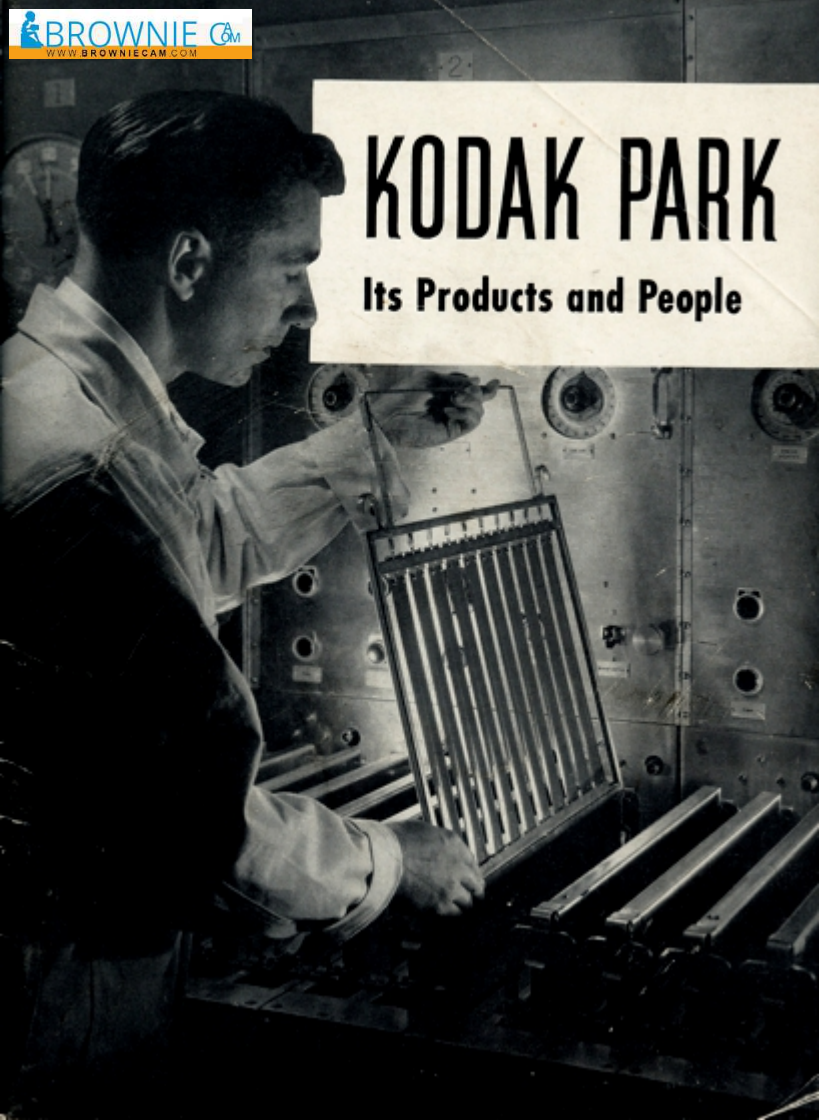


KODAK PARK

Its Products and People

On the cover: Testing a Kodak color film.

Photography in Action

POWERFUL, dramatic, this news picture symbolizes one important field—the press—through which photography enters your daily lives. Other photos on the next two pages also show how photography furthers human knowledge, enjoyment and progress.

PLANT TOURS: Visitors may take guided tours of Kodak Park on Mondays through Fridays, except holidays, beginning at 9:30 a.m. and 1:30 p.m.

Shooting an industrial scene on 16mm motion-picture film.

PICTURES: In Work and Play

Come with us via this brief booklet on a tour of our Kodak Park Works. For we'd like to show you how some of the "raw materials of photography" are produced in this, our largest plant.

From Kodak Park to customers in many lands go shipments of Kodak films, papers, plates and chemicals. They are some of the materials that help to make modern photography.

For these materials "react" when exposed to light. And that is the basis of photography—the action of light on a chemically prepared substance.

The pictures you see on these two pages show a few of the ways—and the results—of using some of the products we make here.

But they only begin to tell the part photography plays in your life today.

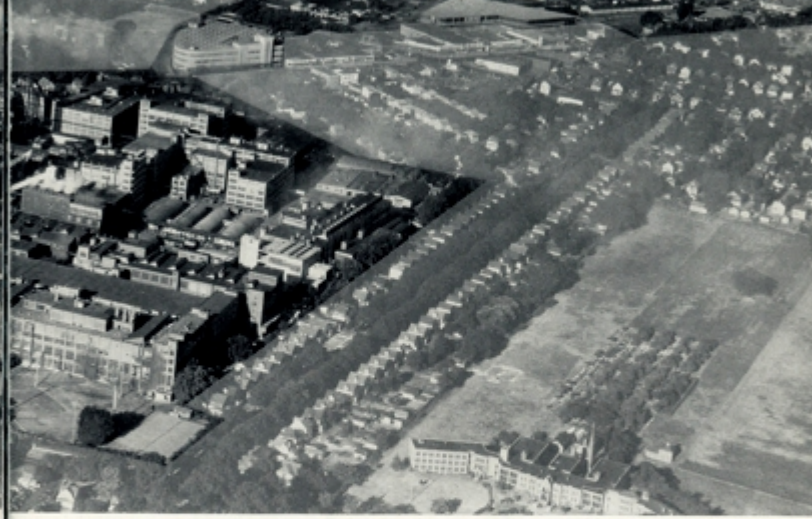
Photography has become an essential part of our civilization. It is serving folks in countless ways. Perhaps it's through a family snapshot. Or it might be through the help received by means of a medical x-ray photograph.

To see how some of these things are made possible, let's begin with a quick, over-all view of the plant itself.

For medical studies.

For aerial photography.

For home snapshots.



KODAK PARK: *Symbol of an Industry's Progress*

CITY-WITHIN-A-CITY, Kodak Park covers about 1,015 acres, stretches from east to west for 2.9 miles. Yet at the first of this century, "the Park" was mostly farmland. Today the plant has over 20,000 employees and is a dynamic sign of the progress of the photographic industry.

But Kodak Park is most interesting not for size but for its manufacturing methods. Sprinkler trucks wash the streets . . . interior production areas are vacuumed, scrubbed, mopped . . . certain employees wear white uniforms of surgical cleanliness . . . some cosmetics are banned because they would, on contact, ruin film.

Here, too, much work is done in air-conditioned, darkened rooms where a single stray shaft of light could spoil thousands of dollars worth of photographic material. Why? Because most photo-products are made to react to light itself. Thus the utmost in production controls is necessary to insure products of the highest quality.

Photographic paper base (above) in storerooms for aging; (below) a few of the wide variety of photo chemicals produced at Kodak Park; amateur roll film (opposite page) coming from automatic boxing machine.

PRODUCTS: *For People All Over the World*

KODAK PARK'S varied output consists chiefly of:

Photographic Films and Plates: More than 1,900 different film items are manufactured; 95 sizes of roll film, 100 sizes of sheet film; 50 kinds of professional motion picture film; 30 different kinds of plates in 55 sizes.

Photographic Paper: 300 different kinds. Considering kinds, sizes, and types of packaging, about 8,600 different items.

Chemicals: 310 kinds of chemicals for photography; 3,800 synthetic chemicals for research purposes.

A sidelight: Only about one-third of the entire photographic industry's production is for amateur use. The rest goes to commercial, professional, business, scientific and industrial fields where photography contributes to the day-to-day living of all of us.

Eastman Dry Plate and Film Co., 1888.

Kodak Park Works in 1890.

Early film was made on glass tables.

MASS PRODUCTION:

Eastman's First Aim

GEORGE EASTMAN took up photography as a hobby in 1877. At night the 23-year-old bank bookkeeper experimented with ways to make photographic "dry plates." His aim: mass-produce these plates to replace the "wet plate" system, which required photographers to prepare their own plates in a dark tent, then use them before they dried. There was no flexible film available then—and very few amateur photographers.

Eastman's work led to his starting the Eastman Dry Plate Co. in 1881. He perfected a paper-based film in 1884 and a transparent roll film in 1889. Growing business called for a new plant. Kodak Park thus was begun in 1890. The first films there were made by drying a liquid plastic solution on glass tables 200 feet long. Modern films are made as shown on pages 14-15.

George Eastman (left) and Thomas Edison at the first showing of a Kodak color motion picture process in 1928.

THE MAGIC OF FILM

What It Is . . . How It Works

PHOTOGRAPHIC FILM is "built" much like a layer cake. The "frosting" is the emulsion on the face of the film. Supporting it is a flexible, transparent base. Another layer, the antihalation backing, absorbs some light and prevents shiny halos in your pictures.

The emulsion is light-sensitive. It's the key to film's power to record an image. Gelatin and silver salts are the main ingredients of the emulsion.

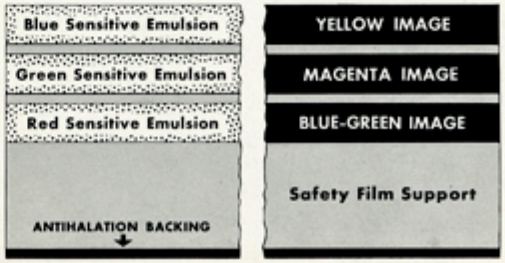
When light strikes the film, the microscopic silver halide grains are "tagged." This is an internal, photoelectric action forming what is technically called the "latent image." Upon development of the film, the latent image takes physical form. The developing solution does this by reducing the exposed grains of silver bromide to metallic silver.

The silver, retained in the emulsion, becomes the "dark part" of the photographic "negative," from which "positives" or prints are made.

Color films are similar—but much more complicated (see diagram below). They have three emulsion layers, each sensitive to a different color of light.

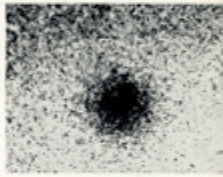
Cross-Section of Kodachrome Film

This diagram shows how Kodachrome Film looks in a side view under a microscope. Three separate emulsion layers in the unexposed film (left) become dye layers that make up the color picture after processing (right).



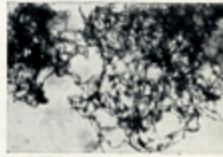
Photographic negative.

Enlarged 25 times.



250×—Silver grains show.

2,500×—Grains growing.



25,000×—Grains become "fibers."

SILVER: *Photography's Lifeblood*

SIXTEENTH-CENTURY alchemists, seeking a way to turn common metals into gold, stumbled onto an important fact: silver nitrate reacts to light by turning black.

Unknowingly, they discovered the basis of photography. Thus silver has become the prime part of a photo-emulsion. Kodak uses 16 tons of it a week for photo-materials.

To begin the process, silver ingots (80 pounds each and 99.97% pure) are dissolved in nitric acid. The resultant liquid is piped to crystallizers. These are 1,000-gallon drums in which the liquid is stirred by pumps, and cooled.

This causes silver nitrate crystals to form and grow. Soaking wet, the crystals are drawn from the crystallizer, then whirled in perforated baskets to "wring out" much of the moisture. Then the whole process is repeated. This step purifies the crystals even more.

Next, the crystals are dried, loaded into stainless steel barrels (each holding $6,500 worth) and trucked to the emulsion makers.

Photographic gelatin enters the scene at this point. Gelatin, as described on the next page, serves to keep the film's silver salts in their proper place in the emulsion.

Kodak produces its gelatin in much the same way as that made for food. And our "photo-gel" is just as pure—to meet the quality needs of the emulsion formulas.

Left: Silver ingots for use in making photographic film are stored in this vault at the Kodak Park Works.

Ingots ready for dissolving in tank.

Crystals purified by redissolving in water.

Final crystallization process.

Combining ingredients for photographic emulsion.

FILM MAKING: *Art and Science*

Now we come to the final steps in producing film.

Broadly speaking, these involve: (1) making the emulsion from the silver salts and gelatin; (2) preparing the base on which the emulsion, or emulsions, will (3) be coated.

Each step demands precise controls, careful engineering, scrupulous cleanliness and a great deal of an indefinable "art."

First, the emulsion: In warm, syrupy form, the gelatin is mixed with silver nitrate and potassium bromide. Because the silver crystals are light-sensitive, this operation must take place in almost total darkness. The nitrate and potassium combine as potassium nitrate, which is washed away. Silver bromide crystals are left in the gelatin. This is the emulsion. Kodak Park makes emulsion for over 200 kinds of film.

Next, the film base: Let's take safety film as an example. Purified cotton linters or wood pulp are first treated with acetic acid. This creates a white, flaky product—cellulose acetate.

The cellulose acetate is then dissolved in organic solvents like the solvents used in nail polish or fast-drying lacquers.

The product of this operation is a clear, thick fluid known to the industry as "dope."

The dope is fed evenly onto gleaming, chromium-plated wheels, four or five feet wide and 18 feet in diameter. As the wheels turn, heat drives off the solvents, and the dope becomes a thin, flexible, transparent sheet.

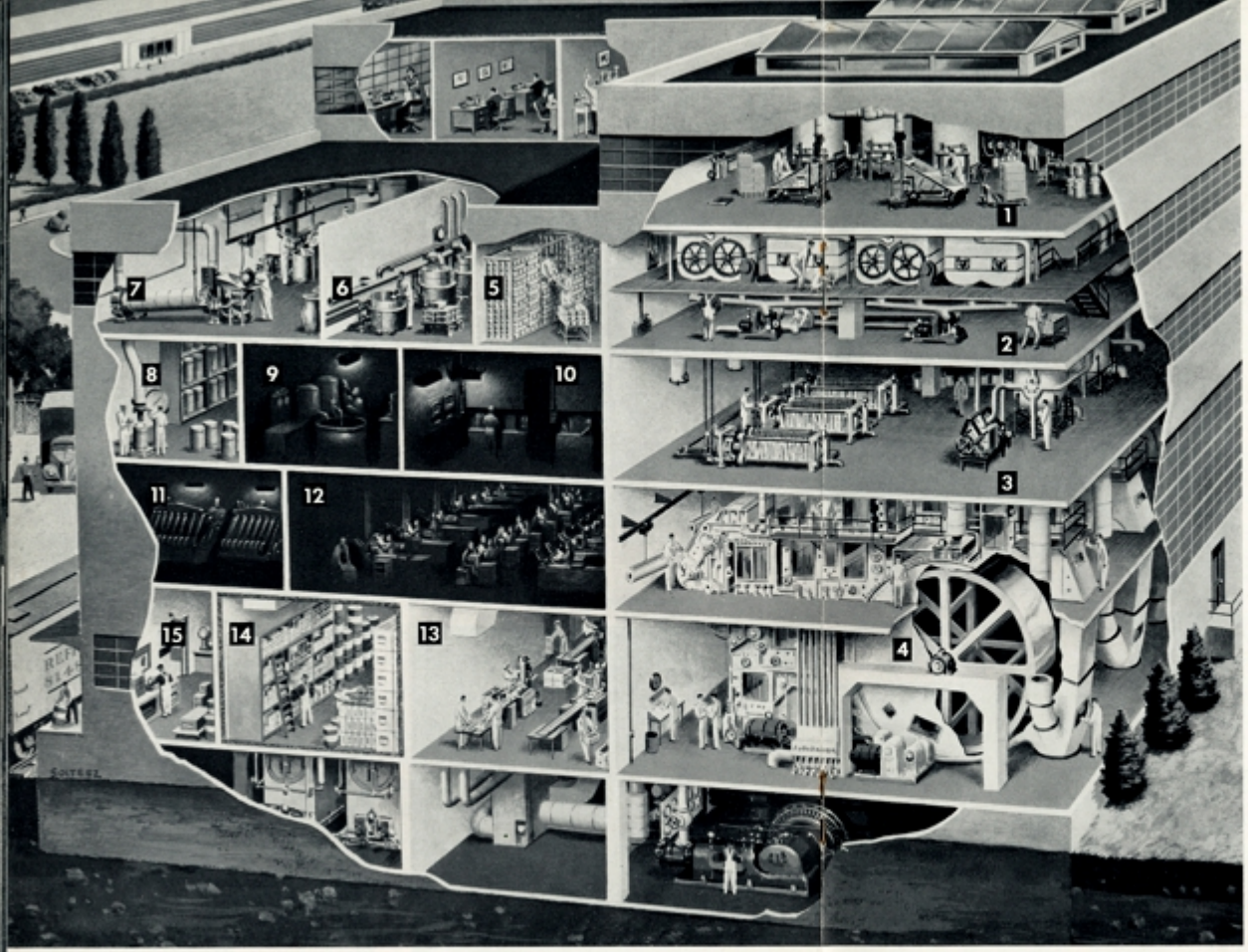
Upon further drying, it emerges from the film casting machines as finished film base.

Finally, the base is coated with the emulsion, as in the photo below.

Film base receiving a coating of emulsion.

Bale of cellulose acetate being broken up and dumped into a solution containing solvents.

Photographic film base emerging from a film casting machine. This is the "windup."



Model Film Plant

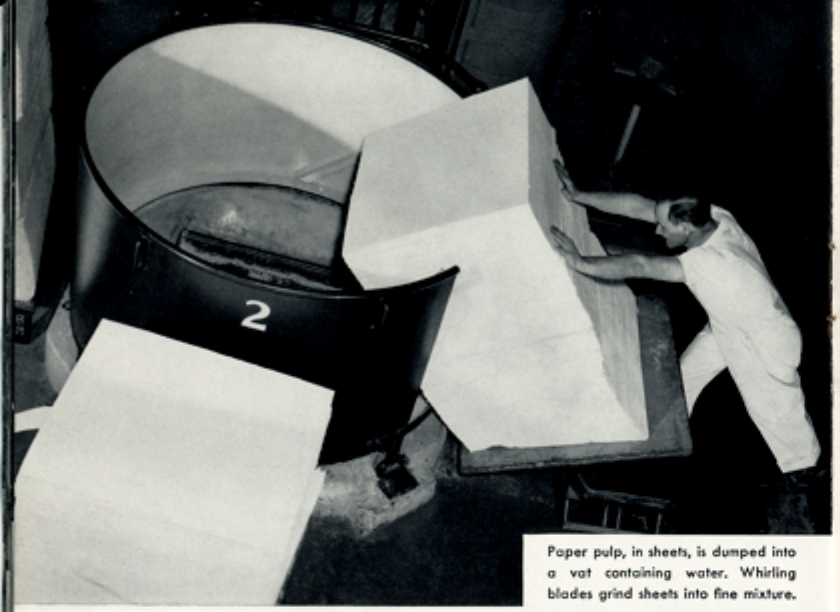
THIS CUT-AWAY drawing of a simplified film plant sums up the production steps.

In (1) cellulose acetate bales are broken up and put into mixers (2) containing solvents. Then the dope is filtered (3) and flowed onto the roll-coating wheels (4). From these machines comes dry film base.

To make the emulsion, meanwhile, silver ingots (5) are dissolved (6) in nitric acid, crystallized and dried (7). These crystals are loaded (8) into barrels for sending to emulsion makers (9).

Film base is coated (10) with the emulsion. Dry film then is slit (11) into proper widths and spooled (12). Steps 9 through 12 take place in darkened rooms.

Quality-control inspections have been constant in the entire process. Finally, the film is packaged (13), sent to insulated, air-conditioned storerooms (14) before shipment (15) to dealers.



Paper pulp, in sheets, is dumped into a vat containing water. Whirling blades grind sheets into fine mixture.

Photographic paper base is inspected after receiving baryta coating, which serves as a foundation for emulsion.

PHOTOGRAPHIC PAPER:

Pulp to Prints

MOST PEOPLE associate "pictures" with "prints." The print—in still photography, at least—is the culmination of the entire picture-taking process.

To make the best prints, you need photographic paper that is tops in quality, of correct texture, contrast and surface.

Photo-paper, too, must be tough —long-lasting. At the same time, it has to be pure. This means freedom from metallic or chemical substances that would play tricks with your pictures.

For years the best papers were made from rags. Good as these papers were, they did get brittle and yellow with age. Impurities in the papers' fibers caused the trouble.

Kodak scientists finally overcame this problem. They succeeded in obtaining wood pulp with cellulose purity equal to that of new-grown cotton.

This was a major achievement. It has resulted in papers with qualities of remarkable stability and permanence.

This roll, fresh from the mill, will provide paper for a million snapshot prints.

Paper is calendered—pressed between rollers—to give more gloss and strength.

Kodak paper pulp comes from selected logs that have been cut into chips and treated with chemicals. This changes the wood to pulp. Further chemical treatment purifies this pulp.

It is next mixed with water and churned in large tile-lined "chests" or tanks to separate the pulp into fibers. These fibers are then cut and sheared by rotary blades moving at great speed.

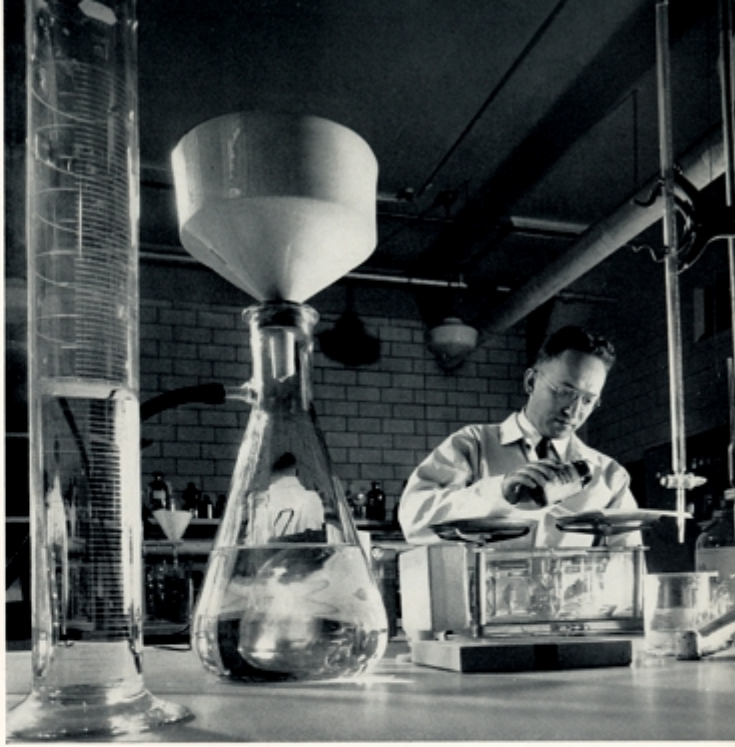
Drained on a moving wire sheet, this water-soaked mixture becomes a rough form of paper.

The making of one pound of paper, by the way, involves the removal of about 100 pounds of water from the pulpy mixture originally fed into the machine.

During these steps, sizing materials have been added to give the pulp more "body," and the entire product has been carefully screened to remove any foreign matter. Then, after the continuous wet web of paper has been stripped from the wire belt, it is dried on a series of chromium-plated rollers. Heavy steel calenders squeeze the paper further, increasing its strength, and it is wound into rolls.

A baryta mixture of barium sulphate and gelatin is next applied to the paper. This fills in pores, gives gloss and provides a base for the emulsion, which is applied in a way similar to that by which film is coated.

This is the baryta mixture which, in diluted form, is coated on photographic paper.



Testing quality of photographic chemicals.

CHEMICALS: *They 'Make' the Pictures*

CHEMISTRY pervades every nook of photography.

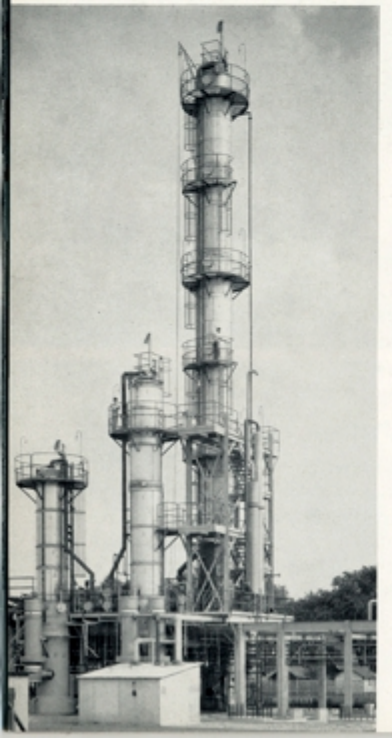
Kodak Park produces a large number of photographic powders and solutions plus a wide range of synthetic chemicals for universities, laboratories and research institutions.

This activity and the operations involved in making film and paper mean that Kodak Park is essentially a chemical industry.

Here is an indication of how demands on the plant have grown: In 1891 two small barrels provided ample capacity to make all the film base dope required. Now Kodak Park's chemical division produces more than 2,400 tons of it a week.

Chemicals for general photographic use—mostly for processing films and papers—are turned out in really large quantities.

A push-button control system, for example, is used in mixing solutions in 5,000-gallon batches. This enables company technicians to compound tons of chemicals as simply as a housewife whips together a bowl of cake batter.



On the other hand, some of the company's many synthetic organic chemicals for research work may be prepared in quantities no larger than a fraction of an ounce.

Regardless of the size of the batch, the mixing of all chemicals takes place under conditions of extraordinary cleanliness. Every batch is laboratory tested before being released for shipment.

Included in the plant's chemical operations are several relatively small but interesting manufacturing jobs.

One is the making of imitation leather, embossed by a 400-ton press, for use in covering some Kodak products.

Another is the production of monomethylparaaminophenolsulfate. That's the stuff which is the essence of photographic developing powders. It is better known by the non-jawbreaking trade name of "Elon."

Where film solvents are distilled.

COLOR PICTURES

By The Million

Color prints roll off processing machines.

EVER since Kodachrome Film was first marketed in 1935, amateur color photography has grown at a rapid pace. Today millions of camera fans enjoy the sparkling, lifelike realism of color pictures.

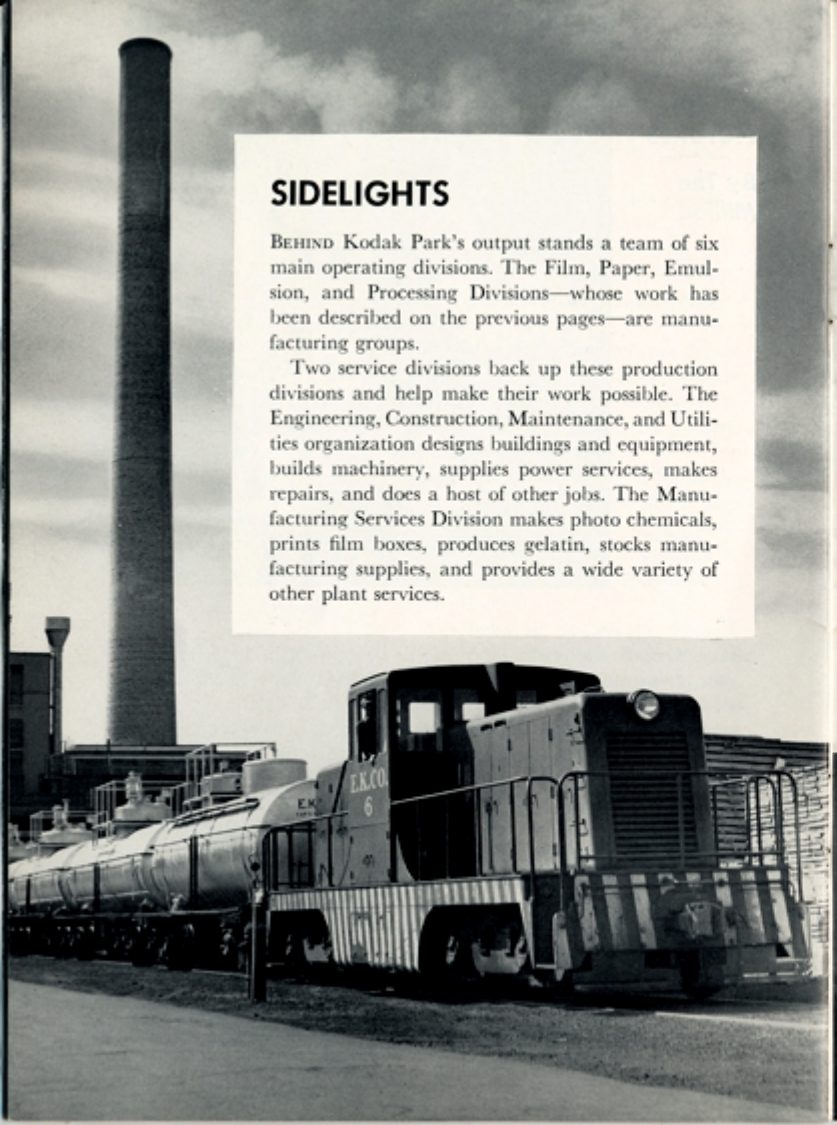
Modern, easy-to-use Kodak color materials provide photographers with a choice of slides for viewing and projection, prints and enlargements, and home movies. But some color products require processing under precise controls with costly and complicated equipment. We offer our customers processing service for these materials through Kodak dealers.

Central headquarters for our ten U. S. processing laboratories (one at Kodak Park) is the Color Print and Processing organization at Kodak Park. Here engineers and scientists work to further improve Kodak color products. The organization also maintains liaison with Kodak processing labs in other countries.

SIDELIGHTS

Behind Kodak Park's output stands a team of six main operating divisions. The Film, Paper, Emulsion, and Processing Divisions—whose work has been described on the previous pages—are manufacturing groups.

Two service divisions back up these production divisions and help make their work possible. The Engineering, Construction, Maintenance, and Utilities organization designs buildings and equipment, builds machinery, supplies power services, makes repairs, and does a host of other jobs. The Manufacturing Services Division makes photo chemicals, prints film boxes, produces gelatin, stocks manufacturing supplies, and provides a wide variety of other plant services.



Kodak Park, landmarked by twin 366-foot smokestacks, is a bustling community in its own right.

Here are a few physical statistics. The plant:

Contains more than 125 major manufacturing buildings;

Operates 7,500 telephones in a dial system;

Maintains a complete fire department;

Makes enough refrigeration in its own machines to supply all the homes in New York City, or the equivalent of 1,500,000 mechanical refrigerators;

Uses 24,000,000 gallons of water a day;

Recovers about $400,000 a month in silver from scraps of discarded film and paper;

Runs a fleet of 200 trucks and other vehicles over 13 miles of intraplant roads;

Runs its own intraplant railroad;

Turns out enough perforated film (mostly amateur and professional movie types) a year to make a strip 785,000 miles long—enough for a round trip to the moon and several times around the world!

Inspecting a highly polished, nickel-plated drum used in making photographic materials.

New equipment helps keep plant facilities continually modern.

A step in recovering silver from scrap film—refining the crystals.

Experimenting with chemicals for a new color film.

RESEARCH: *Constant Quest for Better Products*

SCIENTIFIC RESEARCH is one of Eastman Kodak's keystones.

George Eastman's early "research laboratory" was his mother's kitchen. His efforts resulted in a part-time business. But many Rochester citizens regarded his venture with more than a little skepticism.

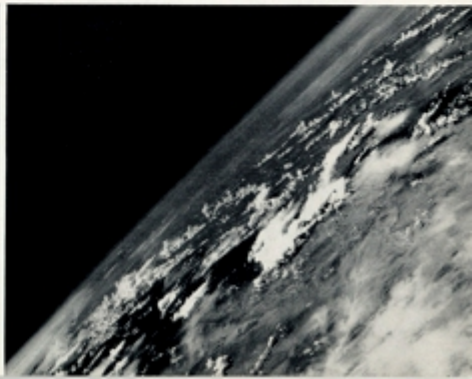
The business, nevertheless, soon took hold and grew steadily. In 1886 Eastman took a virtually unprecedented step—he hired a chemist for full-time research. This was a startling concept. But the principle has continued to be an important Kodak policy, and research is now an accepted practice of many progressive industries.

Eastman believed that his company would prosper and gain stature only as it looked ahead, scientifically. This conviction was given form in 1912 with the establishment of the Research Laboratories. Today a staff of more than 900 trained men and women serves in the main laboratory at Kodak Park. This laboratory operates much as a research university of photography. The idea and practice of research, however, extend far beyond the limits of laboratory headquarters.

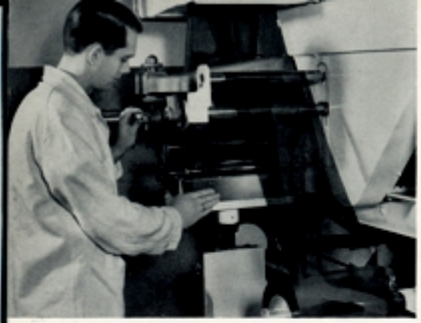
To get a new film, for example, from the laboratory stage into mass production requires much more research and experimentation. Thus, Kodak Park has a large technical staff of engineers and scientists who are constantly seeking new or better ways of commercially making various products that originally stemmed from laboratory experiments.

Every Eastman plant, moreover, has its development units. In these, pure science and practical production techniques are successfully blended into new Kodak films, papers, plates, cameras, optical goods or

White streak on special photo-plate shows track of uranium atom which was split by a bombarding neutron.



Rocket photo, shot on Eastman film at an altitude of 57 miles, indicates earth's curvature and surface haze.



Here a piece of experimental film is being made. This small-scale production will serve as a check on laboratory findings.

chemical products.

And often the bypaths of this kind of research have led the way to discoveries of great usefulness, sometimes in fields quite distant from photography.

In studying ways to improve tropical films, a Kodak research man came up with a method that ultimately produced vitamin concentrates.

A group of Kodak scientists found that a cellulose product they had made was useless for film but was something new in medicine. It is now a surgical dressing that need not be removed from a healing wound. It dissolves harmlessly into the patient's bloodstream.

The many fields of research include subjects ranging from television to nuclear physics, rapid processing of x-ray films to astronomical photography. Some photo plates, for example, are extremely sensitive to starlight. Others provide pictures of what happens when an atom splits or an electron bounces.

But every new Kodak product is, in fact, a tribute to intensive research and development work. Such achievements as amateur motion pictures and modern color films are among the brightest in the history of the Kodak Research Laboratories.

These are but samples of the results of Kodak's research efforts. They have extended the horizons of science . . . and made photography work for us all.

Hundreds of special tests are made in perfecting a new film. These strips have just been developed.

Men and Women of Kodak Park

BIG AND FRIENDLY—an apt description of Kodak Park. Here are some of the people who keep it operating and producing. Their jobs are just a few of the hundreds of different types of work done in the plant.

Kodak Camera Club facilities are used constantly by more than 10,100 members.

The Park is a large and busy place . . . but it has never lost the "human touch."

A new, six-story Cafeteria-Recreation Building serves as a center for many off-hour activities. Outdoor sports are equally popular at Kodak fields.

The cafeteria provides healthful, economical food for employees the clock around.

* * *

Kodak Park people participate in a number of employment benefits. These include wage dividends, sickness allowances, liberal vacations with pay, eight paid holidays, low-cost group life insurance, certain free medical care during working hours, group insurance against medical bills, and a retirement plan.

The athletic and recreational program at Kodak Park includes a variety of team sports, such as bowling and basketball.

Left: Part of plant's new cafeteria.

Employment stability is one of Kodak Park's marked characteristics. Although its products have a seasonal demand, the plant has been very successful in smoothing out job peaks and valleys.

Expert sales forecasting combined with a system of slack-time production for busy-time seasons is the prime reason for the stabilization plan's record.

Right and below: Other scenes in cafeteria building, including kitchen's dozen 100-gallon steam kettles.

We hope that you have enjoyed this brief glimpse of Kodak Park . . . and that it has told at least a part of the story of how the plant's products serve people everywhere.

PRINTED IN U. S. A.

Scene in the Dark

This picture was snapped in the dark—by means of infrared film and invisible infrared light. It shows one of the air-conditioned rooms at the Kodak Park Works where roll film is spooled.

EASTMAN KODAK COMPANY, ROCHESTER 4, N. Y.