



THE KODAK PARK WORKS

WHERE KODAK FILMS, PAPERS, AND CHEMICALS ARE MADE

Kodak
TRADEMARK



Films made at Kodak Park bring the fun of picturetaking to millions
of people around the world.

Kodak Park Products . . . *serving mankind in many different ways*

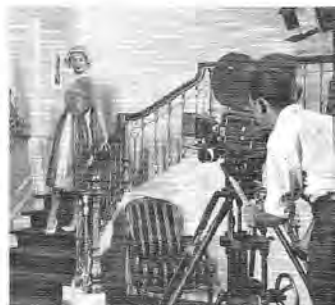
All of the Kodak films, photo papers, and processing chemicals sold in the United States—and many of those sold abroad—are made at the Kodak Park Works in Rochester, New York.

Many picturetakers think of Kodak simply in terms of the film they buy for their own cameras. But few people are aware of the amazing diversity of ways Kodak films and papers are used.

Kodak Park makes films for theatrical motion-picture productions . . . aerial films for mapping and defense . . . x-ray films for doctors, dentists, and industry . . . photo paper for office copying . . .

films and papers for portrait, magazine, and newspaper photographers and for photofinishers . . . microfilm for the miniaturization, storage, and retrieval of all kinds of documents . . . graphic arts films for the printing industry . . . and many other special photo materials.

Because the photographic process is uniquely able to make permanent records of fleeting events, to enlarge small things or make big things tiny, to do a fantastic variety of jobs, the products of Kodak Park are involved in a great many aspects of our daily living—at work, at play, at school, and at home.



Professional and commercial products account for over 60 percent of Kodak's business in photography.



Kodak Park . . . a *bird's-eye view*

The Kodak Park Works is the largest plant of the Eastman Kodak Company. It is almost four miles long and includes more than 140 major manufacturing buildings on about 1,300 acres of land. In fact, Kodak Park is virtually a city within a city, with its own power plants, cafeterias, laundry, and other needed services.

The first buildings were constructed in 1890. The company has been adding new ones and replacements ever since in order to keep up with a rising demand for Kodak photographic products.

The men and women at Kodak Park produce:

- some 200 kinds of film—including roll film, sheet film, and motion-picture film
- over 325 kinds of photo paper
- about 350 kinds of photographic chemicals
- more than 35 kinds of photographic plates

They also make magnetic tape . . . plastic sheeting for packaging and for outdoor signs . . . and more than 4,000 research chemicals.

A vital requirement for making high-quality photographic products is cleanliness. The slightest chemical impurity or particle of dust can damage film or photo paper. Hence, cleanliness is a way of

life at Kodak Park. In some areas, even the air is cleaned ten times every hour.

Film and photo paper would be ruined by light, too. For this reason, key manufacturing operations are carried on in air-conditioned, darkened rooms.

These are among the most obvious steps in a stringent program of quality control. Many tests are made to assure customers they *can depend* on every roll and sheet of Kodak film and paper.

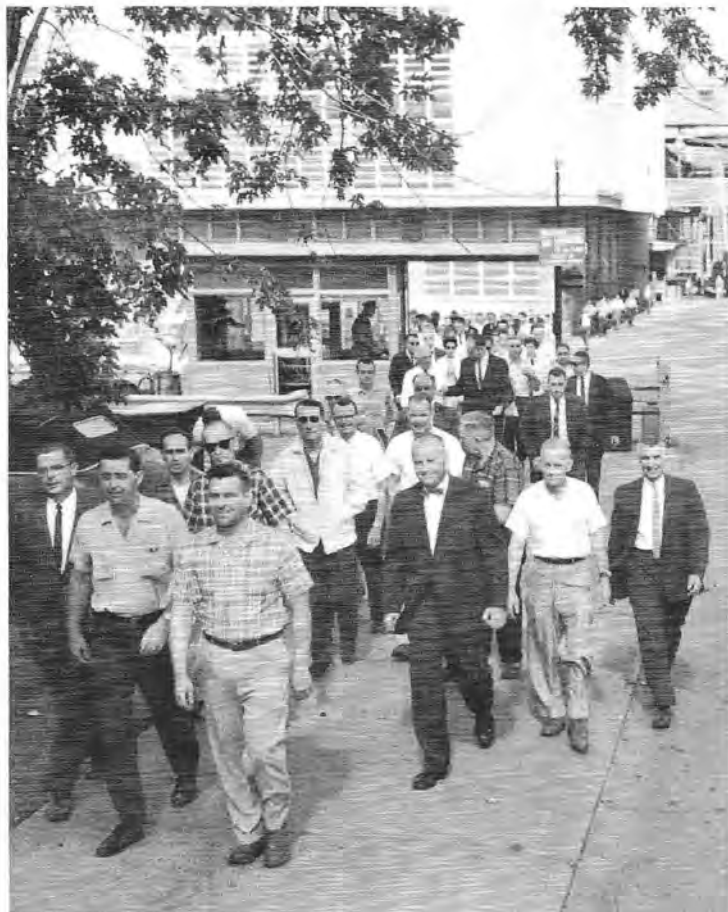


Guided tours of Kodak Park for visitors and their children 5 years or older are provided on Mondays through Fridays, except holidays, at 9:30 a.m. and 1:30 p.m.



Skills and knowledge are passed along both in classrooms and on the job.

Through the years, the men and women of Kodak Park have established a reputation for high quality and reliability in the products they make. ▶



Kodak Men and Women . . . *the people behind Kodak quality*

Kodak's reputation for high quality has been created by the men and women who use the company's modern facilities to produce the best in photographic materials.

The people at Kodak Park—more than 20,000 of them—represent an amazing array of skills and abilities in hundreds of different professions, trades, and specialties. These men and women are part of an enthusiastic company-wide industrial team that has been a key to Kodak's successful growth.

Employment Stability

Although customers use much more film and paper at some seasons of the year than at others, careful sales forecasting has made it possible to keep rates of production steady the year around.

As a result, employment at Kodak Park remains remarkably stable; for the company as a whole, employment turnover is less than one-quarter of the national average for all industry. Over 3,000 men and women at Kodak Park have been with the company for more than 25 years.

All Kodak people share in a broad employee-benefit program. Besides fair wages and safe working conditions, this program includes a wage dividend

(an annual cash payment related to the dividends declared on Kodak common stock), liberal vacations, sickness allowances, a retirement annuity plan, and group health and life insurance plans.

Through a suggestion system, cash awards are paid for ideas that improve products, increase safety, or save time or money.

Varied Recreation Program

The Kodak Park Athletic Association sponsors many activities, including sports, hobby clubs, instructional classes, entertainment programs, and planned holiday and vacation trips. The Kodak camera club, with more than 10,000 members, is the largest in the world.

Besides the dozens of intra-plant athletic leagues, ranging from basketball to golf, there are a number of "varsity" teams. Twice, for example, Kodak Park teams have won the world softball championship.

The recreation center includes a 2,200-seat auditorium, a gymnasium, 20 bowling lanes, and other facilities. Recreation programs are provided not only for employees but also for their children and for men and women who have retired from the Kodak Company.

The Magic of Film ...*what it is* ... *how it works*

Photographic film is built with two main components—(1) light-sensitive emulsion coated on (2) a clear plastic base.

The emulsion consists of tiny crystals of silver halide suspended in gelatine. When light strikes these crystals, several atoms of metallic silver are formed in each crystal. These atoms compose what is known as a “latent image.”

Later, when the film is developed, up to 500 million times as much silver is formed from the silver-halide crystals. This development process gives photography one of the greatest powers of energy amplification known today.

The metallic silver, which is black, is the actual image in a black-and-white negative. Silver also

forms the image you see on black-and-white photographic prints, which are made with an emulsion coated on paper.

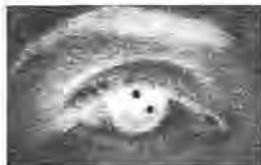
Color film and paper are far more complex. They have multiple layers of light-sensitive emulsion—one on top of the other—to record the different colors of light. As in black-and-white film, each layer contains silver halide; but color dyes replace the silver when the film is processed.

The full range of colors in the final image is actually formed by three dyes—yellow, magenta, and cyan. These three dyes are quite similar to the three primary colors (commonly called yellow, “red,” and “blue”) which painters often use to mix a wide variety of other colors.

Black-and-white images are made up of grains of silver:



Original negative



enlarged 25 times



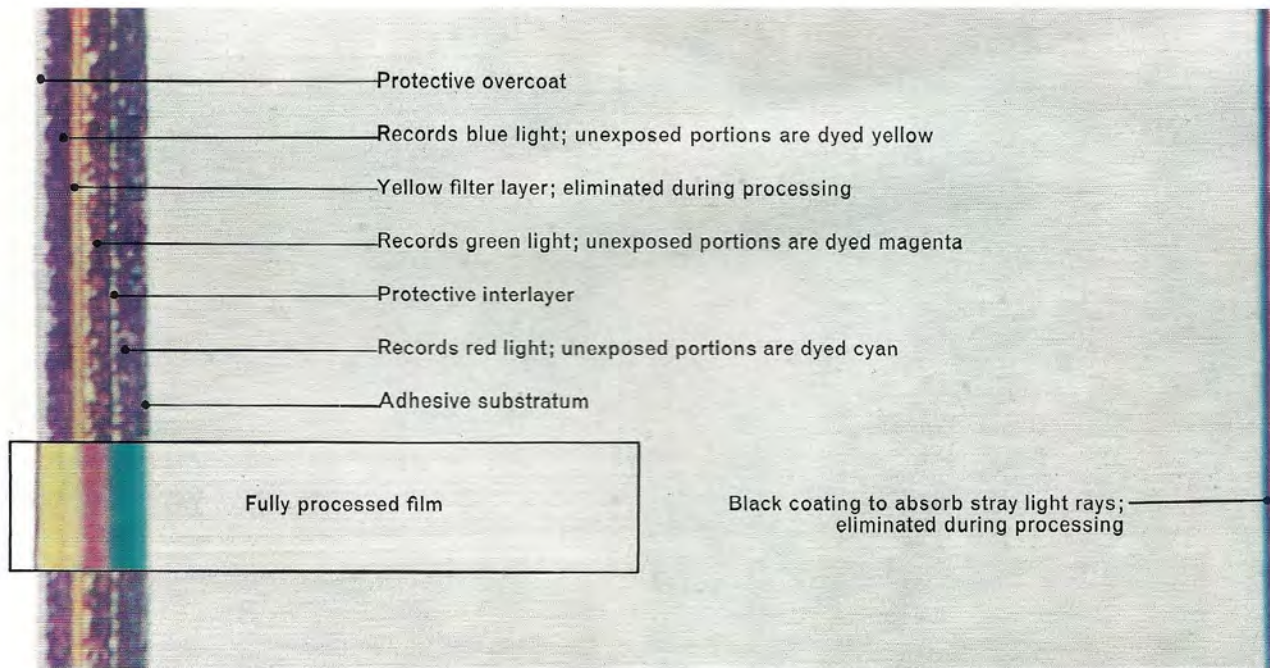
... 250 times



... 2,500 times



... and 25,000 times



Cross-section of Kodachrome film

This photomicrograph shows a cross-section of Kodachrome film magnified about 1,000 times. The main portion is raw film, the way it is when you

buy it. The inset is fully processed film, as in a slide or movie. The total thickness of the coatings is less than that of a human hair.

Film Base . . . *the plastic support material*



Control panels for some of the five-story-high "roll-coating" machines, which make film base 24 hours a day, seven days a week.

The first steps in making film base take place at company divisions many miles from Kodak Park.

At the Tennessee Eastman division in Kingsport, Tennessee, purified cotton or wood pulp is treated with acetic acid to make little pellets of cellulose acetate. Alcohol and other solvents are manufactured

by the Texas Eastman division in Longview, Texas.

These materials are brought together at Kodak Park. Here, in a continuous mixing machine several stories high, the pellets of cellulose acetate are combined with the solvents and a plasticizer to form a thick fluid, called "dope."



The dope is fed evenly onto a gleaming, chromium-plated wheel that is five feet wide, 18 feet in diameter, and weighs over 30 tons. As this large "roll-coating" wheel slowly turns, heat drives off the solvents, and the dope becomes a thin, flexible, clear sheet of plastic.



Left: Workmen prepare to install gigantic wheel in a roll-coating machine. Acetate "dope" will be coated onto this wheel to form film base. **Right:** An inspector examines the chromium-plated wheel to be sure that the mirrorlike finish is free from even the tiniest imperfections.

After one turn on the wheel, the film base is strong enough to enter drying chambers, through which it travels for nearly an hour. During this time, an "adhesive substratum" layer is applied to the film base—so that the light-sensitive emulsion, to be applied at a later stage, will adhere to the base. The film base is then wound into large rolls, usually 54 inches wide.

Equipment is Dust-Free

All of the coating and drying is done in a huge machine, completely enclosed so that not a speck of dust can get at the film base.

Kodak Park produces 13 types of acetate film base. However, some of Kodak's commercial films, such as those for the graphic arts, are made with a different material—Estar polyester film base, which is almost as dimensionally stable as glass. Large facilities at Kodak Park are devoted to the production of Estar film base.

Emulsion Making . . . *key to Kodak's famous films*

The heart of photographic emulsions for films and papers is silver—the key element in light-sensitive silver halide. Next to the U.S. mint, Kodak is the world's largest individual user of silver.

Another vital ingredient in the emulsions is gelatine, which comes from specially treated animal

bones and hides. Kodak makes gelatine both at Kodak Park and at the Eastman Gelatine Corporation in Peabody, Massachusetts.

Gelatine is used to hold the crystals of silver halide in place in the emulsion. The quality of film starts with the purity of the gelatine; it must be purer than the gelatine you eat.

The Emulsion-Making Process

Briefly, here's how the people at Kodak Park make light-sensitive emulsions:

They dissolve 80-pound ingots of silver in nitric acid, then pipe the solution to 1,000-gallon drums. There, the solution is stirred and cooled, causing silver-nitrate crystals to form and grow. The wet crystals are then whirled in perforated baskets to "wring out" the moisture and to purify the crystals.

Emulsion makers mix a solution of these crystals with potassium halide in a warm, syrupy form of gelatine. A chemical reaction occurs, leaving silver-halide crystals in the gelatine. Meanwhile, the ni-

Kodak uses large quantities of silver, the heart of light-sensitive emulsions for films and papers. Shown here is over 40 tons, almost a three-week supply. Each bar is worth well over \$1,000.



trate and potassium combine as potassium nitrate, a by-product that is eventually washed away. This work must be done in darkness, of course, as the silver-halide crystals are sensitive to light.

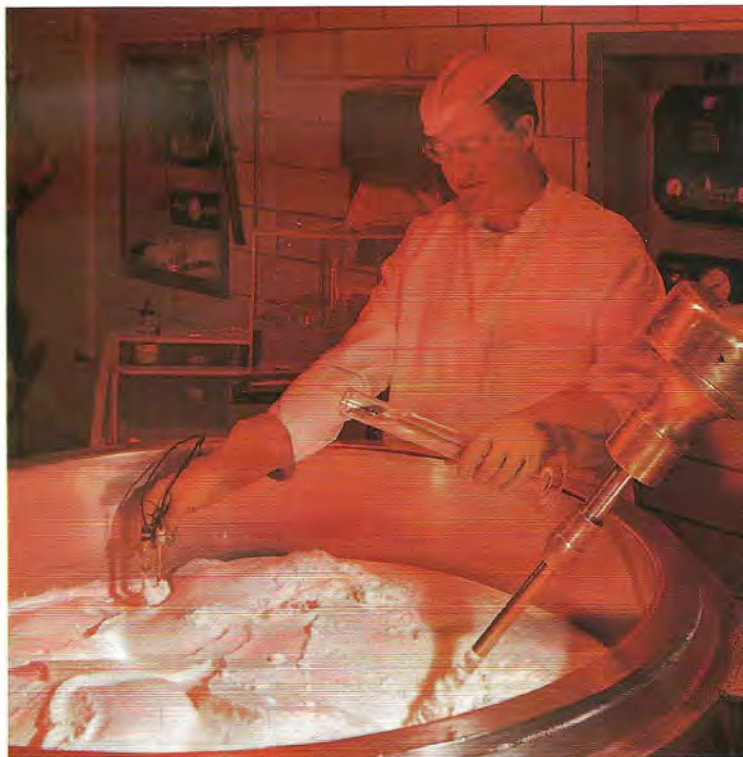
Control of Special Characteristics

The silver-halide gelatine emulsion is then given various treatments for the control of grain size and of the light sensitivity (or "speed") of the emulsion.

Finally, small amounts of various chemicals are added — spreading agents, hardening agents, and chemicals to make the silver halide more sensitive to light, including different colors. Also, for some color films, "color couplers" are added. These are chemicals that will form color dyes when the film is processed.

Many of the quality features of Kodak's world-famous films and photo papers stem from the specialized preparation of the emulsions. In total, Kodak Park makes over 200 kinds of photographic emulsions, each for a special purpose.

A technician combines the basic ingredients for a photographic emulsion—potassium halide, silver nitrate, and gelatine. Because the resulting emulsion is light-sensitive, this work is done in darkened rooms.



Making the Finished Film . . . *rolls and sheets by the millions*

Highly precise work—that describes the job of coating photographic emulsion on film base. Extremely thin coatings, often less than 1/10th the thickness of a human hair, must be applied with exacting uniformity.

Intricate, costly equipment is required for emulsion coating. A typical “coating alley” at Kodak

Park is 200 feet long and five stories high. As in previous steps, everything is kept spotlessly clean. Production areas are vacuumed and scrubbed daily. The air is carefully filtered. And the people who do the coating wear special clothing from head to foot.

They coat wide rolls of film base with the precise emulsion for that film’s particular use. The large rolls are then slit into narrower widths and later chopped into sheets, wound onto reels, or spooled into small, individual rolls.

Precision Perforations

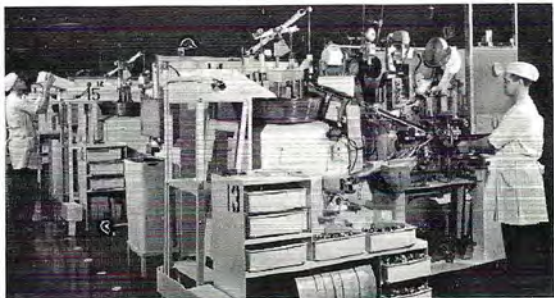
Motion-picture films and many roll films are perforated with sprocket holes. Kodak people take great care to see that these holes are exactly the right size and the right distance apart so the film will operate smoothly in cameras and projectors.

Finally, the film is hermetically sealed (to keep moisture from damaging it) and is packaged in the cans, cartons, and boxes in which you buy it.

All Kodak film is checked carefully as it is being made. In addition, samples are removed from production every step of the way and given exhaustive tests—including an analysis of actual photographs taken with the film sample.



Emulsion is coated on film in scrupulously clean rooms.



Automatic film-spooling machines enable Kodak Park people to supply rolls of film for millions of picture takers.



Samples of finished film must pass a variety of physical and photographic tests before the film will be packaged.

Finally, the film is packaged in the familiar Kodak yellow box. ▶



How Film is Made . . . a *brief summary*

This drawing of a highly simplified film plant shows the major production steps:

For the film base, cellulose acetate is poured into mixers (1) containing solvents to form "dope" (2). The dope is filtered (3), flowed onto huge roll-coating wheels (4), and then dried to form film base.

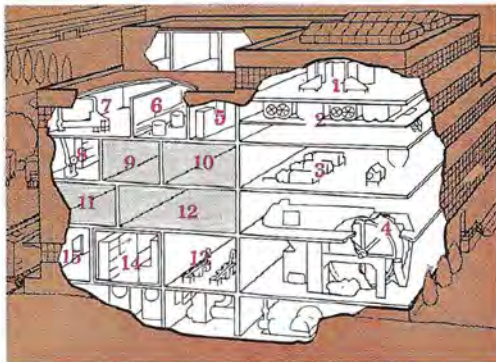
Meanwhile, for the emulsion, silver ingots (5) are dissolved in nitric acid (6), crystallized, and dried (7). The crystals are loaded into barrels (8) and sent to emulsion makers (9), who combine the crystals with potassium halide in gelatine and then add other chemicals.

The film base is coated with the emulsion (10). Then the film is slit into proper widths (11) and spooled into rolls or reels (12). Steps 9-12 take place in darkened rooms.

For almost every step in production, there are several steps for inspection and testing.

Finally, the film is packaged (13) and sent to air-conditioned storerooms (14), from where it is shipped (15) to dealers.

The model plant is, of course, greatly condensed. One or more entire buildings are often devoted to a single step in the manufacture of Kodak film.



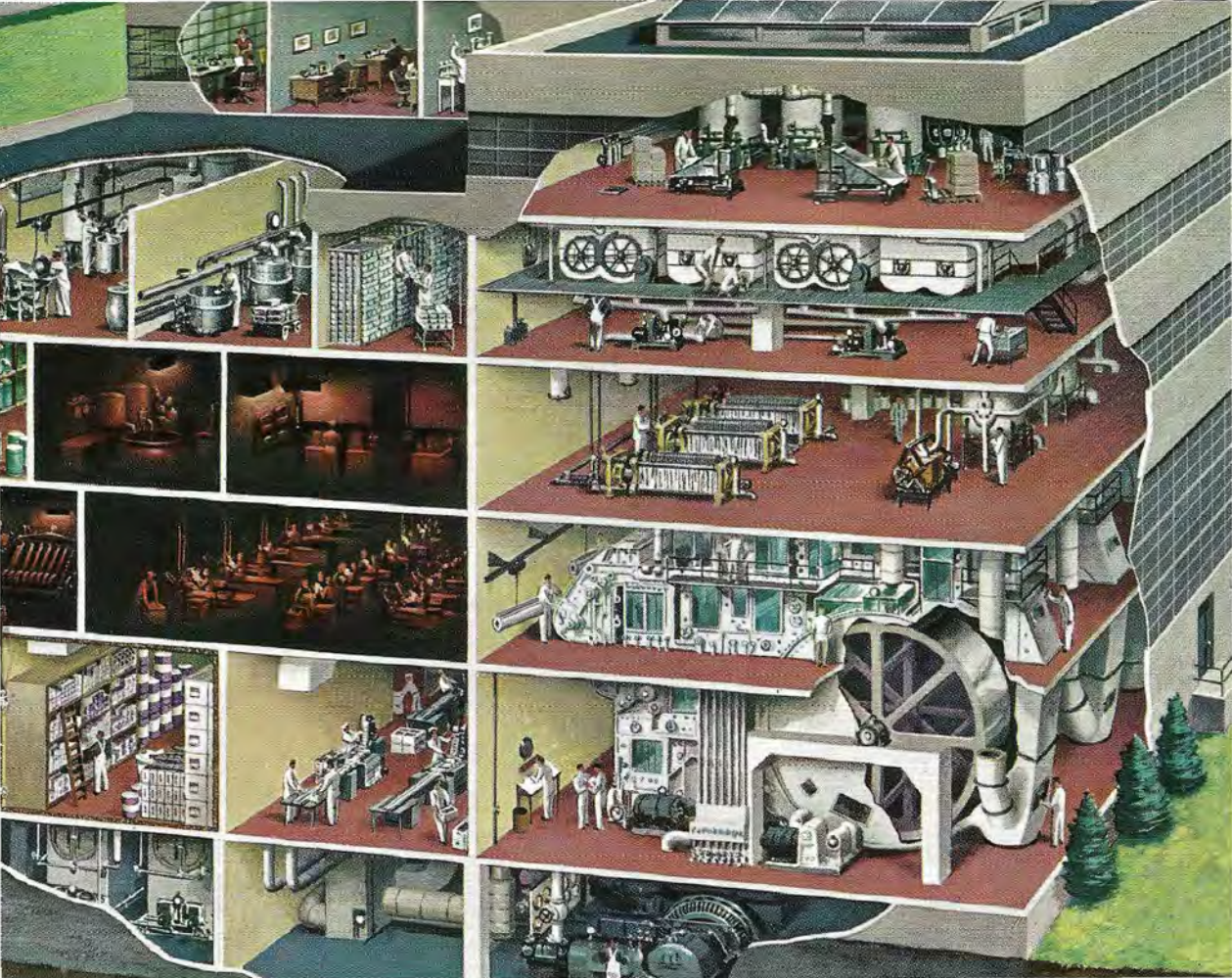


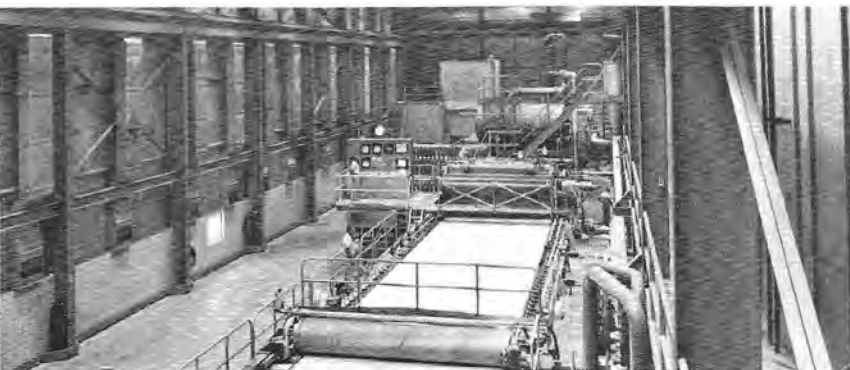
Photo Paper... *for pictures you'll keep for a lifetime*

Because pictures preserve fond memories, people usually keep them indefinitely. Prints that will last for years must be made with paper having unusually high quality as well as special characteristics for photographic purposes.

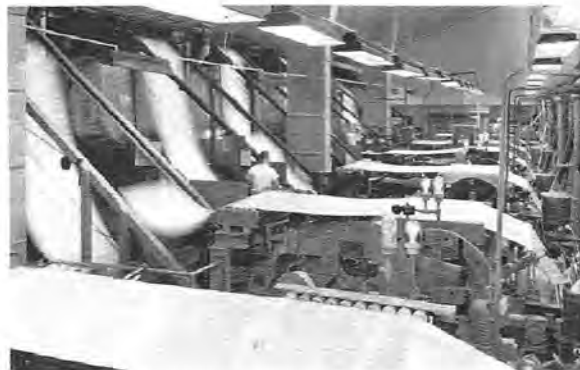
Kodak Park makes not only photo paper but also all the papers that come in contact with film and photo paper, for these auxiliary papers must be of very high purity, too.

Paper making at Kodak Park starts with wood pulp as pure in cellulose as new-grown cotton. In a huge vat of water, sheets of this special wood pulp are defibered by whirling blades and mixed with starch, dye, gelatine, and other chemicals.

The water-laden mixture is flowed onto a moving wire screen and becomes paper as the water drains away. Sizing is added to give the paper more body. Then the paper is dried and "calendered"—squeezed



One of Kodak Park's paper mills can make a web of high-quality paper, 150 inches wide, at speeds of up to 1,000 feet a minute.



A bank of machines coats the paper with "baryta" to provide a suitable base for the emulsion.

between a series of rollers to give it more strength and uniform thickness.

Later, a coating of barium sulfate and gelatine—called “baryta”—is applied to the photo paper. This fills in pores, gives gloss, and provides a base for the light-sensitive emulsion, which is coated in much the same way as in the production of film.

Large rolls of paper are aged in special rooms before they are coated with photographic emulsion and cut into sheets. ▶

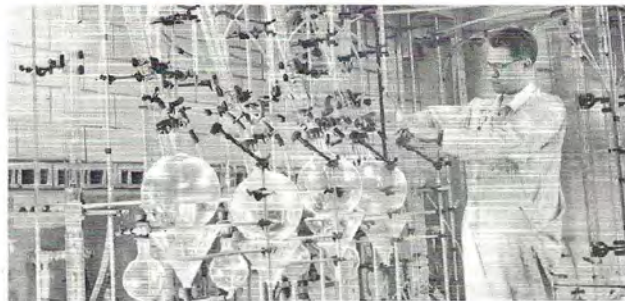


Extensive laboratory tests to ensure high quality are part of each step in the production of photographic paper.





Plastic bottles are filled automatically with photographic processing chemicals.



Over 95 percent of the solvents used in making film base are recovered. They are driven off as the film base hardens, then purified by these distilling towers for re-use.

Many different chemicals go into the production of color film. Technicians use this apparatus to make one of the compounds required in small quantities.

Chemicals . . . to make films and papers and to process them



In essence, Kodak Park is a large *chemical* plant. The production of photographic film and paper is all based on chemistry, and it takes large chemical manufacturing units to support this work.

Also, Kodak Park makes about 350 different processing chemicals—enough each day to fill 18 tractor trailers. Photofinishers and other customers use these chemicals by the packet, bottle, and drum.

Among widely used processing chemicals are ones with tongue-twister names like sodium hyposulfite and 6-nitrobenzimidazole nitrate. But folks prefer to call them simply “hypo” and “anti-fog.”

Varied Methods of Production

Kodak Park produces some chemicals continuously and others in batches. For instance, “dope” for film base is mixed continuously—2,400 tons of it each week. Other chemicals, however, are made in batches which range in size from 10,000 pounds for some processing solutions to a fraction of an ounce for certain additives to film emulsions.

Quality control and cleanliness are just as vital in chemical production as in making film and photo paper. All compounds are tested carefully before they are used or shipped to customers.

Finished products are stored in the distribution center at Kodak Park until they are shipped. The products are moved into and out of the warehouse with the help of modern materials-handling facilities.

The distribution center is the company's largest building—over one mile around the outside. It is situated next to a modern expressway that is part of Rochester's "outer loop." This location provides for easy access by trucks.



Shipping Kodak Products . . . *from Kodak Park to you*

All Kodak photo products made in Rochester—including cameras and projectors—are stored for shipment in the modern, 25-acre distribution center located at Kodak Park.

The people at the distribution center stock, ship, and keep track of more than 30,000 catalogued products from the time they're manufactured until they're sold. They ship these products to eight regional Kodak sales divisions in the United States

and to distributors, export houses, and Kodak associate companies around the world.

These units, in turn, fill the orders of photo dealers and wholesalers. In this way, the products made at Kodak Park reach some 100,000 retail outlets in the U. S. as well as many thousands more in over 115 countries and territories.

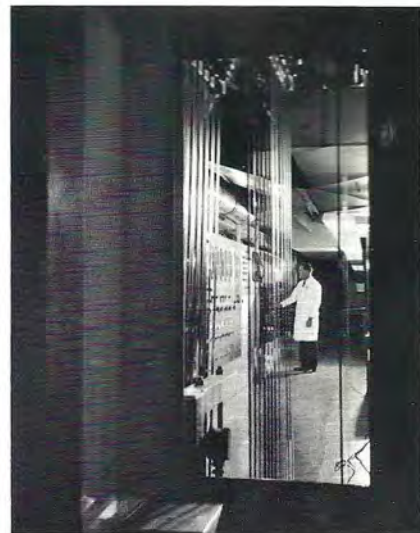
This broad network of sales outlets makes it easy for you to buy Kodak products wherever you go.



◀ Computers at the distribution center expedite many operations—including order handling, billing, inventory control, scheduling, and planning.

Whether at home or traveling, you're probably never far from a dealer who sells products made at Kodak Park.





Kodachrome and Ektachrome films are processed with special equipment under precise controls.

◀ Kodacolor Prints . . . by the thousands.

Color Pictures . . . *processed by Kodak*

Have you ever noticed on your finished color slides, movies, or color prints the term, "Processed by Kodak"? This means your pictures were processed by one of the Kodak Processing Laboratories.

The largest of Kodak's ten processing stations in the U. S.—and the headquarters for them all—is operated by the Color Print and Processing organization at Kodak Park.

Kodak management believes the company must set a high standard of quality in color-film processing. And to be sure that all Kodak laboratories meet the same high standard, the people at Kodak Park coordinate quality control at all these units.

Location of Other Units

Other Kodak laboratories that process color slides and movies are located in Atlanta, Ga.; Chicago, Ill.; Dallas, Tex.; Fair Lawn, N. J.; Findlay, Ohio; Honolulu, Hawaii; Los Angeles and Palo Alto, Calif.; and Washington, D. C. Kodacolor Prints are made at Rochester and at Palo Alto.

There are Kodak Processing Laboratories, too, in various countries outside the United States. The quality of processing by these laboratories is also coordinated by the Kodak Park organization.

● U. S. Processing Laboratories



Besides the unit at Kodak Park there are nine other Kodak Processing Laboratories in the United States.

Meet Others on the Team . . . *in the many support units*

Kodak Park may well be called a city within a city.

It has its own railroad . . . 200 trucks that use 15 miles of intraplant roads . . . three electric power plants . . . a system of 7,500 dial telephones . . . its own water works, supplying over 25 million gallons a day . . . a modern waste-water treatment plant . . . a laundry . . . two fire houses . . . 18 cafeterias . . . and numerous other support units.

Much of Kodak's production equipment is unique and cannot be purchased outside the company. For example, nowhere in the world are there emulsion-coating or film-spooling machines like those used by Kodak. A 3,000-man unit at Kodak Park designs, builds, and maintains such special equipment.

Vital Building Program

Every year, new buildings are needed for more capacity or better production methods. Kodak Park's own construction company within the plant does much of this work.

Other important units are the sundries division, which makes the film spools and reels . . . the print-

ing division, which produces the film cartons and instruction sheets . . . and the paper box division, which makes the sturdy boxes in which Kodak products are shipped.

Yet, with all these internal capabilities, Kodak Park is still a good customer of 10,000 different firms. Each year, it buys supplies and services worth over \$100 million!

With the aid of a model, a group of engineers plans the flow of work in a new plant that is being designed.





◀ Over the last ten years, Kodak Park has invested more than \$250 million in new plants and improved production equipment.

Film cans, reels, spools, Kodapak cartridges, and other related photographic items are made by Kodak Park's sundries division.

Much production equipment—like this Kodapak cartridge film-loading machine—is designed and built at Kodak Park. ▼



Research and Development . . . *foundation for progress*

A continuing flow of new and improved products—to broaden the uses of photography and to make photography better for everyone . . . that is the goal of research and development at Kodak.

Of the hundreds of products made today at Kodak Park, a high proportion were introduced during the last ten years, and virtually all have been improved substantially in that time. Meanwhile,

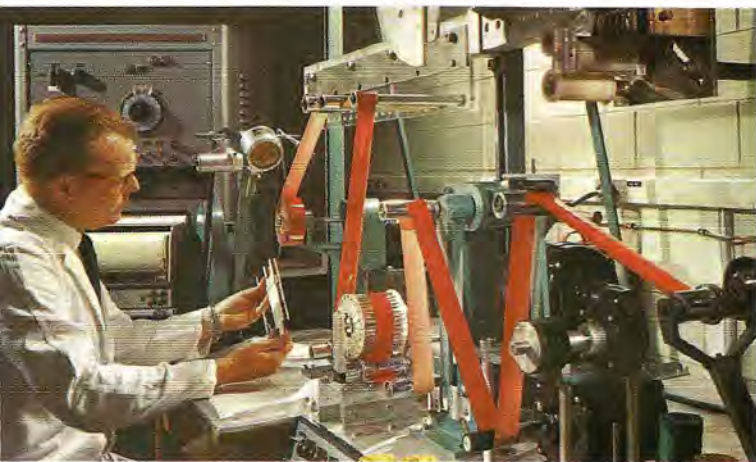
over 2,000 graduate scientists and engineers are at work on still better products for tomorrow.

Kodak Park is the site of the Kodak Research Laboratories, formed in 1912 as one of the first formal research organizations in American industry. Such advances as home movies, color films, and Verifax copying originated in these laboratories.

Research in Many Fields

The laboratories' scientists conduct the fundamental research—the study of the basic areas of chemistry and physics that underlie photography—and the exploratory research and early-stage development on new products. Fields of study range from photographic dyes to rapid film-processing . . . from photoengraving to television . . . from magnetic-tape recording to radiography . . . and from astronomical photography to the production of printed electrical circuits.

The final stages of development are carried out by teams of scientists and engineers in the manu-



◀ A research scientist uses special equipment to study certain properties of an experimental motion-picture film.

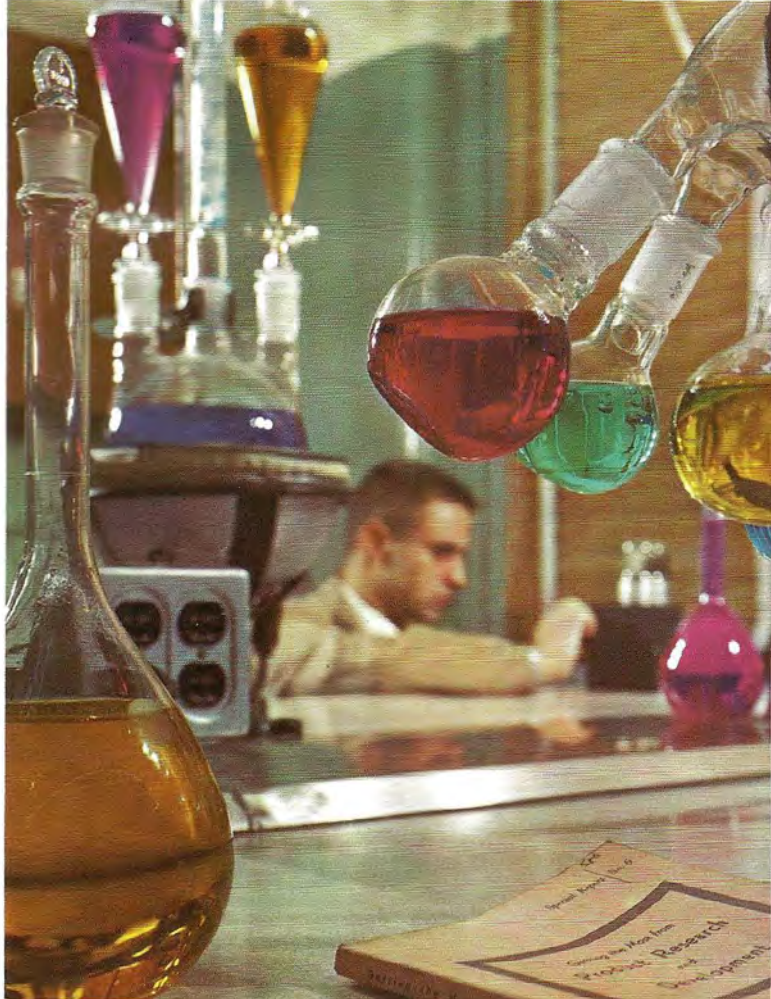


Extensive work in the fields of science underlying photography includes the analysis of new compounds (left) and the study of chemical-reaction rates (right).

facturing plant. These people devise ways to make new products on a large scale, with traditional Kodak quality and uniformity built into each unit.

In effect, it is the job of these men and women to bridge the great gap between a product created in the laboratory and one produced in quantity to meet the needs of a wide range of customers.

Broad research in chemistry has led to continuing advances in Kodak films, papers, and photo chemicals. ▶



Other Kodak Units in the U.S.

The work of Kodak Park is coordinated closely with other Kodak units, especially the Apparatus and Optical Division in Rochester. This division includes the Camera Works, which makes cameras and projectors; the Hawk-Eye Works, a large optical-mechanical plant; and the Lincoln Plant, which does special defense work.

Kodak Park makes film for the Recordak Corporation, the company's unit that sells and services microfilming systems.

Nearly one-third of company sales comes from non-photographic products. Plastics, fibers, and chemicals are made by the Tennessee Eastman division in Kingsport, Tenn., and the Texas Eastman division in Longview, Tex. These products are sold by Eastman Chemical Products, Inc.

The Distillation Products Industries division, which is adjacent to Kodak Park, makes vitamin concentrates and other products for use in pharmaceuticals, foods, and animal feeds.



The Tennessee Eastman Company division, established in 1920, is a major producer of plastics, fibers, industrial chemicals, and raw materials for photography.

The Texas Eastman Company division makes industrial chemicals and plastics. ▶





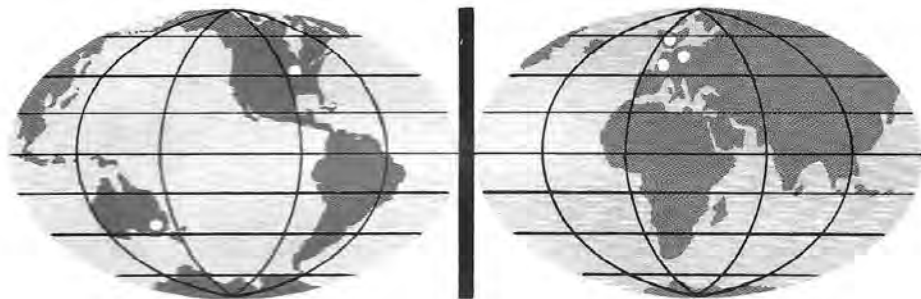
Camera Works



Hawk-Eye Works



Distillation Products Industries



Kodak Units in Other Countries

Over 10 percent of the output of Kodak plants in the United States is sold abroad. In addition, large quantities of Kodak photographic products are made by major associate companies in five other countries:

England—Kodak Limited, with plants at Harrow, Hemel Hempstead, Kirkby, and Stevenage.

France—Kodak-Pathé, with plants at Vincennes, Sevrans, and Chalon-sur-Saône.

Germany—Kodak A.G. at Stuttgart.

Australia—Kodak (Australasia) Pty. Ltd., with plants at Coburg and Abbotsford.

Canada—Canadian Kodak Co., Limited, at Toronto.

Sales and distribution of Kodak products outside the United States are handled through associate companies and units at nearly 150 locations around the world.

EASTMAN KODAK COMPANY, Rochester, N. Y. 14650