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THE EASTMAN KODAK COMPANY, ITS ORGANIZATION, ITS PRODUCTS & METHODS.

Lecture

by

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EASTMAN KODAK COMPANY, ITS ORGANIZATION, ITS PRODUCTS AND METHODS.

INTRODUCTION.

Every thoughtful civilian, especially if engaged, as I was, on the production of Army supplies during the late War, realizes the absolute need of a well organized, intelligent and carefully planned coordination between the Nation's industries and the War Department, particularly its Procurement Division.

The Army Industrial College seems to me an exceptionally well thought-out and efficient means of accomplishing this purpose in the event of another national emergency. I am, therefore, very glad indeed to do what little I may toward this end by telling you something about our Company, its products, methods and possible war-time problems and requirements.

I am going to show you:

I. A general picture of the Company and its products,
II. How the Company is organized and how its various functions are supervised,
III. How the Company's products are sold and distributed throughout the world,
IV. How the probable demand for various regular products is forecast and how planned and controlled through the various manufacturing processes,
V. How raw and other materials are procured and some of our war time problems,
VI. Our methods of securing and training personnel and the problem of the loss of men in "key" positions through the draft,
VII. Something about our general power consumption and how fuel requirements were reduced during our last emergency.

I. GENERAL PICTURE

As you know, our Company does a world-wide business with factories, sales branches and stockhou ses scattered throughout the world. Its principal offices and main plants are located in Rochester, N. Y., and from there, in general, all activities of the Company are supervised and controlled.

Roughly, our properties and activities may be divided into four groups with common characteristics as to organization and functions. These are:

1. Our American Group.

   Including our head offices and American plants, sales branches and stockhouses and a foreign sales Division controlling South American, Mexican and Chinese Stockhouses and Dealers.

2. Our Canadian Group.

   Comprising our offices and plant in Toronto, Ontario, with its branches and stockhouses.

3. Our Kodak Limited Group.

   Having its head offices in London and factory at Harrow, a plant at Vacz, Hungary and with its Continental and provincial sales branch branches and stockhouses.

4. Our Kodak Australasia Group.

   With head offices at Sidney and factory at Melbourne, Australia and with its sales branches and stockhouses in Australia, New Zealand and Tasmania.

For a little more detailed picture, I will give you a further description of these groups.

1. American Group.

   In Rochester, N. Y., we have our "State Street" group of buildings, as we call it. These consist of our Main Office Building, Main Stock, and Rochester Sales Branch and Shipping Building, and our so called, "Camera Works".

   This group has a total floor area of a little

less than 900,000 square feet, with a total of about 4,000 employes, 1,200 of whom are in the offices. It is located on the site of the original "home of the Kodak", to which our sixteen-story office building is a sort of monument.

The Main Office Building includes the executive offices, Sales & Advertising, Legal, Accounting, and similar departments.

The Camera Works makes, with few exceptions, our complete line of kodaks and cameras and most of the accessories which go with them, ranging from the inexpensive Brownie to the new Cine Kodak, i.e., the small amateur motion picture camera, and the Kodoscope which is the motion picture projector.

There are three other plants in Rochester:

(a) The Folmer-Century Plant, employing 150 people.

This plant manufactures the Airplane, Graflex, Eastman View, and Cirkut cameras, together with such specialities as, the Finger-print camera. They also make our complete line of professional, studio and other accessories. In all, there are from 400 to 500 different articles manufactured.

(b) The Hawk-Eye Plant, employing about 350 people.

This plant occupies about 100,000 square feet of floor space. It is devoted almost exclusively to the manufacture of the high-grade lenses required for our own use. When, during the War, the Air Service wanted a super lens for aerial photography, this organization found little difficulty in meeting the requirements and produced a 20" focal length lense that takes a clear picture from three miles above the ground.

(c) Kodak Park Works, employing between 6,000 and 7,000 people.

This is our largest and most important plant. It covers about 230 acres with 124 buildings, representing a total floor area of over 88 acres.

Its products are photographic film, including roll film, Film Packs, Commercial, Portrait, X-ray, and moving picture film; photographic papers, of which there are approximately 150 kinds; dry plates, photographic chemicals; Kodolac paint and varnishes, artificial leather; and sundries of various kinds and descriptions too numerous to mention.

This plant manufactures much of its own raw materials, such as paper for photographic purposes, gelatine, nitric, sulphuric, pyrogallic, and other acids, silver nitrate crystals, paper and wooden boxes, metal cans, and similar accessories.

Then, outside of Rochester, we have at Kingsport, Tenn., The Tennessee-Eastman Corporation which manufactures the products of wood distillation, such as, wood alcohol, acetone, and like chemicals.

In Pasaaic, N. J., we have the Eastman Chemical Corporation manufacturing a line of chemicals special to our business.

In Chicago, we have the Tapprell-Loomis Company making a line of photographic supplies, such as photographic albums, picture mounts, etc.

2. Canadian Group.

In our second, or Canadian, Group, we have Canadian Kodak Company, Limited, located in Toronto. This plant covers twenty-five acres. It is located on the main line of the Canadian-Pacific R. R. and consists of six main concrete buildings, with a total floor space of 10-1/2 acres. This plant employs between 1,200 and 1,500 people.

In a way, this plant is a combination of our Kodak Park and Camera Works, since we assemble there cameras and manufacture photographic supplies. The plant has its own executive and sales forces.

3. English Group - Kodak Limited.

In this group the main plant is located at Harrow, twelve or fifteen miles outside of London. This plant covers 28 acres, 12 acres of building

floor space and employs 937 people. It manufactures photographic plates, paper and film.

The Kingsway Offices employ approximately 650 people. The executive and sales head of this group is located here. Altogether, about 3,300 people are employed in this group, 1,800 of whom are in the foreign or provincial offices. In Paris alone, there are 500 employes, in Bombay, 199, and 195 in Madrid.

At Vacz, in Hungary, we have a photographic paper plant employing 150 people, handled and controlled from Kingsway.

4. Kodak Australasia Group.

In Australia, there is the Kodak Australasia Limited Company. This is operated as an independent organization, but we own 51% of the stock. The factory is at Melbourne with executive and sales offices at Sidney and other sales branches at Adelaide and other Australian and New Zealand points.

Altogether, there are employed a little less than 1,000 in this group. The factory makes photographic paper, coats film base, and finishes up and handles cameras received from Canada through England.

In addition, the Company has sales branches in New York, Chicago and San Francisco, and twenty-five stockhouses in this country and other sales branches and retail stores throughout the world, some

36 in Europe
6 in Africa
7 in Asia
9 in Australia
3 in South America
1 in Mexico
1 in Canada

These will be mentioned in connection with our third heading covering the distribution of product.

In all, the Company has a total of 16,2[illegible] employes throughout the world.

II. ORGANIZATION.

In general, it has been Mr. Eastman's policy to avoid over centralization. The idea has been to supervise managers, rather than to attempt to manage through centralization from afar. Managers are therefore allowed a wide range of latitude as to ways and means of accomplishing their objectives, the entire test being how well these objectives are attained. Our orgsnization is therefore built up chiefly on a functional basis.

At the head, is Mr. Eastman, who is the Chairman of the Board of Directors. To him reports the Assistant to the Chairman who is in charge of office management and statistics.

Next, we have the President, Mr. W. G. Stuber, who in addition to his other duties, is directly responsible for the maintenance of our standard of excellence of photographic quality throughout all of our plants, both here and abroad.

Next, comes Mr. Frank W. Lovejoy, Vice President and General Manager. Directly under Mr. Lovejoy come the managers of our various groups and plants. These managers, in the case of Kodak Limited, Canadian Kodak Company, Limited, and Kodak Australasia, are responsible not only for manufacturing, but also for the sales and distribution of product, subject to general policy control.

Next, we have a vice-president who is also the Company's secretary in charge of the Legal Department.

Then we have a vice-president in charge of Sales Policies including foreign and domestic advertising.

To the Vice-President and General Manager report the Company's treasurer, the managers of our domestic plants, and also the heads of such departments as our Research Laboratory, our Department of Industrial Relations, the Patent Department, and Production Planning Departments.

Under the supervision of the Vice-President in charge of Sales Policies, comes the General Sales Manager in charge of domestic sales, the manager of Cine or Moving Picture sales, the Manager of X-ray Sales, the Manager of Chemical Sales, the Manager of Export Sales, Government and Aero Sales, the Advertising Department, and the Manager of our Service Department. Under this division also comes supervision over the design of all the Company's labels

and containers. This department also includes the manager of Stockhouses and supervision over the Company's retail stores.

As an illustration of our plant organization, we will consider that of our Kodak Park Works. Here, we have a Works' Manager with two Assistant Managers, one with supervision over production and the other responsible for engineering and maintenance, including the generation of power and like activities.

The Production Division is divided up into departments with department superintendents in charge of each and with three general superintendents between the department superintendents and the assistant managers, each having supervision over a group of departments.

The Engineering & Maintenance Department is directly under the supervision of a department superintendent.

From the previous enumeration of the products manufactured at our Kodak Park Works, it will be noted that in a way this plant is like an aggregation of factories, each with its own products or lines of products, each under its own department superintendent, each tied in with a central organization, and each dependent for engineering and maintenance service upon a centralized engineering department.

In our industry, this engineering and maintenance department function is very important. Manufacturing processes are almost constantly in the process of evolution and development with changes and improvements constantly under way.

Roughly, we have from fifteen to twenty trades represented in this department with a total of 1,100 to 1,200 men employed. The activities include the design and construction of new buildings, automatic machinery and equipment for carrying out the various chemical processes, supervision over the generation of power and the maintenance of the entire plant.

III. SALE AND DISTRIBUTION OF PRODUCTS.

In the United States, our products are distributed from our four Sales Branches. These are located in Rochester, New York City, Chicago, and San Francisco. To them, we ship our principal products in carload lots from our Branch Shipping Department located at Kodak Park. These Sales Branches are responsible for the distribution in their respective territories.

We also have about twenty-six stockhouses scattered throughout the country. The stockhouses supply professional photographers principally and such small dealers as are not large enough to do business directly with the Branch houses. The Branches reship to the stockhouses within their respective territories. The stockhouses very often have their own salesmen and carry the accounts of their small dealers, in which case they assume responsibility for the account. Of the regular dealers supplied by the Branches, there are about 16,000. For them, credit is passed upon by the central Credit Department at Rochester. Goods are billed from the Branch houses, but the account is kept at Rochester through duplicate invoices.

The Export Sales Department in Rochester handles sales through our Sales Branch in South America, Mexico, China, and Japan.

Canadian Kodak Company, Limited, handles its own sales and ships its own products throughout the Dominion and to British Possessions.

Continental European, African, and Asiatic Sales Branches are controlled by Kodak Limited from Kingsway, London, and Australian and New Zealand business is similarly controlled by Kodak Australasia Limited.

The general scheme of handling manufactured product is to manufacture in large quantities in those places where through specialization such manufacturing is the cheapest. Where labor rates or other conditions make it advisable, raw or partly processed parts are supplied from another plant and are then finished and completely assembled locally.

Thus, for example, our Canadian plant is supplied from Rochester with such small camera parts as can be most economically manufactured there. These parts go into the completed cameras and then some of the cameras in turn are supplied to Kodak Limited in London, specially for the British Isles, because of Canada's preferential tariff.

Also film base ready for the various photographic sensitizing emulsions is furnished from Rochester for Canadian Kodak Limited, Kodak Limited, England, and Kodak Australasia, where it is put through the numerous finishing operations and manufacturing processes which go to make the finished product. This method is advisable because of the very extensive and expensive equipment required for the manufacture of this material and by this method the need of greatly increased capital expenditures through duplication of this equipment is avoided.

IV. PLANNING AND CONTROL.

The problem of accurately anticipating the probable demand for a product as varied and widespread as ours is extremely complicated. This is so, not only because of our world-wide distribution and such political influences as this involves, but also because of the very nature of the product.

Photographic paper and film are not entirely stable. They deteriorate with agg and the product therefore must be dated and provision made that it is used up before the expiration of the time as denoted by this dating.

The demand fluctuates not only within wide limits for the different months throughout the year, but this demand also varies widely depending upon whether or not we have an early spring, good vacation weather, good and prosperous times, etc. In some lines, photographic paper, for example, there is a heavy demand just before the Christmas season. This also applies to some extent to the amateur cameras which are purchased as Christmas gifts.

The general method of anticipating the demand for our regular product is to forecast the future by past experience and the correlations between our sales and general business indicators such as bank deposits and labor employment to establish probable trends based upon this experience. Before we can properly plan our production and control it to the established schedules, we must therefore have ample records and necessary data. This data is collected, collated and supplied to our various departments by a central statistical department, with an auxiliary statistical department located at the Kodak Park plant in order that it may be in direct touch with this plant's particular problems.

The work of the Statistical Department is a staff service to the other departments. Among its activities, it furnishes data to the Purchasing Department on the index number of prices, market conditions, trends, forecasts for general commodities, for raw materials purchased, and for construction materials, giving an addition information regarding seasonal variation in prices, regarding sources of supply and markets, total consumptions and inventories.

It supplies information to the Planning Department covering seasonal variation in sales of principal products, long time trends in sales of principal products, forecasts and barometers against which correlations have been established as indicating probable sales for certain products. Among these, have been bank

EASTMAN KODAK COMPANY.

STATISTICAL DEPARTMENT.

PURCHASING.

General Commodities
- Index Number of Prices
- Market Conditions-Trends
- Forecasts

E.K.Co. Raw Materials
- Index Numbers of Prices
- Seasonal Variation in Prices
- Data re Sources and Markets
- Market Conditions-Trends
- Forecasts
- Purchases
- Receipts
- Consumption
- Inventories

Construction Materials
- Index Number of Prices
- Index Number of Bldg. Costs
- Market Conditions-Trends
- Forecasts

PLANNING.

- Seasonal Variation in Sales of Principal Products
- Secular Trends in Sales of Principal Products
- Barometers for E.K.Co. Sales
- Forecasts

PRODUCTION.

- Output
- Index of Monthly Production
- Monthly Costs
- Cost Trends
- Gross Profits
- Burden
- Waste
- Employee Efficiency
- Idle Machinery

DISTRIBUTION.

Finished Stocks
- Shipments
- Unfilled Orders

Branches
- Stocks
- Comparative Expenses

Stockhouses
- Sales
- Comparative Expenses
- Profits

SALES.

Orders Received

Sales by Prin. Products
- Periodical Sales Trends
- Correlation of Certain Products

Sales by Geographic Div's.
- Countries
- States
- Sales Territories
- Cities

Product Analysis of Sales in Cities, States & Countries

Per Capita Sales in Cities, States & Countries

Indices of Purchasing Power
- Countries, States, Cities

Dealer Density

Traveling Representatives
- Comparative Expense
- Calls

Consumers
- Field Surveys

Index Number of E.K.Co. Selling Prices

Returns and Complaints

ADVERTISING.

Percentage of Sales
- Principal Groups of Products

Effects of Special Campaigns

Effects of Local Adv.

Effects of Advertising on Seasonal Variation

ADMINISTRATION.

Organization Charts
Cost of Selling Percentages
 by Principal Products
Net Profit Percentages
 by Principal Groups
Administrative Expense
 percentages
Credits
 Losses from Bad Debts
 Acc'ts. Receivable Balances
Foreign Exchange Rates
Investments-Market Prices
Statistics of Photographic
 Industry
Foreign Trade
 Photo Goods
Construction Programs
Office Management
 Output per Employee in
 Clerical Depts.

INDUSTRIAL RELATIONS.

Periodical Census of
 Employees
Labor Turnover
Lost Time
Wages
 Comparative Rates
 E.K.Co. Plants and
 Outside
 1. Standard Trades
 2. Standard Clerical
 Occupations
 3. Occupations
 peculiar to industry
Cost of Living Roch.
 Index Numbers of
 Principal Groups
Index Numbers of Wages
 and Cost of Living
Accidents-Frequency
 and Severity Rates
Medical Dept. Statistics
Comparative Lunch Room
 Costs
Vital Statistics

GENERAL BUSINESS CONDITIONS

Outside Services
 Current Conditions
 and Forecasts
Indices of Retail Trade
 Conditions
Index of Employment
Bank Clearings & Debits
Production Indices
Transportation Conditions
Money Rates
Security Prices
Foreign Trade
Conditions in Different
 Sections of U.S.
 Services and
Publications
 E.K.Co. Representatives.

clearings outside of New York City, price indices, like for example the Irving Fisher Indices, employment indices, etc.

For the production departments, it supplies information covering output, costs, cost trends, comparative plant, department, and employ efficiency, idle machinery, etc.

For the Distribution Department, it gathers information covering finished stocks, shipments, unfilled orders, branch stocks, branch comparative expenses and the same data for the stockhouses.

For the Sales Department, it furnishes data on orders received, sales by principal products periodical sales, trends, sales by geographical divisions, per capita sales in cities, states and countries, etc., and computes indices of purchasing power and sets quotas for sales .

In the same way, pertinent data is supplied to the Advertising, Administrative, and Industrial Relations Departments.

As to the data upon which such reports are based, let us consider, for example, the question of purchasing power for the different states. This would be determined from the following data

(1) Number of persons reporting an income over $1,000.00

(2) Average income, as obtained from the Report of the National Bureau of Economic Research on Distribution of Income by States.

(3) Automobile registration (pleasure cars)

(4) Proportion of dwellings equipped with electricity and telephone.

(5) Expenditure for luxuries and pleasure estimated from the Excise Tax taken from the annual report of the Commission for Internal Revenue.

(6) Magazine circulation.

(7) Interest in education, based on

(a) Expenditures for education

(b) Relation of daily average attendance at school to the total number of children from five to eighteen years of age.

(8) Foreign-born population.

(9) Rural population.

(10) Scenery and resorts.

Each state is rated in each of these elements, being arranged in rank from the highest to the lowest, with the median considered as 100. A weighted index is then computed for each state for all factors combined.

If this organization and the functions of the Statistical Department are of particular interest, I would refer you to the Article by Mr. M. B. Folsom, head of this department, in the January, 1924, issue of, "The Harvard Business Review".

The object of planning is to maintain stock on as low a basis as is practical, considering the seasonal fluctuations and demand for the product, to procure maximum turnover, and to plan for even production schedules throughout the different months of the year.

Using the information furnished by the Statistical Department, the Centralized Planning Department forecasts the probable demand for the major items of our product and issues to the different plants definite quantity orders for the ensuing month's production, together with covering in all the requirements for a period of six months.

Sundry items, such as printing frames, developing tanks, etc., are manufactured in quantities most economical to the production departments. This, necessarily means, that the quantity produced often covers a three months' period. Consequently, the Planning Department issues orders covering quarterly requirements, with instructions to make deliveries on definite dates throughout that time. In this way the manufacturing department is able to have in process a lot large enough to produce economically and at the same time agree with the quantities as called for by the Planning Department's schedule.

A detailed illustration may make the methods of this department clearer. Photographic film is finished and shipped from four different plants, i.e., from

Kodak Park, Rochester, from Canadian Kodak, Limited, Toronto, from Kodak Limited, Harrow, and from Kodak Australasia, Melbourne. The base of this film, or support, however, is all made at Rochester and is supplied to the other plants from there as a raw or semi-raw material. In this case, the Central Planning Department forecasts and plans the output of all four of these plants and includes in the production schedule for film base the proper quantity to cover the requirements of the other three plants Cameras are a similar case. Cameras are manufactured complete in Rochester for shipment and distribution throughout the world, with the exception of the British Isles. Cameras are partially manufactured, assembled and completed by the Canadian Kodak Company, Limited in Toronto for shipment to the British Isles. This is because of the preferential tariff in favor of Canada, mentioned before.

Semi-finished camera parts are made by our Camera Works and supplied to Canada for completion and assembling, and lenses manufactured by our Rochester Hawk-Eye plant are supplied to Canada. The production orders for the completed cameras, camera parts and lenses are planned and issued by our Centralized Planning Department.

The orders from the Centralized Planning Department are blanket orders. They are not detailed and itemized. These blanket orders received by the different plants are then broken down into elemental requirements and handled in regular routine by the plant production departments.

These orders give the total quantities of cameras which will be required and show a dissection in quantity between those for which parts only are to be made and furnished to the Canadian plant and those which are to be finished complete, and the allocation of these latter to our various distribution districts. In other words, figures would be given showing the quantity to be distributed locally, the quantity to be allocated to the Rochester Foreign Sales Division, the quantity to be shipped to Europe on account of Kodak Limited, and the quantity to be distributed through Kodak Australasia.

Our stock of kodaks is about 2.7 months', making a turnover of about 4.5, which we think is very good, considering that the average turnover for clothing, drug store accessories, and hardware stores is 3.1.

The Planning Department has four sub groups:

(1) There is the group controlling schedules and trends of production of sundries, chemicals, nitrocellulose solutions, and Premium cameras.

(2) There is the group having control over all of our various kinds of photographic film, except standard motion picture film.

(3) A group having control over kodaks and lenses.

(4) A group having control over motion picture film.

In addition to this, there is then the Kodak Park Planning Department which controls the production for that plant. I believe an illustration from the charts prepared will make more plain the detail of this planning.

Referring to the chart showing Product "B" Sales, the light line shows the variation within the month and from month to month in the quantity of this product sold. The heavy black line shows the twelve months' average of sales. Each month, the new monthly figure is added and the oldest month is dropped off, so that this is a twelve months' moving average. The path of this line shows the general trend and the dash line drawn in shows the average or "mean" of the moving average and establishes the definite trend from which under normal conditions, with no unusual factors cropping upon future sales can be quite definitely predicted. Our Statistical Department have even established definite algebraic formulae for these geometric curves.

It will be noted that this plot is made on logarithmic paper and against a vertical logarithmic scale.

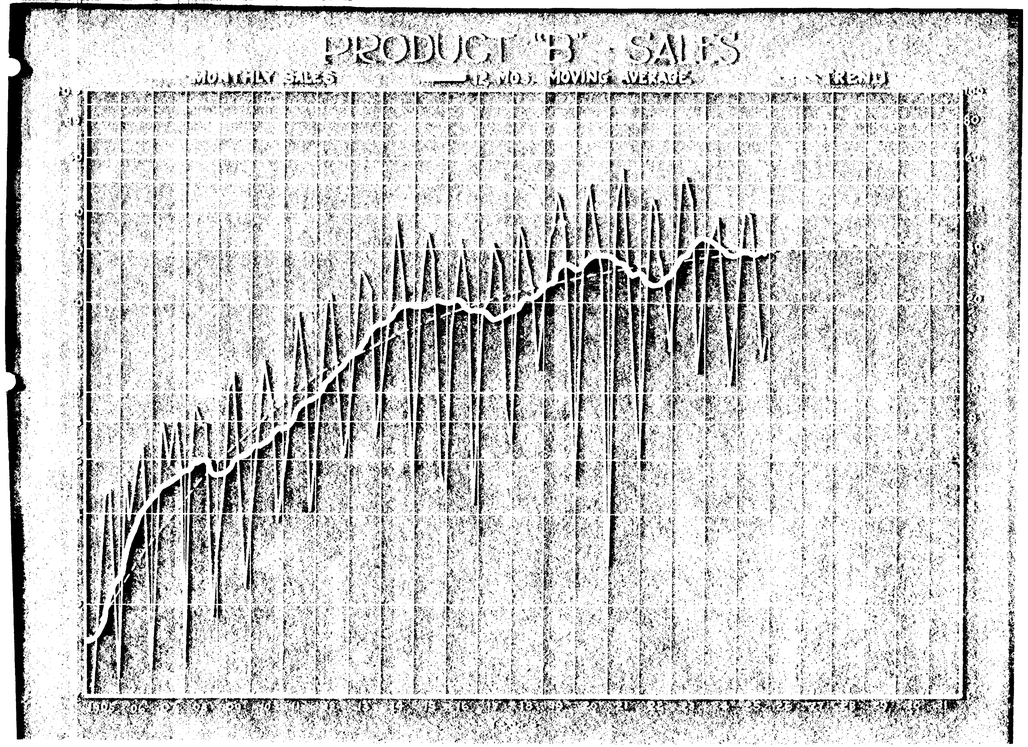
Having forecast the probable demand for the product, the next problem is to provide for an even production schedule. The purpose is to have the production schedule uniform throughout the year, with the exception of the two months of June and July, when it is desirable to reduce the production approximately 20%.

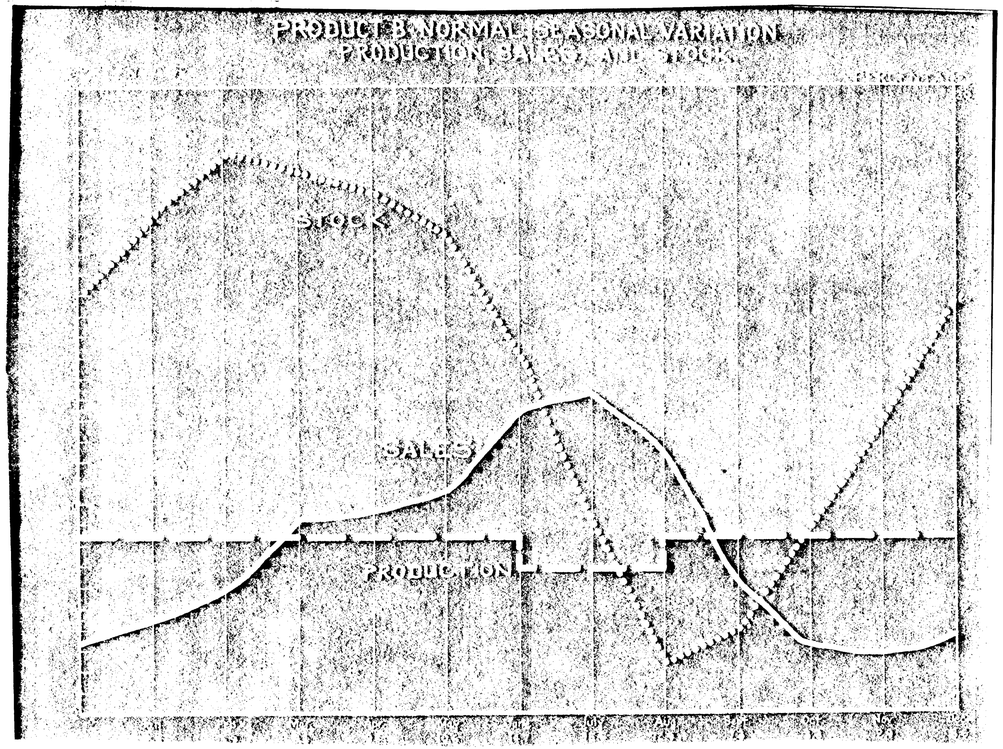
On a uniform production schedule throughout the year, we would of course produce 8-1/3% of the yearly output each month. With the allowance for vacations out, we plan to produce 8.62% of our product in each of the ten months and 6.9% during the two summer or

vacation months. Referring therefore, to the chart, Product "B", Normal Season Variation in Production, Sales and Stock, the dash line shows this premod production shedule in percentage of the total year's business.

From past records, the probable monthly sales is plotted in percentage of total yearly sales. This is expressed by the continuous heavy line.

We next wish to determine what stock we must carry in anticipation of these sales. Arbitrarily, we decide because of the perishable nature of our product under summer conditions of temperature and humidity, that we wish a minimum stock on hand on August 31st, and that this shall be 2.5% of the year's output. This establishes arbitrarily our stock for this point.


PRODUCT "B" - SALES
MONTHLY SALES
12 MO. MOVING AVERAGE
TREND


PRODUCE B. NORMAL SEASONAL VARIATION
PRODUCTION, SALES, AND STOCKS
SALES
PRODUCTION

We will assume also, for the present, that we have stock on hand so that we are in a position to make shipment of our August monthly sales quantity. It is obvious that our stock on September 30th will be equal to the stock on hand at the end of August, plus production during the month of September, minus September sales. This establishes our September 30th stock point. Similarly, for the other months throughout the year, stock points are calculated and from this, the dotted stock curve is drawn in.

Obviously, the total quantity as represented by the areas beneath the production and sales line are equal and the quantity representing the stock throughout the year is in excess of this.

Reference to the third chart, Product "E", Production, Sales and Stock, shows how this normal stock line is used for production control as applied to any particular product.

This time we have taken a different product and have faked the curve in order to illustrate two or three principles. Upon this chart, we start with the estimated weekly production line, the estimated monthly sales and the normal stock line determined as just described. We next decide that there may be a permissable plus or minus variation from the stock line of 25%. This, then, establishes the maximum and minimum stock lines From these, we plot against the estimated weekly production the actual weekly production, (This is the heavy black line.) and we plot the weekly actual sales, accumulating these week by week within the given month.

From the actual production, actual sales and previous stock, we can readily obtain the new stock quantity on hand. This is shown by the upper heavy line.

The chart visualizes, therefore, what is actually taking place and immediately shows up discrepancies between the estimated and actual sales, or the estimated and actual production. Consider the week ending January 5th, for example Production for this week was 8,000, whereas it should have been 15,000. Sales were 12,000, giving a net loss of 4,000, a drop of this amount in the actual stock line.

The real function of the stock ahead is to serve as a cushion to absorb irregularities in production, and the real function of the stockkeeper is to carry his stocks and place his orders with the idea of main-


PRODUCT B. NORMAL SEASONAL VARIATION
PRODUCTION, SALES AND STOCKS
SALES
PRODUCTION

taining this even flow of production. Previous to the use of maximum and minimum limits and before actual sales were visualized, upon seeing his stock diminishing the stockkeeper would order an unusually large supply of parts, almost always making an additional allowance to "play safe", with the result that the production department might receive an order for more than twice the average monthly consumption. When the next month's sales reactions set in, the stockkeeper found himself receiving twice the normal consumption of stock, while his deliveries were low. As a result, he would stop placing production orders, so that the tendency was, in attempting to hold to a proper stock level, to intensify the variations in this level.

Again referring to the chart, it will be noted that beginning in May, the accumulated monthly sales have consistently exceeded the estimated sales quantities, and as a result the actual stock line has dropped so that upon November 1st it is out of bounds and is below the established minimum. New increased monthly sales figures for November and December are therefore plotted, based on this experience and the monthly production schedule is increased from 15,000 to 18,000 to meet this.

At Kodak Park, our different manufacturing departments have departmental stockrooms. Requisitions upon the Purchasing Department are made out in accordance with the production schedule supplied to the department superintendent by the Kodak Park Planning Department. Copies of such purchase requisitions are submitted to and checked by the Planning Department to insure control over stores.

The services of the Planning Department have been found to be of great value in controlling stock on hand of both finished and raw materials, and in keeping the heads of the manufacturing departments constantly advised as to just where they are as against their production schedule and required stock on hand.

The department is to the business what a navigating officer is to the ship. It advises at all times where each department of the plant, as a whole, is on its course of yearly production.

V. PURCHASING RAW & OTHER MATERIALS.

A list of the materials used in our business would be long and most comprehensive. Suffice it to say, that it includes, not only every conceivable

domestic material, but also practically every conceivable material from the "Seven Seas".

Production materials are requisitioned by our departmental store keepers. These clear through the department heads and are controlled through copies which go to the Planning Department for their check. These requisitions ordinarily are for material as per definite specifications and authorize the Purchasing Department to order the material in question, stating the specification number, what is desired, date wanted, and information as to place of disposition of material when received by our central Receiving Department. They obviously also give the necessary data for disposition as to cost of material by our Costing Department, and information for the proper auditing of supplyer's invoice and authorization for its payment.

In general, the Company buys in the open market. In some cases, future requirements are covered by term contracts and for some special materials future supply is assured through having these made and supplied to us by our own subsidiary companies, like the Tennessee-Eastman Corporation, or the Eastman Chemical Corporation, previously mentioned.

You may be interested in a list of some of the materials which are received at the Kodak Park plant in carload lots. Among these might be mentioned, alcohol (donatured), acids, aluminum foil, cotton, camphor, clay and cement, etc., gelatine, glass, lime, pulp, rags, soda-ash, etc.

In a war emergency, the supply of necessary materials in adequate quantities is of course absolutely essential. Much of our product is a wartime necessity. For example, aerial photography is absolutely essential and during the late war we manufactured Lewis Gun cameras which were used for instruction in airplane gunnery. The gunner recording his hit through taking a picture of the vital section of his opponent's plane.

Protection of material supplies in such an emergency is secured through increasing the normal stocks carried ahead, and in addition to this, recourse may be had to many make-shifts in case of necessity. Probably this can better be explained by citing some of the make-shifts resorted to in the past.

Photographic Paper

Paper stock, before the War, was purchased abroad. We carried a large stock, about one year's supply, and had been experimenting in a small way for a number of years in the manufacture of paper ourselves. At the outbreak of the War, but before this country was involved, we therefore started the construction of a large paper mill in which to manufacture paper for our requirements. In addition to this, we were able to find some domestic sources of supply with which to carry on until we were able to produce for ourselves.

Barium Chloride (Baryta Coating)

This material is used for the coating of paper. Previously, it had been imported from Europe. We were able to purchase Tennessee baryta and then installed refining equipment and learned to refine this product.

Pyrogallic Acid

This had been previously purchased from Europe. During the War, the supply was shut off, since they could not get it across the Atlantic. We were, however, able to get the nut galls from which it is made across the Pacific from China and then installed the necessary fermenting and refining equipment so that we now make this product ourselves.

Gelatine

This was purchased abroad, but we found an American source of supply and then built our own plant, from which we are now able to get a better quality of gelatine than we were ever able to purchase.

Glass

Before the War, glass for both lenses and photographic plates was imported. During the war, as a result of the activities of the Government's Geo-Physical laboratories under Dr. Wright, great strides in the development of manufacturing methods for this product were made and we were able to buy glass for both purposes from the Pittsburgh district.

Tin Plate

Large quantities of tin plate are used, both for tin cans and for tin lining of export cases. For this latter purpose we have developed the use of a

laminated waterproof paper which serves every requirement, and for most purposes tern plate can be substituted for tin plate, although it is not as good.

For some of our photographic chemicals, there are deviations which may be made in the formula so that if one chemical element is unobtainable, by suitable changes, another chemical can be substituted in its place.

Each material presents a special problem in itself and results have shown that Necessity, like Experience, is a splendid teacher.

We maintain extensive laboratories, both for controlling and checking production methods and quality, for the development of industrial processes, and for the purpose of pure research. Their service in meeting these material problems was invaluable.

VI. SELECTION & TRAINING OF PERSONNEL AFFECTED BY DRAFT.

Our business is not a common and usual one. The bulk of our operators are therefore specialists trained and developed on our plant for our particular operations and purposes. For a great many positions, a qualified operator has had to have years of highly specialized training. The work may involve control of chemical operations, the coating of photographic emulsions on our various photographic products, or the inspection of such products before they are cut and packed for the trade. This applies particularly to our men, many of whom work on shift jobs similar to those in the paper or steel industry.

In the War emergency, we found we could replace men with women or girls on some operations which were not on a shift basis. For practically all of our jobs now we have definite job analyses and specifications which visualize in detail the job and specify the class and kind of an employee by whom it should be performed. Upon many of the operations, especially those upon which a large number of operators are employed, we have motion studies and Standard Written Practice Instructions which tell just how the job is performed. These correspond in industry to a Manual of Arms in the Army.

In the selection of employes, we use psychological tests to determine the natural aptitude of the applicants and from this the jobs for which they would be suited. During the War, new employes were then trained in a separate training school, using the motion

studies and Standard Written Practice Instructions as the basis for instruction and applying practical psychology in the school so far as possible, to encourage the new employee to stick to the job until taught.

This trainning period was the critical time when turnover was high and often most discouraging.

When the beginner was competent, he was then transferred to the production department where payment for work done was on a piece work, bonus, or other financial incentive basis of payment.

As a result of this combination of activities in handling the new employees, it was found possible to greatly reduce the loss and turnover of beginners and to materially reduce the time for beginners to become competent and increase the output otherwise unobtainable and to cut down the loss of product attending the breaking in of green help.

At this point, it may be well to mention some of the activities of our Industrial Relations Department which make our Company a good firm to work for. The Company has had for years a suggestion system with awards to employees for good suggestions. It has a stock ownership provision through which employees who have met certain requirements are able to buy limited quantities of stock at approximately one-tenth of its market value. There is a wage dividend plan by which the employee receives dividends on his wages, thus sharing in the Company's prosperity. There is provision for sickness and accident compensation, graduated in accordance with length of employment. Safety-first activities are carried on through departmental safety committees, and then there is a Savings and Loan Association which assists in financing the construction of homes.

VII. POWER PRODUCTION PROBLEM.

At our Kodak Park plant we burn from 400 to 500 tons of coal per day. We have a power house capacity of 14,500 H.P. and a refrigeration capacity of 4,000 tons per 24 hours. During the Summer we buy some current from the local gas and electric company, but in the Winter we generate all of our own power, using the exhaust steam for heating.

Normally, we have from two to three months' supply of coal either in our stock piles, or in transit from the mines. This month, we have approximately

30,000 tons of coal in storage, but this is increased when the need is indicated, as upon the occasion of a threatened strike, etc.

In connection with our plant we have a complete waterworks sufficient for a city of 150,000 including an inlet on Lake Ontario, six miles from our plant, a pumping station with a capacity of 12,000,000 gallons daily, our own pipe line, and a storage reservoir of 5,000,000 gallons' capacity on the plant.

Our local gas and electric company generate both by hydraulic and steam power and are interconnected with Niagara Falls, so we really have three independent sources of power.

During the War, a committee was appointed by the manager for the conservation of fuel. This committee appointed departmental committees, and as a result through their joint activities every unnecessary expenditure of power was eliminated. Lights were kept turned off, building temperatures were reduced, both by day and during the night, belts were thrown off on unnecessary line shafts, and processes requiring heat from steam were closely investigated and supervised. In this way, a material reduction in our coal consumption was effected.

CONCLUSION

I am not sure that the information as given is of direct value to you in your work, but I do think it has given you a fairly comprehensive conception of the extent of our Company's activities, its products, and at least some of its problems.

I am an industrial engineer, not a statician nor a chemist, but if there are any questions which I can answer, I shall be pleased to do so.