annual meeting of the American Institute of Mining, Metallurgical and Petroleum Engineers in Chicago.

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## PHYSICS

## AEC Reactor Achieves Highest Neutron Flux

➤ STABLE operation of one of the Atomic Energy Commission's production reactors at the Savannah River Plant at a peak flux of four and two-tenths quadrillion neutrons per square centimeter per second was achieved on March 4. This is the highest flux level ever obtained in a reactor.

Operating the reactor in this manner is planned to continue for several months during a break in normal production operations. The reactor was designed to produce plutonium and tritium for defense purposes.

The high flux method of operation of the reactor was initiated to determine its feasibility for producing curium 244, and possibly other isotopes, more efficiently.

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