When you want POWER you want PETERS 'High Velocity' |

says Charlie Madsen,
famous Kodiak, Alaska, guide

"When you go up against a giant Kodiak bear, you want your first shot to knock him down for keeps. That's why I use Peters 'High Velocity'. It's never failed me in many years of hunting these giants."

Charlie Madsen is often called "the dean of professional guides in Alaska." He advises hunters to load up with Peters "High Velocity". On one hunt, he says, a 1600-pound Kodiak was stopped with one shot just 35 feet away. That's why Charlie Madsen tells his hunter friends there's no more powerful ammunition in the world than Peters "High Velocity"! For deer, elk, moose, caribou, antelope and other game it packs knockdown, knockout wallop.

ASK YOUR DEALER for Peters "High Velocity" big-game cartridges. They give you a wide variety of bullet types and calibers. Peters "Inner-Belted" or Protected Point Expanding Bullets penetrate deep...deliver smashing power with minimum disintegration in heavy big game. And Peters exclusive "Rustless" non-corrosive priming gives you split-second ignition.

PETERS packs the POWER

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DU PONT MAGAZINE

JAMES H. McCORMICK, Editor
Associate Editors, GORDON H. KESTER
MARY ELLEN EVANS

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This 10th in a series of articles on

Du Pont research looks in on the men, ideas and work behind

The world of plastics

Exploratory research on polymers may give birth to new plastic with exciting possibilities.

By MARY ELLEN EVANS

Many a man reading these words can remember the day when that example of devilish discomfort, the celluloid collar, was also an example of the only synthetic plastic in existence. As an industry, modern plastics have skyrocketed. As materials for everything from kitchenware to chemical plants, they touched off a revolution in the late '30s that shows no signs of abating.

Last year, the Society of the Plastics Industry estimates, production of synthetic resin toed the three-billion-pound mark. That's a 30 per cent increase over 1952 and
more than five times the volume of ten short years ago.

Talk to an engineer or architect who’s given to forecasting and he’ll paint a picture of whole systems of chemical processing equipment of plastics, homes and offices floored by pumping a liquid resin into a cast, plastic mortar and prefab walls containing foamed-in-place insulation. He’ll also remind you that cashing in on many of the future possibilities for plastics will require a greater knowledge of these complex materials than anyone now has, plus perhaps many more plastics than are currently bubbling in scientists’ brains.

No one knows these facts of life better than the Du Pont researchers who work daily in plastics for engineering materials, finishes, coatings, films, fibers, elastomers, adhesives and laminates. This article cannot cover the entire field but will take a look at research on synthetic resins which can be extruded, molded or cast.

Starting both from market needs and from what is termed exploratory research, chemists in the Polymers and Chemical departments are aiming at such goals as:

- Polymers for mechanical applications that will bear great stresses in service with little deformation.
- A polymer with strong adhesion to glass or metal for reinforced plastics.
- Finding the relation of polymer structure to weatherability so scientists may synthesize polymers for longer outdoor life.
- Heat-resistant polymers easily fabricated at reasonably high temperatures. (That no kitchen baking dish is made of plastic points up the fact that there is now no resin material that doesn’t decompose chemically or lose shape.)
- Casting resins with low viscosity, low shrinkage, low heat evolution, and generally good properties.

“We became convinced some time ago we could advance in the making of useful polymers only by first extending our knowledge of the structure of these long-chain molecules. Then we must relate this knowledge both to the conditions of synthesis and to the behavior of the polymer in fabrication and use,” says Dr. J. S. Beekley, director of Polymers research.

Such investigation of the building blocks of polyethylene led to the development of tougher, stiffer “Alathon” 10 polyethylene resin. Learning to control properties of polymers may be a big step toward creating ideal materials for specific jobs. For, as in all plastic materials, usefulness is lodged in their physical properties, and these properties depend on the physical properties of the base polymer.

“GET OFF BEATEN PATH…”

Du Pont men in exploratory research are encouraged to get off the beaten path to try new architecture for molecular structures, new catalytic reactions, new methods of polymerization. It may be months or even years between the creation of successful materials such as “Zytel” nylon resin and a new polymer in development that appears to have some outstanding properties.

Some physical work as well as organic chemical synthesis is included in exploratory research. Fundamental physical chemistry studies are now aimed at establishing a molecular structure that needs no additives to make it resistant to weathering. What the researchers hope to be able to say is that a certain chemical structure will give them a polymer whose life can be predicted under certain weathering conditions.

After a new polymer is created, the general research section of Polymers asks the big question, “Does the new material have worth-while properties?” Is it different from materials already made by Du Pont or its competitors? If the exploratory group or Chemical Dept. researchers have changed the molecular architecture, has this changed the physical properties? If so, how much?

INJECTION MOLDING, a common method for forming plastics, tests new resin candidates.

COMPRESSION MOLDING machine in application lab also helps researchers determine ways to fabricate plastic.
Research is very concerned with this relationship. The chemical-physical testing group also asks why the plastic has certain properties. The goal is to relate the molecular structure to properties so they may predict what must be done to the polymer to get superior properties. How can they put the bricks together in a different way for a better house? Complex apparatus which measures molecular weight by light scattering and by osmotic pressure helps tell the scientists how the molecules are put together.

In one laboratory what looks like the control panel of a space ship is actually a series of instruments to measure electrical properties of plastics. As one man pointed out, a vast store of knowledge has been acquired and published on measuring electrical properties. For determining the mechanical properties of plastics, scientists are still near the beginning. Plastics are new kinds of materials; they are both viscous and elastic. Physicists and chemists have done much work on viscous materials and much on elastic materials. But here for the first time they are inherently combined in a single material. To speed their knowledge of physical properties, researchers are using an analog computer to translate lab findings into electronic terms which are known and understood. Giant electronic brains are also used to work hypothetical problems or compute formulas that would take human brains months or even years. Said one scientist: "Machines can do the routine; men can be free to think."

**FROM COMBS TO PIPING**

After a polymer is nominated for development and its properties are fairly well established, the application section of Polychemicals goes to work on the material to see how it handles in existing machines and how the customer or customer's customer might process it. They make everything from combs (a good first-test form) to dishes, piping, gears, trays and wheels. Formed in customer molds, the new plastic is field tested in such applications as gears, knobs for car gearshifts, plates, bristles, shower heads, wheels for supermarket baskets, fruit knives, tumblers and parts for typewriters. What happens when a material doesn’t fit the pattern of processing for known plastics? For example, "Teflon"
tetrafluoroethylene resin is a plastic that does not actually melt but forms a gel. Extrusion techniques for known plastics didn’t work with this tough candidate. Wholly new processing techniques had to be developed or “Teflon” wouldn’t have gotten out of the lab-curiosity category. Trying methods that were closer to those of metallurgy than conventional plastics, researchers worked out extrusion of the molding powder under pressure in heated dies and extrusion of thin sections from a lubricated paste of “Teflon”.

The Engineering Dept. of Du Pont is concerned with plastics as construction materials. Their research section studies plastics to obtain more specific information from an engineering angle. Where appropriate, plastics are used in construction projects, and from experience new data are assembled. Last December the department compiled a manual for the Company’s engineers. It aids these men in the selection of materials by listing properties of specific plastics and how they have behaved in use, ranging from electrical conduit sheathed with “Alathon” polyethylene to gaskets of “Teflon” and chemical tanks of reinforced polystyrene.

The Electrochemicals Dept.’s monomethyl dimethyl hydantoin (MDMH), an odorless formaldehyde donor, is well past the laboratory stage as a chemical used to harden proteins such as casein into plastic materials. In addition to its interest in formaldehyde products, Electrochemicals continues work on “Elvanol” polyvinyl alcohols for the manufacture of oil-resistant films and other plastic articles. The research divisions of several Du Pont departments are also concerned with the investigation of new intermediates for resinous materials.

NEW FLUORINE MONOMERS

At the Jackson Laboratory of Organic Chemicals, scientists are drawing on their long experience with the “Freon” fluorinated hydrocarbons to synthesize new fluorine monomers that may provide new plastics for the future.

The Organic Chemicals Dept. has been engaged in much research on the chemistry of isocyanates. Among the valuable new products made from Du Pont isocyanates are resilient and plastic foams. Such foams are made by reacting a disiocyanate with a resin, water, and a suitable catalyst. Within a few minutes carbon dioxide gas forms and causes the liquid to foam as it hardens.

By adjusting the type of resin and disiocyanate and by changing their proportions, a variety of foams may be formed. Rubberlike foams made in this way have outstanding ability to carry loads even though they are very light in weight. The rigid or semirigid foams are tough and resistant to vibration. Some are going into aircraft construction and other assemblies which must combine light weight with high strength and durability. Others are being used for insulation. The fact that foams can be made at room temperature and easily produced in place around complicated structures makes them more attractive economically.

How much farther plastics will go is a question to be answered by industrial and consumer needs and by what the researchers find in the small but rewarding world of the man-made molecule. The celluloid collar is already far behind.

Dr. John F. Lontz measures pipe of “Teflon” made by paste extrusion, a process he developed. Lubricated powder is preformed, then extruded under pressure.
Building in the Arctic

"Must have been mighty cold up there."

That's still the first statement most friends make when they hear you've traveled to Alaska. And as you describe your trip, you try to set them straight.

"Yes, it is cooler there," you admit, "but for every summer night when the temperature falls below 50 or 55, you'll catch a day when the mercury is 85 or 90."

Misconceptions about Alaska's temperature are easy to understand. For example, temperatures of 40 and 50 below are not abnormal for an Anchorage winter, but July and August are often hot. Their annual temperature range of 130 degrees is more than a topic for conversation; it governs outside work in our northernmost territory. Construction work, for instance, literally freezes up during the black Arctic winter. The problems of one typical Anchorage construction company—and how it solves them in building roads, plane taxiways and parking strips at nearby Elmendorf Air Force Base—will show you what we mean about temperature calling the signals in Alaska.

Emmett V. Roetman, mechanics superintendent charged with the responsibility of keeping Birch, Lytle Green Co.'s construction equipment running smoothly, calls the punchins in his company's battle against the weather. Birch, Lytle Green is at work long before snow disappears in the spring, and keeps pushing until dirt freezes brick-hard in the fall. Night temperatures hit 25 regularly, and sometimes fall below zero before the company calls a halt. Roetman and his men occasionally drop a round in the fight, but now they've worked out a maintenance program that takes care of most contingencies.

Cold weather protection is needed for 95 per cent of Birch, Lytle Green equipment.

The list includes some 160 tractors, trucks, earthmovers, welding machines, electric power plants, air compressors, rock crushers, asphalt plants, shovels and cranes.

"Early in the fall," Roetman said, "mechanics make on-the-job inspections and necessary repairs to the cooling systems of all water-cooled equipment. Then we protect with our premixed solution of 'Zerex' antifreeze and water. The premixing is done in our main Anchorage shops, saving time, trouble and possible errors on the construction site.

"I've spent my share of time sweating over equipment," Roetman continued. "I know how much it means to our maintenance men to have nothing more to do than pour in a premixed antifreeze solution."

Birch, Lytle Green also are convinced they save money and time with Du Pont antifreeze. "It took cooling systems off our headache list," they say. "We no longer have failures from hot spots, rust or corrosion. The chemical rust inhibitor in 'Zerex' premixes thoroughly with water and doesn't settle out in storage."

The pay-off came this past spring when maintenance crews overhauled a number of tractor and compressor motors. Every cooling system was clean and in good shape. "We can't ask for more than that," said Roetman.
New developments in jersey are making it an attractive fabric this fall for men's, women's and children's apparel. America's knitting mills have added practicality and new luxury to this fabric by blending "Orlon" acrylic fiber and wool. The addition of "Orlon" makes it washable. New, improved yarns that have more bulk give it a cashmere-like hand. Colors are vivid. Printed patterns, never before used on jersey, and many different textures give it new variety and versatility as a fabric for the whole family.

Available in a blend of 80 per cent "Orlon" and 20 per cent wool, the knitted fabric is a boon to busy wives and mothers who can take care of sports shirts, blouses, robes and children's clothes in short order. Even after many washings, the jersey keeps its softness and shape, resisting shrinkage or stretching. It drapes well, which means that designers of women's apparel can use the same fabric for both casual and sophisticated designs. And it can be durably pleated, even in the narrowest of accordion pleats, thanks to the "Orlon" fiber in it.

"Orlon" fibers are precision controlled in manufacture and dyeing. Jersey incorporating these fibers can be produced in all the most wanted shades for fall. Solid colors range from black and gray to brilliant shades of orange, green and red. A mixture of colors in heather tones is popular. Printed jerseys include checks, stripes and lacy patterns on colors.

This blended jersey is ideal for travel whether it's in a man's sports shirt or a cocktail dress. It packs compactly and resists wrinkling, the bane of travelers. Sports shirts, now on men's wear counters, are colorful in patterns borrowed from the classic Scandinavian ski sweater, in other patterns, and in solids. They wash easily, dry fast and keep their shape without blocking.

Luxury with practicality is what consumers have come to expect in wearing apparel these days. Jersey of "Orlon" and wool was developed to fulfill their expectations.

Colorful, luxuriously soft and washable, jersey of "Orlon" and wool proves ideal for travel. Shown are sports shirt and dresses of this popular new blend.
Evaporating washday drudgery

How a Dakota farm boy’s ingenuity paid off for the housewife

When Ross Moore was a boy on a farm in North Dakota, one of his chores was bringing in the laundry from the back yard clothesline. Young Moore was dutiful, but he didn’t relish this task. Even red flannels were hard to get off the line when the temperature dropped to 40 below.

As Moore grew older he decided that washing and drying clothes was drudgery no housewife should have to endure. He figured that in a year’s time she used up enough energy to shovel eight tons of coal, and that she walked 25 miles and lifted two tons of clothes. By his late teens he had rigged up a gasoline-driven washer and a drying room for his home.

Memories of helping with the family washing stayed with Moore after he became an engineer. He noted that washing machines were appearing in more and more homes, but women, and perhaps small boys, still made hundreds of trips to the clothesline. Why didn’t someone invent a home clothes dryer?

In the early ‘30s, after several years’ designing, Moore built an electric dryer which sent warm, dry air through toased laundry. It looked like a crude drum, but it dried clothes. The inventor was sure he was on the right track for a useful appliance. Manufacturers, however, took a dim view of the contraption. It wouldn’t sell, they contended. Finally, a Minneapolis company agreed to make the dryer. Things were going well for the appliance when hard luck hit the company and it went out of business. Moore was about where he started.

At this time, Charles Melka, a Du Pont finishes salesman, heard of Moore’s ill-fated invention. He suggested to the well-established Hamilton Manufacturing Co. of Two Rivers, Wis. that they take a look at the
North Dakota engineer’s clothes dryer.

Appliances hadn’t entered the manufacturing picture at Hamilton, but almost everything else had. Started in 1880 by J. R. Hamilton, an expert carpenter in a sail factory, the company first made wooden printing type. From a one-room business it rapidly expanded to include the manufacture of furniture and equipment for printers, dentists, draftsmen, surgeons, laboratories and libraries.

It was 1938 when Hamilton looked at the clothes dryer, saw its possibilities as an appliance, and brought both the invention and the inventor to Two Rivers. Moore and the company’s researchers improved the design of the machine, and Hamilton introduced the first home clothes dryer to be marketed nationally.

During World War II when material shortages stopped production, research on improvements continued at Hamilton. The streamlined dryer that made its postwar appearance had a timer for hard-to-dry garments, specially designed drum and baffles for large or small loads, and a germicidal lamp.

When it came to choosing a finish for the metal cabinet of the Hamilton automatic clothes dryer, the researchers selected Du Pont “Dulux” white enamel. They had used “Dulux” for years on the dental and surgical equipment and knew it withstood drugs, cleaning compounds and long, hard wear. It was a natural for the clothes dryer.

As the new appliance caught on with homemakers, the demand for dryers pushed Hamilton’s finishing facilities to the limit. Management looked into the future and decided to build a finishing department as efficient and modern as industrial designers could dream up. The result is a penthouse structure, 53 by 221 feet, atop the metal fabrication plant. Here in a world of overhead conveyor lines, parts for dryers and other metal products move in and out of painting booths with the precision of a line of ballet dancers.

Of special interest is a series of spray booths where the paint is applied electrostatically. By this process, the metal parts are grounded to the conveyor. Each rack in turn trips a switch which opens the valve on the spray guns. The paint spray passes through a negatively charged electrical field, picks up the charge and is attracted to the metal part on the conveyor. A rack-activated switch at the opposite side shuts off paint flow as the enameled part goes past.

Because of the electrostatic charge, enamel particles adhere to the sheared edges in a firm bond as on the flat surfaces. From this spray booth the conveyor travels to a hydro-filter booth where the finish on recessed areas is reinforced by a manually operated gun. After final finishing, the parts move by conveyor into gas-fired ovens, where they are baked for 45 minutes at 280°F. Inspections, assembly, testing of the dryer and a final inspection complete the manufacture of a Hamilton clothes dryer.

To meet the demand for a washer to match the clothes dryer, Hamilton introduced a companion unit in June 1953. At the same time, Hamilton dryers in both electric and gas models were redesigned for installation with the washer. Later in the year additional models of both washer and dryer were developed in competitive price ranges to make the Hamilton line available to varied income groups.

The know-how and efficiency of a Wisconsin company are going a long way toward making a North Dakota farm boy’s dream come true. Washday drudgery is evaporating in the automatic clothes dryer.

Painters touch up recessed areas of dryer parts after “Dulux” enamel is applied electrostatically.

Drum of dryer is added to base as assembly of appliance begins. Hamilton manufactures gas and electric dryers.

At end of assembly line, tested dryers are sealed and packed in protective paper cartons ready for shipment.
Whether king size or mite size, the job is done with

Industry's versatile bristle

By L. J. GRUBER

“Cotton pickin’ hands” are going modern. One of the newest wrinkles in harvesting the fluffy crop is a mechanical picker that uses rotating brushes bristled with “Tynex” nylon filament to remove the cotton from the bolls.

A carpet manufacturer in New York is raising the nap tubes, to clean out scale, dirt and other foreign matter.

The obvious common denominator in these illustrations is a brush, but more significantly a brush bristled with “Tynex”. And it isn’t mere coincidence that finds these bristles in brushes for industry. Practical-minded businessmen have chosen them because their performance means operating economy.

This versatile bristling material made by Du Pont combines many outstanding properties that make it ideal for industrial brushes, whether what’s needed is a soft bristle for cleaning a thin-skinned tomato, a tapered and tipped bristle for a paintbrush, or a tough, stiff bristle for scrubbing iron and steel.

Because it is a man-made material, “Tynex” is uniform in both composition and dimension. A wide range of sizes permits selection of the proper stiffness for the de-
sired brushing operation.

Probably the most remarkable attribute of "Tynex" is its high abrasion resistance. Tests have shown that in rug cleaning, for example, rotary rug-scrubbers bristled with this nylon outlast rotary fiber brushes at least 10 to 1 and in some cases 16 to 1. Floor sweeps bristled with "Tynex" have withstood the daily job of sweeping 12,000 square feet of factory floor space for eight months with less than 1/16 inch of the bristle length wearing away. Such long-life reports are far from isolated.

From the maintenance angle, brushes bristled with "Tynex" present few problems as they absorb no odors and can be cleaned and sterilized easily. They also resist fungi, bacteria, rot and mildew.

"Tynex" also is resistant to strong alkalis, synthetic detergents, oils and greases, even dilute acids. These bristles have a long life and remain stiff when wet, characteristics which are highly important in many phases of industrial manufacturing where brushes are used.

There may be a place in your own industrial task force for "Tynex", as there is in the 3,000 other industrial jobs now being performed by brushes tufted with "Tynex".

rotating brushes in this cotton harvester...

and brushes for whisking dry these cans on a conveyor.

long-wearing "teasels" for raising nap on fabrics...

hose-attached brushes for cleaning trucks, trains...
Surface active agents are tailor-made by Du Pont for...

**Special assignments**

Surfactants or surface active agents, popularly recognized today as detergents that do your laundry, wash your car, or clean your dishes, possess characteristics almost poles apart. The stable compounds may be oil-soluble or water-soluble. They function in hard water or in the presence of acids or salts. It's easy to see why, then, they are at work carrying out special assignments such as wetting and penetrating, foaming, and mixing the unmixable such as oil and water.

One unusual user is the cement industry. An acoustical plaster made by the American Bildrok Co. of Chicago contains a Du Pont surface active agent as a frothing promoter to build volume. This cuts the amount of water needed, thereby reducing shrinkage during drying. Voids result that increase the noise deadening property of the plaster. This same manufacturer is furnishing an insulating roof fill, a very lightweight air-entrained concrete for home construction. Incorporating the air in the concrete makes it lighter, and a lighter steel framework can be used for the building.

Surfactants have found a large use as detergents in clear, cream and paste shampoos. They lather well, clean thoroughly and rinse out without leaving a scum. Most important, they do these things in hard as well as soft water. They also perform in other cosmetic products where stability to light and aging is required. These surface active agents must be free of unpleasant odor, too, and able to maintain the desired color of the product.

An equally important large-scale user of various surfactants is the textile industry. Here they function in dozens of operations such as wetting, dispersing or emulsifying—as detergents, softeners, or leveling and penetrating agents. The diversified line of products made by Du Pont's Organic Chemicals Dept. works for man-
made fibers as well as wool, cotton, silk and linen.

Surface active agents have made possible the recent development of easily applied water-based paints. In this instance they act as dispersants, suspending resins and pigments in a way that gives better appearance and a more even coat.

Metal processors also depend on Du Pont-formulated surface active agents for pickling and for flux baths and metal cleaning. These organic compounds even help the electroplating industry where their wetting characteristics have resulted in improved production.

For maximum effectiveness, cutting oils must spread over an entire cutting surface and adhere to metal parts being tooled to lubricate and cool them properly. In these operations, surface active agents act as mixers or emulsifiers in the cutting oils to make them spread more readily.

Another unusual task of surfactants is to make oil wells better producers. Oil deposits are locked in rock formations, and acid is used to dissolve the rock, freeing the trapped petroleum. By combining a surfactant with the acid, the oil industry discovered, the process is quicker and penetration is deeper.

**INSECTICIDES MORE EFFICIENT**

Surface active agents make insecticides more effective for household and agricultural use. In food processing they assist also in removing dust and fungi from fruits and vegetables. The leather, paper and photographic industries are others that employ surface active agents regularly, and the area of usefulness for these special-assignment chemicals is constantly growing.

Du Pont’s surface active agents, in effect, get one of your cheapest commodities, water, to work harder for you in the interests of efficiency and lower operation costs. The Du Pont Organic Chemicals Dept., always on the lookout for new uses for its line of job-engineered surfactants, is glad to consult with anyone who has ideas or problems concerning their use.

Textile mills use a variety of surface active agents. Here they function in such necessary operations as wetting, emulsifying, softening, cleaning and leveling.
Queen of quarries

At the world’s largest limestone quarry, U. S. Steel turns out safety records
as well as millions of tons of stone a year

By W. L. DEVER

Lake Huron sparkled blue on the horizon the July day that Rogers City, Mich. quarry workers assembled before a railroad flatcar decorated with red, white and blue bunting. On board were the city band and officials, including the U. S. Bureau of Mines’ district engineer.

Said the engineer: “211 quarries were entered in the safety contest in your group... You men, with a record of 1,273,376 man-hours without a disabling accident, easily won the top honors. In your 20-odd year history in these annual nationwide safety competitions, you have won first honors a total of five times...”

As his words faded away, it was clearly a day of miscarriage for Karl Marx, champion of the “oppressed” worker. The pleased faces of the workmen told the story:

Aerial view of 17,000-acre quarry shows screening house, center, and lake boat at dock.
the only thing that's overburdened, knocked around, and crushed at the Calcite Plant of the Michigan Limestone Division of U. S. Steel is high-grade calcium carbonate rock.

Overburdened by as much as 30 feet of sand, gravel, earth and shale.

Knocked around by “Nitramon” blasting agent.

Crushed by the gyratory crushers of this, the world’s largest limestone quarry.

As a source of limestone for U. S. Steel and many others, Rogers City’s sprawling (17,000 acres) operation is essential to the ferrous metals industry. In blast furnaces, limestone helps separate metallic iron from the impurities in the ore. The resulting slag, floating atop the molten metal, is drawn off periodically. Nearly a half ton of stone is needed for each ton of iron. Large amounts also go into steelmaking in open hearth furnaces.

In addition, large tonnages of limestone flow to other calcium carbonate-hungry industries: To makers of portland cement, glass, paper and leather. To farmers as agricultural limestone, a soil sweetener. To the sugar industry for processing and refining beet sugar.

A huge slice of the production pie, some 20 per cent of the total, goes into chemicals. It aids in making bleaching powders and soaps, insecticides and fungicides, lime and acetylene, and an array of plastics, pigments, synthetics, filters and other products.

FRANTIC PACE

The size of Michigan Limestone’s output requires a production pace that, though geared to human safety, is seemingly frantic. Its crushing plant alone produces 4,500 tons an hour, two shifts a day. In the face of this need for speed, the company must deal with an unburied Nature whose ice-sealed Great Lakes rule out winter shipping. Since most of the stone can best be moved by lake boats, the freezing months are the season for overburden-stripping and major plant and equipment maintenance.

Winter finds Rogers City crews busy drilling deep holes, loading them with “Nitramon” blasting agent, setting them off with “Primacord” detonating fuse and “Primacord” MS connectors, and blowing some 2,000,000 cubic yards of debris out of the way. When April comes, actual production will begin.

Blasting isn’t abandoned in the summer. Its emphasis simply changes. Instead of removing useless overburden, crews set out to shatter the limestone payload.

Several quarry faces, cliffs towering up to 115 feet, are drilled with rotary drills at intervals varying with the height of the face. Into the holes goes the Du Pont blasting agent. Then, after the dust of the explosion settles, electric shovels take over, loading the limestone into 60-cubic-yard rail cars. Next stop is the plant, where crushing, washing and sizing take place.

It is logical that a plant with Michigan Limestone’s meticulous interest in production and safety should use “Nitramon”. This blasting agent not only packs enormous wallop, it gives good breakage with a minimum of vibration and a maximum of safety. It isn’t touchy to store, handle, or use.

This pleasantly two-faced character of “Nitramon”, alternating between the lion and the lamb, has helped account for many a well-broken quarry face, and many a beaming human one as the national safety awards were passed around.
A semitechnical progress report on

"Teflon" in the electrical industry

By R. J. WOODRUFF, Jr.

In the family of Du pont plastics which have in various ways made places for themselves in the electric and electronics field, "Teflon" tetrafluoroethylene resin is possibly the kingpin.

To the electrical industry "Teflon" offers dielectric and thermal advantages which cannot be matched by any other single material. It is tough, flexible, and hangs onto these properties over temperature ranges from -450°F. to 500°F. As wrapped tape, as an extruded coating on a wire or as a molded part, "Teflon" is not affected by weather or moisture.

The latter properties prompted the Dixon Corp. of Electrical wire, coated with "Teflon", meets extreme operating conditions with the help of Rube Goldberg's imagination. Wire goes through tests and emerges with insulation unscathed.
Bristol, R. I. to use the plastic as an insulator in the antenna of air-borne electronic equipment used to measure distances. “Teflon” was selected, a correspondent from Dixon writes, because of its excellent electrical characteristics and the fact that it caused little or no wave distortion. Also, “Teflon” does not wet easily, thus minimizing electrical leakage in the rain—a property which was most useful because it also minimized icing.

The Dixon people also report a case where a particular job was impossible until “Teflon” came along. A Dixon customer needed a material for the construction of a high frequency dielectric plate control. The customer’s engineers said the material must have high dielectric and temperature strength, moisture resistance, low coefficient of friction and flexibility. It took “Teflon” to cover the full range of requirements.

Dixon supplies the firm with a shaped unit consisting of a 27-inch rod with a nut on either end. On the individual nuts are spring contacts, and with a turn of the rod the capacitance of the high frequency dielectric plate may be varied. Varying the settings, once a time-consuming operation, is now practically instantaneous.

“Teflon”, which is supplied by Du Pont as a molding powder, an aqueous dispersion, and in powders designed for extrusion processing, can be counted on to meet most of the design problems of the insulation field. Wire and cable can be insulated in thicknesses required by electrical engineers by dip coating, extrusion, calendering, ram or screw extrusion, or tape wrapping. “Teflon” can also be teamed with such materials as glass and metal to meet special insulating problems.

Continental-Diamond Fibre Co. of Newark, Del. is using “Teflon” extensively in insulating tapes for wrapping wires and cables. These tapes provide increased conductor efficiency at high temperatures, and last longer. They give protection to cables used by the aircraft and automotive industries, and to those for heavy duty motor and generator jobs.

The unsupported tapes, manufacturers and industry report, are capable of keeping their original shape and size. This makes for a tighter fit over sharp bends and corners and around odd shapes.

**MINIATURES CHALLENGE DESIGNERS**

The trend to miniaturize circuits some years back sent electrical engineers and designers on a talent hunt among the available materials which would meet the special stresses and requirements of this new field. “Teflon” has been able to meet the challenges because of its inherent heat resistance. Miniature circuits in electronics equipment develop high temperatures and operate under terrific loads. Coaxial connectors, some smaller than kernels of corn, are made of “Teflon”, and small, high-voltage cables are insulated with this resin. Other midsize molded components include tube sockets, insulators, and inserts for coaxial connectors for terminals.

“Teflon”, manufacturers have discovered, works well in tandem with other materials. One lends supporting properties to the other. Lundey Associates of Waltham, Mass., has, along with others, developed a mixture of “Teflon” and silicone rubber to insert in an insulator terminal. In this particular application “Teflon” contributes strength and oil resistance to the part. Lundey also reports that “Teflon” is unaffected in ordinary soldering operations, and that the range of colors in which it can be processed helps greatly in coding the circuits.

In the electrical industry, and in industry as a whole for that matter, what “Teflon” and the rest of the Du Pont family of resins and plastics have done is to stake out for themselves an entirely new classification, that of nonmetallic industrial and engineering materials.

The combination of electrical, thermal, chemical and mechanical properties of “Teflon” makes it ideal for such uses as miniature connector assemblies, electrical wrapping tape, and for wire insulation.
You won't believe your nose

... but it's true. Paint jobs in hospitals, offices, schools and plants can be odorless now

By ELIZABETH ETHERIDGE

Time was when a doctor would rather tackle a stubborn disease than live through a hospital paint job. With the patient there might or might not be complications, but with maintenance painting the doctor could be sure of one thing—complaints. For paint fumes and hospitals just don’t mix.

As antibiotics came to the doctor’s aid in his fight on disease, so another product of research has joined him in his tussle with hospital maintenance problems. Today Du Pont odorless finishes are banishing the traditional odor of paint jobs in hospitals, schools, homes, food processing and manufacturing plants—in fact, anywhere that paint odors and people or products aren’t compatible.

Take, for example, the story of Doctors Hospital, Inc. of Bessemer, Ala., until a few months ago plagued periodically with paint odors. One day on his rounds, Dr. H. C. Springer noticed that a paint project was under way and braced himself for the usual complaints. But when painting was done in the room of an ambulatory patient, plenty able to complain, there was not a word of protest. This peace was maintained later when the hospital was color-conditioned throughout. The secret: Du Pont odorless finishes.

At the new King’s Daughters Hospital, Martinsburg, W. Va., Du Pont odorless paints were used throughout its rooms for 138 patients and its nursery, lobby, lounges, cafeteria and chapel. The hospital’s administrator, Sister M. Theresa, reports that “This was our first experience with Du Pont odorless color-conditioning finishes, and final results have proved very satisfactory. The lack of odor during the actual painting provides the best recommendation for the use of these paints in regular hospital maintenance. In remodeling the old hospital for a nurses home, Du Pont color conditioning will be used throughout the building.”

The $1,600,000 modern hospital was opened last March, marking the culmination of years of hard work by the community, the Sisters of the Holy Ghost and women of the King’s Daughters Hospital Circle. One wing, yet to be completed, will add space for 62 more patients.

The Caylor-Nichol Clinic and Clinic Hospital, Bluffton, Ind., well known in the Midwest, have joined the ranks of odorless paint users. So have the St. Joseph Hospitals of Milwaukee, Wis. and Fort Worth, Tex., a fact which now gives them something more in common than their names.

Although Du Pont’s new finishes are odor-free during application, they develop a slight aroma as the film hardens. As a safety measure, the new paints require reasonable ventilation, even if they do not have annoying fumes.

Just as paint odors annoy the person who is ill, so they annoy the student who must study. More than one school administrator has found this out the hard way.

Luckier than these was Dr. Lewis Carpenter, a young Methodist minister who learned his first lesson in the paint catechism while en route to his new job as president of the National College for Christian Workers in Kansas City, Mo. A chance acquaintance on the train gave him the clue which was to solve more paint problems than he had any idea he would face. The clue was to see a Du Pont paint dealer.

Dr. Carpenter tucked the advice away with the other words of wisdom which are given so freely to a man embarking on a new job. It was only later that he found the advice sound.

Odorless paint used in the college dining room did not disrupt service. And in the classrooms, corridors and dormitories, it did not disturb the students studying for work in churches, schools, and community welfare agencies around the world.

At Memphis State College in Tennessee, officials tell the same story. Classes and office work went on as usual while the Administration Building was being completely refinished from stem to stern.
No paint smell around food at King’s Daughters Hospital in Martinsburg, W. Va. Du Pont odorless finishes in aqua and white were used.

Private room in King’s Daughters Hospital is cheerful with sunlight walls and white ceiling in Du Pont Color Conditioning.

Joining the ranks of doctors and educators as odorless paint users are the businessmen who run the nation’s industries. In food processing plants like theRalston-Purina Co. in Davenport, Iowa or the American Maize-Products Co. in Roby, Ind., odorless paints have made it possible for production and redecorating to go on simultaneously. At Kentucky’s Bowling Green Manufacturing Co. carburetors flowed off the assembly line while paint was flowed on the walls. Meanwhile in Chicopee, Mass. the 600 women employed at the F. W. Sickles Co. paid no attention to the painting around them but kept on turning out parts for television sets.

These stories are being repeated across the nation in any place at all where paint-fumes and efficient production, like oil and water, don’t mix. “Odorless” can be the paint prescription applied to any decorating job where an eye for beauty might be dulled by the sense of smell.

Faculty apartments at National College for Christian Workers, Kansas City, gleam in Du Pont odorless paints.

National College’s Anna E. Kresge Chapel, as well as other campus buildings, reflect good decoration plans.
THE MAGIC BARREL

Take an oil drum and fill it with some samples of the thousands of products derived from oil and natural gas. Then add some showmanlike patter and demonstrations, and you have the highly successful Magic Barrel lecture developed by Du Pont for use by the oil industry which this month celebrates its 7th annual Oil Progress Week.

In the past year the Magic Barrel has been rolled out for some 300,000 members of luncheon clubs, chambers of commerce and other civic groups, and for uncounted millions on about 50 television shows. In the Far North, radio listeners have heard the petrochemicals story on Alaska’s Midnight Sun network. This fall, pupils in New York City’s 230 junior and senior high schools will learn, via the Barrel, how much more oil does than simply power their dads’ automobiles and heat their homes.

Six hundred oil company employees have been trained by Du Pont to deliver the educational talk. These, in turn, have taught others. A group of 40 speakers is being readied to handle the New York school assignment alone. One hundred and fifty Magic Barrels are now in circulation, and another hundred are expected to be made up as the demand increases.

The idea for the lecture originated with Du Pont’s Petroleum Chemicals Division, which supplies the oil industry with tetraethyl lead antiknock fluid, gasoline dyes and antioxidants, and other fuel additives. The Barrel is designed to familiarize people with the wonder world of petrochemistry, in which crude oil and natural gas are transmuted into thousands of useful organic compounds. It is estimated that more than one half of all organic chemicals produced are made from oil and gas.

OIL FOR MORE FOOD

The extra beef and milk you’re having today might never have reached the table if it weren’t for insecticides made from petrochemicals. Horn flies, for example, rob cattle of thousands of gallons of blood annually, and rob them of energy and grazing time, too. They can cause an animal to lose a half pound of weight in a day, and so bedevil a cow that her milk flow is reduced 20 per cent. The oil-derived insecticide methoxychlor is tough on horn flies, yet unusually safe for animals and humans.

Thousands of square miles of Western land are covered with sagebrush and mesquite. The mesquite, especially, costs cattlemen millions of dollars a year in lost pasture. Until recently no method had been found that
was both practical and effective for killing off mesquite. Now such brush killers from the Magic Barrel as 2,4,5-T are turning thousands of miles of brush-covered land into grassy ranges for cattle.

Oil helps farmers grow better crops by providing petrochemicals used in the manufacture of such products as Du Pont “Arasan” seed disinfectant, which protects seed against disease and insures a greater yield for every acre.

Oil products protect food on its way to market, too. Cellophane is so widely used in food packaging that it hardly needs mention. The oil industry now supplies petrochemicals for cellophane and for polyethylene film, which is especially good for wrapping frozen food because it remains flexible at low temperatures.

Speaking of frozen food, the safe “Freon” refrigerant used almost universally today in home and commercial refrigerators and freezers is a child of petrochemistry, too.

**OIL FOR SHELTER**

As you open the door of a modern home and step into the living room, you are virtually surrounded with products from the Magic Barrel. Floors and furniture have protective coatings of paint or varnish, which may use petroleum-derived solvents or thinners. Upholstery and curtains may be of such man-made materials as nylon and “Orlon” acrylic fiber. Furniture may be covered with “Fabrilite” vinyl plastic coated fabric. Nylon, “Orlon” and “Fabrilite” are made with the help of petrochemicals.

Detergents for dishwashing and laundry, the flexible “Dulux” enamel on the stove and refrigerator, vinyl plastic flooring, the finish put on the familiar Du Pont cellulose sponge next to the sink and tub—all are contributions of the Magic Barrel, too.

**OIL FOR CLOTHING**

The leading synthetic fibers, “Dacron” polyester fiber as well as nylon and “Orlon”, are made with the help of oil-derived chemicals.

The list of Magic Barrel contributions to better living stretches on and on: “Zerone” and “Zerex” antifreezes; propellant for aerosols; the nylon gears in mechanisms from speedometers to food mixers; “Alathon” polyethylene resin for squeeze bottles, pipe, and wire insulation; new “Mylar” polyester film, with a tensile strength one third that of machine steel; tough, nonsticking “Teflon” tetrafluoroethylene resin, and “Butacite” polyvinyl butyral resin for safety glass.

Winding up his talk, the Magic Barrel lecturer points out that the Barrel is empty only because of space limitations. “I doubt if we could build a barrel big enough to hold the thousands of different products that are made today with the help of petrochemicals.

“With civilian demands still rising and military requirements impossible to predict,” he concludes, “America’s oil men know that they must continue the search for oil. Their continuing success will play a big part in the success of the nation. And on their continuing success we must depend for the high standard of living we enjoy—with the help of the Magic Barrel.”
What makes you tired?

...this is only one of the many problems of preventive industrial medicine being tackled at Du Pont's new Haskell Laboratory

A couple of years back we talked in these pages about the functions of Du Pont's Haskell Laboratory as they apply to the well-being of Du Pont employees and the public which buys the Company's products.

We characterized the work of the Haskell lab as a type of sleuthing—with reservations; these being that most of the detective work was done in advance. In other words the type of medicine practiced was preventive rather than diagnostic.

The analogy still holds, and we are now pleased to report some physical changes in the shape of a new laboratory, and a widening of responsibility. This past spring the name was changed from Haskell Laboratory of Industrial Toxicology to Haskell Laboratory for Toxicology and Industrial Medicine, which indicates better than a lengthy description, perhaps, the Company's increased and continuing preoccupation with the health of those who make and use the products of industry.

In our earlier discussion of the Haskell lab we noted that it was housed on the fringe of the Experimental Station area, practically within sight of the Du Pont Building in downtown Wilmington. The facilities and staff are now installed in a new one-story, air-conditioned building located in a grove of native trees near Newark, Del., about 17 miles from Wilmington.

And by way of a progress report we can announce the addition of a new line of research—physiology—to the four major efforts, toxicology, biochemistry, pathology and physics, into which the broad attack on the problems of preventive industrial medicine had previously been divided.

This newest effort, physiology, is worth special attention because of the startlingly large area it is attempting to cover: the health, comfort and welfare of an individual at work anywhere, and under any manufacturing conditions.

WORK ENVIRONMENT STUDIED

The staff devoted to the study of daily work environment is trying to discover why and how a man gets tired, which may sound naive in the extreme. A Haskell scientist will tell you it is not. Temperature, humidity, clothing, perhaps even the odor of the chemical he might handle are contributing factors to fatigue. Perhaps the way he works, whether stacking boxes or reaching high for a valve cutoff handle, is wrong.

The $2 million price tag on the new laboratory in-

Clothing, heat and humidity play part in fatigue studies—part of program to find why people tire.
cluded the installation of some marvelously sensitive equipment for measuring the physiological stresses that crowded in on a man working at a specific job. At the new Newark lab researchers can duplicate the employment atmospheric environment of any section of any Du Pont plant, whether in upstate New York or eastern Texas. Laboratory technicians, both men and women, pedal endless miles on bikes that go nowhere or on treadmills in one of two "all-weather rooms." They may be battling below-zero temperatures in parks suits and mittens, or sweating out 90° or better temperatures with the humidity about as high. The clothing they wear may be of natural or synthetic fibers. The point is to discover, within the closest limits possible, the temperatures and the clothing which will keep a man most comfortable. For there is a correlation between comfort and fatigue.

Similarly, a triangular platform supported by a complicated array of quartz crystals can be so sensitively adjusted as to graph the effort expended in any motion made by a man standing on the platform. The object is to develop more efficient and less tiring ways of doing a specific job.

There are practically no limits to the amount and type of research along these lines that will be covered in the foreseeable future, for the quest is now in the realm of variables, not constants.

Otherwise the four basic lines of research are being pushed as vigorously, or more vigorously, than when we last reported.

**INFLUENCE REACHES BEYOND PLANTS**

Since more than 90 per cent of the sales of products manufactured by Du Pont are of items that go to others for processing, the influence of the Haskell Laboratory must reach far beyond plant walls. Broad experience has associated certain groups of chemicals with potential danger, both to the Du Pont people who make them and the employees of the customers who process them. The ingredients of soaps, cleaning solvents and aerosol products are typical. The Haskell people run tests on agricultural products, for example. Such research showed that a new fly spray for cattle containing methoxychlor will not pass toxic properties along to the raw milk or meat.

Safety for employees has been a fetish with the Company since the days when Eleutheria Irénée du Pont took what nowadays seems to be an elementary precaution; the small buildings in which he made black powder were widely spaced along the banks of Brandywine Creek in Wilmington. Later a descendant, Alfred du Pont, called a halt to the manufacture of a promising new explosive because in confined spaces, such as in ship cargo holds, the vapors constituted a danger to the crew.

This early display of "responsibility," as Du Pont President Crawford Greenewalt noted in a talk dedicating the new laboratory last spring, marked the first stirring of policies which have been adopted by Du Pont and the chemical industry for the public welfare. The work of the Haskell Laboratory, he pointed out, is a projection of this basic thesis.

Haskell and toxicology labs of other companies test safety of detergents before selling to consumer for home use.

Inhalation toxicity check helps determine safety of dust or gas.

Blood pressure of men, dogs checked by same technique. This study helps add to knowledge of new chemicals.

Checking toxicity of chemical. Test will indicate whether or not it is likely to irritate human skin.
Remington Arms Company, Inc. announces the development of a tough, flexible wad made of Du Pont “Alathon” polyethylene resin for use in Remington and Peters trap and skeet shells. The new wad gives a tighter gas seal as it propels the shot out the gun barrel, improving the shot pattern at all ranges. The shock-absorbent plastic also reduces gun recoil.

In the days of smooth-bore muskets, a Remington spokesman recalled, hunters resorted to a variety of materials as wadding for their loads of powder and shot. The paperlike nests of wasps, as well as dry leaves, grass and paper were used by these muzzle-loading pioneers.

Through the years of development in shotgun shell manufacture, still other materials have served as wads. Rubber was used at one time, and thin wooden discs at another. More recently, wads of cardboard, wood fiber composition and felt have been standard shell components.

The polyethylene wad, called an “H” wad because of its appearance in cross section, forms the center of a new and highly efficient wad column. It rests between a springy under-the-shot or front wad and an over-the-powder wad impregnated with a hydrocarbon compound for barrel lubrication.

When the shell is fired, expanding powder gases thrust against the three wads, squeezing them into a single column and forcing the shotgun pellets out of the barrel.

Just as piston rings follow the contours of a cylinder wall to provide a tight seal, so the flexible “H” wad adapts itself to variations in the gun barrel, preventing any blow-through of the powder gases and consequent loss of power.

This tight seal insures that the shells will perform uniformly shot after shot. The lighter recoil resulting from the plastic wad also pays off in less fatigue for the marksman engaged in lengthy tournament firing.

Remington ballistics engineers are hailing the new polyethylene wad as the most important advance in shotgun shell construction since Remington introduced the flat top crimp in 1940.
Japan's Mr. Documentary

Unlately Japanese promotional films were pretty much confined to the sun-sinking-in-the-west variety of travel short designed to lure tourists. Now a growing tide of industrial, educational and instructional films is flowing from the islands and winning critical praise abroad.

The man largely responsible for the growth of Western-style documentaries and industrial films in Japan is 46-year-old Ian Mutsu, British-born son of a Japanese diplomat.

Mutsu emigrated from London to Tokyo in 1931 to launch a career as reporter and photographer. During World War II he was held by the Japanese as an enemy alien, a fact resented by Mutsu mostly because it prevented his taking pictures.

After the war he got into the movie business with two documentaries, "Japan Awake" and "For the Four Freedoms," both strongly pro-Allied. In addition to industrial films promoting such Japanese activities as cotton spinning and shipbuilding, Mutsu and his staff have since made "Meet the Watanabes," a story of Japanese family life, and a training film on weapons operation for Japan's Self-Defense Force. His cameramen also cover the Far East for foreign newsreel companies; they exposed more than 10,000 feet of film monthly in reporting the Korean War alone.

"It's no exaggeration to say that some of history's most exciting war scenes have been shot on Du Pont 'Superior' 35mm film," Mutsu says. "By the way, I've used your excellent films, 'Superior' 2 and 'Superior' 3, ever since I began making movies."

May Day, 1952 found newsreel photographers covering Communist-inspired riots in Tokyo.

Mutsu covers Far East for foreign newsreel firms.
Re-use cardboard containers by spraying markings with Stencil Kover by Reynolds.

NEW AEROSOLS

More new push-button products have appeared on the market to make jobs of home and industry quicker and easier.

Take the problem of applying a harmless hotfoot to roosting birds. Today you may put Roost No More bird repellent on ledges and gutters. It's a gelatin compound made by National Bird Control Laboratories, Skokie, Ill. Feathered friends find it disagreeable underfoot and promptly change their landing fields.

If you throw away containers because they are covered with shipping stencils, you can re-use them by covering the markings with Stencil Kover in an aerosol by Reynolds Ink, Inc., Cleveland. In 90 seconds, spray on a new stencil using any of Reynolds' colored stencil inks.

An aerosol paint remover produces a slushy white foam that removes paint and varnish fast and efficiently. Made by Bostwick Laboratories, Inc., Bridgeport, Conn., the new paint remover is nonflammable.

Continental Air Filters, Inc., Louisville, Ky., now sells E-Z Oil in an aerosol for quick recharging of permanent furnace and air-conditioning filters after cleaning.

For all these aerosols, Du Pont furnishes "Freon" fluorinated hydrocarbon propellents.

Apply Roost No More to ledges, and unwanted birds will seek other perches.

Spray the clean, dry filter with E-Z Oil. No draining is needed before installing.

Remove paint and varnish by spraying area with foam that causes finish to blister fast.

Scrape off blistered paint or varnish with spatula. Remover is extremely easy to use.
Fabrics that fly

Two Du Pont coated fabrics have taken to the air in planes that have set impressive records for themselves.

The Bell Aircraft Corp.'s rocket-powered X-1A zoomed through the California sky at 1,650 miles an hour on December 12, 1953. This speed is two and one-half times the speed of sound and 300 miles an hour faster than anyone had ever flown before. Recently, the same plane set an altitude record reported to be 90,000 feet.

The X-1A is not intended to be a tactical plane. Its purpose is to use the sky as a giant wind tunnel to solve the problems of high-speed flight. Although the X-1A is essentially the same as an airplane built by Bell for the Air Force in 1945, the main advances are that the new plane has increased propellant tank capacity and is equipped with a turbine pump to force-feed the rocket propellants, made up of liquid oxygen, alcohol and highly concentrated hydrogen peroxide solution.

Here is where a Du Pont coated fabric entered the picture. Bell engineers chose "Teflon" polytetrafluoroethylene coated glass fabric to enclose glass wool insulation blankets for the oxygen lines and tank ends. Should a leak occur, ordinary insulation materials in contact with the propellants would create a fire hazard. The fabric coated with "Teflon" is not attacked by any of the three propellants. The insulation is so effective at the extreme temperatures of liquid oxygen, which boils at −297°F, that it prevents excessive loss through boil-off. Bell engineers worked out a method of heat sealing the insulation blankets to exclude moisture.

Bell also has built a twin to the X-1A. Still to be flight tested, it is the X-1B which incorporates further advancements in instrumentation.

When Douglas Aircraft Co. fitted out the DC-7, that giant airliner that hops across the U. S. A. nonstop, its engineers chose only those materials that rated highest in laboratory and field tests. Du Pont's "Fabrilite" vinyl plastic coated fabrics, for example, had already flown millions of miles in United Air Lines DC-6s and DC-6Bs. So when United and Douglas got together on the DC-7 Mainliners, "Fabrilite" again went to work.

The pilot's compartment may not be too familiar to passengers, but the safety and comfort of the pilots are important to anyone who flies. Even the compartment's wall lining should be a material that is lightweight, flame resistant for ashtray areas, readily cleanable, easily worked into recesses such as the housing for the nose gear steering wheel, and attractive. "Fabrilite", an old hand at meeting these requirements, got its flight ticket and went to work in United's Mainliners.

"Fabrilite" lines the pilot's compartment in United's DC-7s that cross the country nonstop.
**What's New**

- **A THREE-DIMENSIONAL COLOR CAMERA**, the "Linxer", made by the Lionel Corp., Irvington, N.J., utilizes five parts molded of Du Pont "Zydel" nylon resin. The low-priced camera is designed for 16mm unperforated color film and is small and relatively lightweight.

- "**ORLON**" ACRYLIC FIBER hits the fall market in several new uses. New hand-knitting yarns of "Orlon" are sold under the Chadwick's Red Heart label. Produced by Coats & Clark, Inc., New York, the yarns are three-ply and are especially suitable for dresses, sweaters and baby garments. Also introduced for fall are blankets of "Orlon" made by Princeton Knitting Mills. The new blankets are light in weight, washable and soft to the touch. A luxurious fabric of "Orlon" and cashmere, called Fonderna, is making coat news. Made by Elsinger Mills, New York.

- **BULK SHIPMENT OF GRANULAR** or powdery materials may now be made in these 2,500-gallon neoprene and fabric drums developed by United States Rubber Co. The containers can be collapsed after emptying and returned for re-use. The exterior and the inner lining are Du Pont neoprene, which provides high resistance to aging, weathering, abrasion and effect of oils and chemicals. Containers also available in 500-gallon and custom-built sizes.

- **A NEW LABORATORY** for long-range and fundamental research by Du Pont's Electrochemicals and Pigments departments is scheduled for completion by the end of 1955. To be located at the Experimental Station, Wilmington, the building will cost more than $2.5 million. Facilities will be provided for the two departments in separate wings of the building.

- **A RUGGED NEW ALL-PURPOSE SOLVENT** for vapor degreasing, "Triclene" D trichloroethylene, was announced recently by Du Pont. "Triclene" D retains its high purity and stability even after repeated use and distillation. It resists attack from light metal chlorides, from light, heat and water, and from acidic materials.

- **A GREENHOUSE** covered with Du Pont polyethylene film has shown good results in holding heat and moisture to spur plants to vigorous growth. Built at the University of Kentucky's department of horticulture, the frame-and-film structure is inexpensive and easy to construct.
• NEW UNIFORMS for stewardesses on Northwest Orient Airlines are made of fabrics containing 55 per cent “Dacron” polyester fiber and 45 per cent wool. Chosen for their easy care and neat appearance, the summer and winter uniforms and topcasts are in various weights of the fabric, all in Strato blue.

• LABORATORY WARE of Du Pont “Alathon” 10 polyethylene resin is being introduced by Pioneer Plastics of Dayton, Ohio. Pictured are a 250 ml. beaker and small funnel of “Alathon”. Pioneer expects to produce a 65mm funnel with a specially designed filter, a cover for burettes, and two graduated cylinders.

• A MOTTLED DENTURE PLASTIC, made of “Lucite” acrylic resin and called Varihued, is said to be almost indistinguishable from the natural tissue of the mouth. Densene “33” Varihued denture plastic is made by Cosmos Dental Products, Inc., 653 Eleventh Ave., New York 36, New York.

• AN APPLICATOR PAD for a squeeze-bottle deodorant is being made of “Onal” acrylic fiber. Ever-Dry Corp. of Los Angeles tried various fabrics and fibers before choosing a fleece of Du Pont “Onal”. The fleece fabric is made by Princeton Knitting Mills.

• AN AUTOMATIC TOURNIQUET for the hospital operating room, made by the Robbins Instrument Corp. of Attleboro, Mass., assures complete control of blood flow, important in operations on arms and legs. Pressure is supplied by a container of nontoxic, nonflammable Du Pont “Freon-12” dichlorodifluoromethane.

• “7” SPECIALTIES is offering a free sample of Du Pont Car Wash, a soapless detergent that makes car washing easier, faster and more economical. Simply sponge it on, rinse it off, and let it drain. For a free sample, write Car Wash Offer, Specialties Sales, Du Pont Company, 8167 Du Pont Bldg., Wilmington 98, Del.

• DU PONT FINE SILICA TECHNICAL, a chemically made, finely divided amorphous silica, is giving outstanding reinforcement to silicone rubber gaskets. The fine silica, in pelleted form, is available in experimental samples. For sample and literature on the product, write Du Pont Rubber Chemicals Division, Desk AT, Nemours Bldg., Wilmington, Del.

• A SHOWER DOOR made of translucent panels of “Alathon” 10 polyethylene resin can be home-installed to fit any recessed tub that goes wall to wall. Manufactured by American Shower Door Co., Inc. of Hollywood, Calif., the new door comes in coral, pearl gray, sea green and sky blue panels with framing of polished aluminum.
Rubber

Neoprene, Du Pont's chemical rubber,

By A. J. HAWKINS, Jr.

Ever hear the old story of the disgusted farmer in West Texas who spent thousands of dollars drilling for water and kept striking oil?

A lot of drillers wish the story were true. The drilling industry has almost forgotten the old “rope choker” who dug a hole in a likely spot by bouncing a chisel-type bit into the ground; oil exploration today is a highly scientific and complicated business. But the odds against striking oil in an unproved area are still 8 to 1.

As the search for oil intensifies and drillers go deeper (down to two and a half miles in West Texas), cost becomes

Neoprene stabilizer fits around drill collar just above drilling bit, keeps bit centered in hole. It gives good service despite severe heat, abrasion.

Oil drillers work night and day, can't afford breakdowns.
more of a problem. The modern rotary drilling rig is an intricate assembly of machinery that may cost up to a million dollars. Naturally, the owners of these rigs are interested in earning a return on their investment by doing everything possible to increase working efficiency. Neoprene, Du Pont's chemical rubber, plays an important part in achieving this goal.

Once a well is started, drilling should be continuous, drillers point out. Down time may cost the driller $50 an hour. So shutting down to replace worn-out parts is a pocketbook problem. Following are some examples of how neoprene helps minimize this pocketbook picking.

NEOPRENE HOSE GIVES LONG SERVICE

In rotary drilling, a weighted steel rock bit is attached to the end of a drill pipe and rotated in the hole. To lubricate the bit and bring out rock cuttings, drilling fluid or "mud" is circulated down the drill pipe, around the bit, and back up the hole. Flexible rotary hose on the surface carries the mud into the rotating drill pipe. This hose is built to withstand pressures in the thousands of pounds, and is made with a neoprene tube and cover. Oil-based muds sometimes used for drilling would soften and disintegrate ordinary rubber tube, while sunlight and weathering would harden and crack a cover of natural rubber. Neoprene stands up to both oil and exposure. A driller operating in the Gulf Coast area reports, "We've had a neoprene rotary hose on our rig for the past 18 months. We've drilled over 125,000 feet of hole using both water and oil-based muds, and the hose still shows no signs of wear. Neoprene hose can really take it."

Reports from the field on the product's service record are not confined to hose, either. Circulating pumps for drilling mud have pistons and packings made of neoprene. In West Texas the boss of a rig, or tool pusher as he is called, says that the neoprene gland packings on his mud pump are lasting twice as long as the rubber ones he formerly used. This is an important cost saving when you consider the down time involved in replacing pump pack-
ings that have given up the ghost and failed prematurely. A vital use of neoprene in many drilling operations is in drill pipe protectors. When drilling in certain types of rock, it is necessary to put casing into the well, to wall off some formations and to prevent the hole from caving in. During drilling, the drill pipe rotates inside this casing. To prevent wear between the casing and drill pipe, large neoprene protectors are slipped onto each length of drill pipe. These protectors are hollow cylinders of neoprene which are stretched—sometimes to nearly twice their original inside diameter—in order to snap them onto the drill pipe. The neoprene must be able to take this expansion. In addition, it must withstand the constant abrasion and oily mud in the hole, and grip the pipe tightly enough to resist the pressure from below and remain in proper position on the pipe.

An experience of a South Texas tool pusher, J. W. Voss of the Taylor Oil and Gas Co. and Mayfair Minerals, Inc., points up the fact that neoprene can do all this and come back for more. “We were drilling in Hidalgo County,” relates Voss, “when the well kicked below 10,000 feet. Bottom hole pressure was over 9,000 pounds per square inch, and the temperature about 285°F. After we got the pressure under control again, we pulled the string of drill pipe, and inspected our neoprene drill pipe protectors. Every one of the 170 on the string was in place and unharmed. We ran them all back down the hole.”

A similar use for Du Pont’s chemical rubber is in a drill collar stabilizer. This is also a hollow cylinder of neoprene that fits around the drill collar just above the drilling bit. Its job is to keep the bit centered in the hole and make drilling go faster. Here the Du Pont rubber takes a thorough beating. It is bathed in oily mud and abrasive cuttings, ground against the rough rock sides of the hole, and subjected to high bottom hole temperatures and pressures. Yet the neoprene drill collar stabilizer is giving twice the service its cast iron predecessor did in the deep wells of West Texas.

**NEOPRENE HELPS PREVENT BLOWOUTS**

Probably the most spectacular use of neoprene in the drilling industry is in a blowout preventer. Oil is usually found in large pockets, capped by or combined with gas formations. These formations have built up tremendous pressures over geological eons. When the driller hits one of them, this pent-up pressure tries to escape up the drill hole. It must be confined in the well until apparatus is installed to release it slowly into tanks and containers.

In the old days, blowouts were fairly common. Men were killed and small companies were literally blown out of business. Today, thanks to improved tools, increased knowledge and better mud control, blowouts are comparatively rare. The hydrostatic pressure of the column of drilling mud is calculated to hold the pressure of the well in check. Occasionally, however, a high-pressure formation is reached unexpectedly. The bottom hole pressure suddenly exceeds the weight of the mud above it and a blowout is imminent. In this emergency, blowout preventers—devices for sealing the hole around the drill pipe and containing the pressure—are called upon. The violent fury of a blowing oil well is indescribable, and the equipment needed to hold it in check has to be rugged in the extreme. Neoprene sealing elements are used in various types of blowout preventers to pack off well pressures running as high as 8,000 pounds a square inch. Many blowouts which could have destroyed lives and thousands of dollars worth of equipment have been averted by blowout preventers with neoprene pack-off elements.

These are a few of the places where man-made rubber is helping oil men drill faster, straighter and more safely. Whether they need hose, corrosion-resistant coatings, packings, or any of the hundred-and-one other specialty rubber products for oil field use, more and more drillers are counting on neoprene for the really tough jobs.

Neoprene drill pipe protector, top, acts as buffer between casing and drill pipe. This is rugged duty.
New face for the falls

Dynamite has finished the face lifting job nature started at Niagara Falls’ Prospect Point. When a section of the point gave way July 28, plunging 165,000 tons of rock into the gorge, an estimated 3000 tons was left hanging precariously on the brink. This triangular remnant has now been dropped with two blasts of Du Pont “Gelex” dynamite fired by the McLain Construction Corp. of Kenmore, N. Y. The foreshortening of Prospect Point has a happy aftermath, it turns out. Visitors will have a better view of the celebrated waterfall.
Fast band for a bottle neck

Two years ago in the Magazine we predicted a useful future for newly developed machines that slipped cellulose bands around the necks of bottles. We pointed out that banding was the only unmechanized operation left on the bottling line, and that machines could apply the bands about three times as fast as the most practiced hands.

Today we can report that mechanical banders are slipping millions of colorful "Cel-O-Seal" cellulose bands on bottles in the liquor, wine, carbonated beverage, drug and home products fields. Bottlers of beer and food products, too, are expected to take advantage of the functional and decorative bands now that this fast means of applying them is practicable.

Two types of machine are currently being used for band application. One, using cellulose tubing in roll form, cuts bands to length electronically. The other handles pre-cut "Cel-O-Seal" bands. Various bottle sizes and shapes, from small drug vials to gallon jugs, are being banded economically by machine. The machines can be adjusted to changes in line speed or in bottle size in a matter of minutes.

"Cel-O-Seal" bands go on the bottle wet, and shrink tight as they dry. They provide a tamperproof, leakproof seal. More than that, they improve the appearance of bottled packages. Sales messages and trade-marks, impregnated in the bands, add impact at the point of sale that's especially important when so many glass-packaged goods are bought on impulse.

Here's what a few glass packers say of the advantages offered by the bands:

Hiram Walker & Sons: "... those eye-appealing "Cel-O-Seal" bands protect bottle contents and tax stamps, top off our packages in style."

Duncan Hines Dressing for Salads: ""Cel-O-Seal" bands give us a prestige package with added brand impact."

Many firms, such as Parke, Davis & Co., use the bands to safeguard quality pharmaceuticals, enhance package appearance, and establish product family identification.

Development of the mechanical banders marks a revolution in this industry. By lowering the cost of application, machines are making possible wider use of the bands to catch the customer's eye and protect the quality of glass-packed products.

Gisholt machine is fed pre-cut "Cel-O-Seal" bands. Speedy machines make the use of cellulose bands more practical.
Detroit has no monopoly on auto design. Witness this quartet of homemade sports cars from Hartford, Grand Rapids, Cincinnati and Atlanta. They are typical creations of auto body and paint shop men whose enthusiasm for their work spills over into leisure hours. A few may develop a profitable sideline, designing and building sleek eye catchers for customers; others are paid fully enough in personal satisfaction alone.

Some of the designers begin with stock car parts. Others mold the body of reinforced plastic. Still others depend on sheet metal and a welding torch. But one common ingredient is perspiration; perhaps 6,000 man-hours went into the building of these four models.

Each of these cars has been finished with several coats of Du Pont "Duco" lacquer, sprayed on and rubbed down with meticulous care. The designer of the bug-like little Lampo, for instance, tells us the paint job arouses more admiration than any other single feature of his prize-winning car.

It's not surprising that body shop men should choose Du Pont finishes for their pet cars. They've been refinishing customers' cars with these same high-quality materials for the past 30 years.

Lampo, built by Arthur Brow, Jr., Grand Rapids, has modified '19 Mercury engine, body parts from Hudson and Lincoln. Finish is "Duco" Palm Green.

Frank Maratta, Hartford, invested 1,500 man-hours in his prize-winning car, valued at $7,000. Exotic lines, "Duco" Bittersweet finish are eye catchers.

HYBRID CARS

Atlanta's Downing Motors used 2 doors and a front fender from wrecked '52 Olds, rear fenders from '53 Olds in making his sports convertible. Finished in "Duco" Aztec Red.

Built by Ken Kamp, Norwood, O., this trim job has reinforced plastic body, '37 Ford chassis and 60 hp V-8 engine. Finish: Majestic White.
“Dacron” totes a lunch pail, too

The man-made fiber is holding down industrial jobs in addition to its more familiar clothing assignments

“Dacron” polyester fiber, described in advertisements as an easy-living fiber because clothes made from it remain good looking with a minimum of care, is making life easier for industrial users, too. More specifically, it’s saving them money.

Take the case of the hotel laundry that bought a roll cover of “Dacron” for the flatwork ironer shown here. The cover cost $32.90, and it lasted 36 weeks before the constant 300°F to 350°F heat made it unserviceable. That added up to an average weekly cost of 91.4 cents. A good cotton cover, priced at about $12, lasted from four to five weeks under the same conditions, at a weekly cost of $2.67.

Needless to say, all eight rolls on the hotel ironer are now covered with heat-resistant “Dacron”.

A side benefit of the new covers is the less frequent shutdown required for changing roll covers. This may add up to a 90 per cent reduction in labor cost and down time for the cover-changing chore. Taken together, longer life and lower labor costs are compelling arguments for “Dacron”. Commercial as well as institutional laundries are being convinced.

Take another case. The Record Industrial Co. began experimenting with thread of “Dacron” back when the product was known as Fiber V. Today all of the work shoes sold by the Philadelphia concern are stitched with “Dacron”. The fiber’s chemical and abrasion resistance add months to the life of shoes worn in oil refineries, steel mills and chemical plants, and the added strength of the thread is an extra bonus. Strong, good-looking shoelaces of “Dacron” are also featured by Record Industrial.

New industrial uses for “Dacron” are on the horizon. One of them involves nonwoven felts of the fiber. Because of the resistance of “Dacron” to chemical and dry-heat degradation, to deterioration from mildew, and to swelling when wet, it may be possible to use it where felts have never been used before. In addition, the felting of “Dacron” is a radically new process, much quicker than the traditional felting of natural fibers. It is a controllable process, too. Felt characteristics can be varied almost infinitely for specific end uses.

Insulation of “Dacron” covers wire used in electronic equipment, and the fiber is being evaluated for other insulating jobs. Its low moisture pickup, heat resistance and high dielectric strength are advantages here.

We’ll have more to report about such industrial applications for “Dacron” in the months ahead.
Du Pont Notes

Stepped-up production is in the offing for "Teflon" tetrafluoroethylene resin at the Washington Works, Parkersburg, W. Va. Four years old as a commercial product, "Teflon" is being used increasingly as a corrosion-resistant material in the chemical industry and as electrical insulation. New uses are foreseen, among them widening use of the polymer as an industrial fiber. Present plans call for doubling Parkersburg's production capacity.

Partially tied to this is the new plant being built at Louisville for the manufacture of "Freon-22" monochlorodifluoromethane, an intermediate in the making of "Teflon" and a refrigerant and aerosol propellant in its own right. This is the third expansion in production facilities for "Freon" in the last year. A fourth is already in the wind; the company has under consideration a new plant for "Freon" and tetraethyl lead manufacture in California to serve the Western market.

"Dear Editor," writes Reader William C. Moffatt of Philadelphia. "In the August-September issue under Du Pont Notes you state that top executives have fewer cases of ulcers, high blood pressure, etc., than those one step below them. Have you ever heard an executive defined as one who goes around with a worried look on the face of his assistant?"

A new plant for production of methionine goes on stream this fall at Beaumont, Texas. It will be operated by the Company's Organic Chemicals Dept. Du Pont methionine is a synthetic amino acid, an essential part of most proteins. Added to feed for broilers and turkeys, it helps them gain weight faster and use feed more efficiently.

A new sales service laboratory has been opened near Wilmington by the Polychemicals Dept. Replacing outgrown facilities at Arlington, N. J., the $3,000,000 laboratory is devoted primarily to solving the problems of plastics customers — helping them design new products, improve existing ones and develop better fabrication techniques. The new laboratory underscores a conviction shared by Du Pont and the rest of the plastics industry: progress can come only through wiser selection of plastic materials and better design of end products.

The Film Dept., too, plans to build a sales development and technical service laboratory at the same site. Ready for occupancy by next fall, the new laboratory will expand the department's service to customers for celophane, acetate and polyethylene films, "Mylar" polyester film, cellulose sponges and sponge yarn, and "Cel-O-Seal" cellulose bands. In addition, the laboratory staff will explore markets and investigate industry's need for new films.

Speaking of films, remember when Colonel Stoopnagle announced the invention of a celophane rug to discourage maids who might sweep dirt under it, and a celophane mattress to facilitate under-the-bed inspections by old maids? That was about 20 years ago, when both radio and celophane were youngasters.

Today's shopper, according to the latest Du Pont survey on buying habits, decides on seven out of ten purchases after she is in the store. "If somehow your product catches my eye — and for some reason it looks especially good — I'll buy it" was the philosophy gleaned from 5,338 shoppers in 250 supermarkets in 35 different cities.
“NuGreen” fertilizer compound is favored as a nitrogen source for fall plow down because it resists leaching.

It’s plow-down time in the corn country

By JAY H. MACKEY

AMES, IOWA

Out here where the tall corn grows, the farmers are adding a new term to our vocabulary. It’s “plow down,” the latest advance in growing more corn on an acre. Fertilizer on considerably more than 60,000 acres in Iowa alone were plowed down for the 1954 corn crop.

Plow down in this land of corn usually refers to spreading fertilizer high in nitrogen content on farm land and then plowing or disk ing it into the ground. Normally, crop residue such as oat stubble or cornstalks are plowed under along with the fertilizer. On steep, rolling land, or on very sandy soil, this is usually done in the spring to avoid water erosion or leaching losses. More and more corn farmers, however, are plowing nitrogen and other fertilizers down in the fall. This trend to fall plow down has been sparked not only by a desire of farmers to fertilize when they aren’t busy during planting season, but by dollar-and-cents statistics and favorable reports by colleges.

To begin with, as Prof. Lloyd Dumenil of Iowa State College’s Agronomy Dept. sums it up, “Lack of nitrogen limits corn production on most Iowa soils.” The Univ. of Missouri College of Agriculture adds: “Corn requires about one and a half pounds of nitrogen per bushel. This fertility element is usually the limiting soil factor in corn production in Missouri. Where mineral deficiencies in the soil are corrected, and where moisture is ample, there usually will be a close correlation between corn yields and available nitrogen of the soil.” Thus, while nitrogen is only one of the ingredients essential for plant growth, it holds the key to top yields.

Prof. G. E. Smith, of the Univ. of Missouri’s Soils Dept., has been running nitrogen plow-down tests for four years, using a solid urea type nitrogen like “NuGreen” fertilizer compound. The tests were run on adjacent plots as alike as Siamese twins. Each had the proper amount of minerals added to the soil, and starter fertilizer was applied to each. But only on one was enough urea plowed under to provide 200 pounds of nitrogen an acre. On this treated
plot, 69 to 106 bushels of corn an acre were grown during the four years, while on the nitrogen-hungry strips the corn yield ranged from 18 to 72 bushels. For one plot the four-year average was a healthy 97; for the other an unsatisfactory 59 bushels.

"On corn land where nitrogen alone is required, every dollar invested in nitrogen will return $3 to $4," explained Prof. Dumenil. "Plow down offers many advantages. It is the most practical way to make heavy applications of nitrogen-rich fertilizers and build up land that has been drained of its fertility. Many farmers prefer plow down of nitrogen to side dressing at cultivation time; they don't like to be slowed down when killing weeds takes priority. Placing nitrogen deeper in the ground usually promotes a deeper and more extensive root system—sometimes up to a doubled root length. The deeper root system can draw more moisture and food from the soil and, as a secondary benefit, starve out shallow-rooted weeds. This goes a long way toward insuring farmers a money-making crop under adverse conditions, particularly dry years.

"There are other advantages of plowing down solid nitrogen and other fertilizers," he added. "Many dealers offer a spreading service, usually at little or no extra cost over fertilizer delivered at the farm. Plow down also assures that the plant food will be ready for the corn when it's needed, and it can be used to supplement other methods of fertilizer application."

Concentrated, free-flowing Du Pont "NuGreen" fertilizer compound is favored as a nitrogen source for fall application because it resists leaching and works effectively in double harness with plow down. "NuGreen" and vegetation should be plowed under at a time when soil temperatures are likely to remain below 57 degrees until spring. The urea nitrogen in "NuGreen" is converted rapidly to ammonium nitrogen, which is fixed to soil particles and held securely against the leaching action of water movement through the soil.

As the soil temperature rises in the spring, the nitrifiers which were dormant during cold weather again become active and gradually convert the ammonium nitrogen into nitrate nitrogen. Both forms of nitrogen are then available for crop growth. There is plenty of nitrogen from the "NuGreen" to feed the crop and to break down rapidly the organic vegetation buried with it. Nitrogen temporarily tied up by the decomposed organic matter is gradually released to the crop later on, and is not wasted. In most Midwestern soils, much of the nitrogen not used one season remains in the soil for the next year's crop.

Dr. George Scarfeath, formerly of Purdue Univ., is generally credited with being the first to recommend a form of plow down. His idea was to put the plant food at the bottom of the plow furrow. That method has almost been forgotten in the last decade, but as heavier fertilization has been needed, broadcast and plow down have become of major importance. Only in the past few years, however, have farmers begun heavy nitrogen treatment of corn.

"NuGreen" is assured of a place in this growth picture because the farmer will always know how much nitrogen he is getting, he can control the time of application to suit the needs of his farm, and he can add as little or as much nitrogen as he wants to each field.

"The potential future of plow down is almost as broad as Midwest corn farming itself," Prof. Dumenil commented. "Come back and talk to us in a couple more years. We're starting to roll on this business of solid nitrogen plow down in the corn country now."
IT'S ANTI-F-PE

(OCTOBER)

HERE'S WHY IT'S SMART TO SEE YOUR DEALER DURING "ANTI-FREEZE WEEK"

You'll beat the "first-freeze" rush that usually jams the dealer's station. Later, cold weather will bring everybody in at once. Don't wait; drive in now for careful, unhurried service.

You'll be safe because your dealer will have time to completely check your car's cooling system—tightening up hoses—flushing out rust and sludge that can clog the radiator.

...and you'll get complete protection against rust, corrosion and freeze-ups when your dealer installs Du Pont "Zerone" or "Zexa"—whichever you prefer.

TO PREPARE YOUR CAR FOR WINTER...

1. CLEAN OUT RUST AND SCALE WITH NEW IMPROVED COOLING SYSTEM CLEANSER

BEFORE YOU PUT IN ANTI-FREEZE, your car’s cooling system needs a careful check-up. Accumulated rust, scale and grease can plug radiator passages. This slows down circulation, resulting in overheating which can cause anti-freeze losses and serious engine damage. Acid corrosion and rust take place in engine blocks, too, eat quietly away on water pump impeller blades and the vital parts in your car heater.

CLEAN OUT RUST AND SCALE—safely, easily, thoroughly—with new, improved Du Pont Cooling System Cleanser.

SIMPLY POUR DU PONT CLEANSER IN THE RADIATOR and run the motor. It works even while you’re driving...solves rust so it can be drained out. No reverse flushing necessary. Neutralizer is included in each can to complete the job. Insist on the genuine Du Pont Cleanser, marketed only by Du Pont in a package bearing the red Du Pont oval trade-mark.

ASK ABOUT THE COMPLETE DU PONT PRE-ANTI-FREEZE SERVICE at your service station during “Anti-Freeze Week,” and assure trouble-free driving this winter. Du Pont Cooling System Cleanser costs $1.25 at most dealers.
2. ASSURE SAFE, WINTER-LONG PROTECTION
WITH "ZERONE" OR "ZEREX" ANTI-FREEZE

DU PONT "ZERONE"...America's economy anti-freeze buy. Keeps cooling systems cleaner.

DU PONT "ZEREX"...the one-shot winter-long anti-freeze. Guards against rust and corrosion.

3. PREVENT LEAKS AND SEEPAGE WITH
DU PONT COOLING SYSTEM SEALER

Your cooling system may seem watertight yet still have tiny pinholes through which anti-freeze can creep. You can easily eliminate the threat of this wasteful seepage. Simply pour Du Pont Cooling System Sealer into your radiator. It finds and closes the holes...can't clog or harm rubber hose or metal parts. It's economical insurance against the loss of anti-freeze...and consequential loss of protection for your cooling system.

MAKE AN APPOINTMENT NOW TO HAVE YOUR CAR COMPLETELY SERVICED FOR WINTER DRIVING.

DU PONT

BETTER THINGS FOR BETTER LIVING...THROUGH CHEMISTRY
Dyeing "ORLON"*-wool blends?
You can get...

balanced shades in union dyeings...

striking contrasts with cross dyeings...

subtle shades for tone-on-tone or white heathers...

with Du Pont's new "SEVRON"† dyes

These new "SEVRON" dyes—applied to "ORLON" Type 42 staple—stain wool only slightly. Therefore, when used with acid or chrome colors for the wool, "ORLON"-and-wool blends can be dyed in single-bath applications.

The sample swatches above give an indication of some of the new, bright shades you can achieve for these blends.

The colors show good light fastness and excellent wet fastness. If you are working on "ORLON"-and-wool blends—or plan to—be sure to get further information on this new range of "SEVRON" dyes. For technical help with coloring problems, write to E. I. du Pont de Nemours & Co. (Inc.), Dyes and Chemicals Division, M-3, Wilmington 98, Del.

"ORLON" is Du Pont's trademark for its acrylic fiber.†Trademark