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ABSTRACT

The intent of this field tested instructional package is to acquaint the student with the methods and processes used in the production of goods. Defining behavioral objectives, the course description includes media guide, suggested classroom activities, and sample student evaluation forms as well as the basic information section. The course defines production technology and offers an explanation of the five stages of production. Also included are descriptions of the production practices of pre-processing, processing, and post-processing. (Author/MW)

Learning Activity Package

Prepared as an Aid in Implementing
The Wisconsin Guide to Local Curriculum
Improvement in Industrial Education, K-12

Introduction to Production Technology

Junior-Middle High School

Pertaining to Field Objective Number One

"To provide students the opportunity to work with the production element of industry to gain an understanding of how it functions in providing goods and services.

Produced by

The Industrial Education Instructional
Materials Development Project
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Menomonie, Wisconsin

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University of Wisconsin-Stout

RATIONALE:

In our daily activities, we often come in contact with many goods produced by industry. These goods are produced to meet a variety of our needs. Goods are produced to provide us with food for our tables, materials so we may communicate with others, and transportation so great distances may be traveled in short time periods. Although these goods are intended for different uses such as transportation, food, and communications, the processes and techniques used to produce these goods have many similarities. Before one can fully understand how industry functions, he must have a basic understanding of the production techniques and processes it uses. This learning activity package is designed to give you an introduction to the basic techniques and processes of production in industry.

Other packages and classroom activities will cover the various methods of processing, changing, and handling materials in a much more complete manner. Remember that this is only a starting point for your study of production technology.

Turn to the next page and read the objectives carefully!

OBJECTIVES:

Terminal Objective:

Upon completion of this learning activity package you will have a basic understanding of the methods and processes used in the production of goods.

Enabling Objectives:

1. Without the aid of resources, you will formulate and write, in your own words, an acceptable definition of production technology.

2. Without the aid of resources, you will recall and correctly describe the five stages of production, giving two examples of each stage.

3. Using any resources available, you will describe in writing, using specific examples, the production practices of pre-processing, processing, and post-processing.

Options: Read the self-test on the following pages and then check the following selections that apply to you.

___ If you feel you can meet the above objectives:

___ A. See the instructor for a teacher evaluation.

___ B. Take the self-test as a self evaluating device, then see your instructor.

___ If you feel you cannot meet the above objectives:

___ A. Take the self-test to see what objectives your studying should be based upon, then turn to the media section on page 5.

___ B. Skip the self-test and turn to the media section on page 5 to help you achieve the objectives.

Self-Test: Introduction to Production Technology Name _____

Period _____

Part One: Complete the questions below without the aid of resources.

1. In the space provided below, write in your own words the definition of production technology.

2. In the space below, list and describe briefly the five stages of production, giving two examples of materials that have been processed in each stage.

A.

B.

C.

D.

E.

Self-Test: Introduction to Production Technology Name _____

Period _____

Part Two: Complete the question below using any resources or media available to you.

3. In the space below describe in writing, using specific examples, the production practices of pre-processing, processing, and post-processing.

Pre-Processing -

Processing -

Post-Processing -

When completed, ask the instructor for the answer sheet.

MEDIA SECTION

Objective Number 1: Without the aid of resources, you will formulate and write in your own words, an acceptable definition of production technology.

Optional Media: Check one or more selections.

___ 1. Complete Activity - I-1A in this package.

___ 2. Classroom or school library dictionary.

___ 3. Library encyclopedia.

___ 4. "The World of Manufacturing" text book, page 258.

___ 5. Film, "The Story of Productivity," (see instructor for viewing date).

___ 6. Read page 7 in this package.

Objective Number 2: Without the aid of resources, you will recall and correctly describe the five stages of production, giving two examples of each stage.

Optional Media: Check one or more selections.

___ 1. Complete Activity - I-2A of this package.

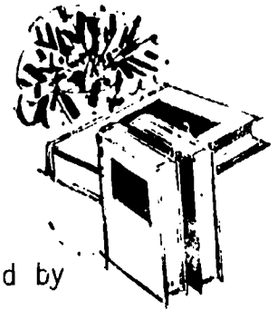
___ 2. View the film, "Production - Key to America's Economic Growth," (see instructor for viewing date).

___ 3. Read pages 7 thru 10 in this package.

___ 4. Review the learning activity package on Processes.

___ 5. Other readings approved or suggested by the instructor.

Objective Number 3: Using any resources available, describe in writing, using specific examples, the production practices of pre-processing, processing, and post-processing.



Optional Media: Check one or more selections.

___ 1. Complete Activity - I-3A in this package.

___ 2. Read pages 10 thru 11 of this package.

___ 3. Other reading or resources suggested or approved by the instructor.

___ 4. Review the learning activity package on Maintenance and Service.

Group Option: May be substituted for the above options.

Participate as a group member in the teacher directed production activity. This includes actively taking part in the production simulation, group discussions, and completing the mastery test for this package successfully. (See instructor for details.)

Film List: "Introduction to Production Technology"

1. "American Road"
   Rental fee - free
   Time - 39 min.
   Black & White
   Contact:
   Ford Motor Company Film Library
   The American Road
   Dearborn, Michigan 48121

2. "DuPont Story, The"
   Rental fee - free
   Time - 40 min.
   Black & White
   Contact:
   DuPont & Company Motion Picture Section
   Advertising Department
   Wilmington, Delaware 19898

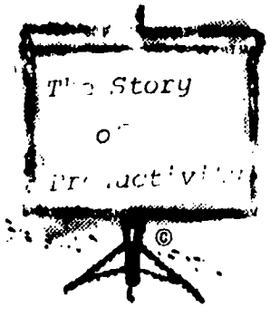
3. "Production - Key to Americas Economic Growth"
   Rental fee - free
   Time - 28 min.
   Black & White

   Contact: The Do All Company Film Librarian
   254 North Laurel Avenue
   Des Plaines, Illinois, 60016

4. "Story of Productivity, The"
   Rental Fee - free
   Time - 28 min.
   Black & White
   Contact:
   The Do All Company Film Librarian
   254 North Laurel Avenue
   Des Plaines, Illinois 60016

5. "World of Henry Ford, The", 1963
   Rental Fee - free
   Time - 35 min.
   Black & White

   Contact: Ford Motor Company Film Library
   The American Road
   Dearborn, Michigan 48121



INFORMATION SECTION

Production Technology

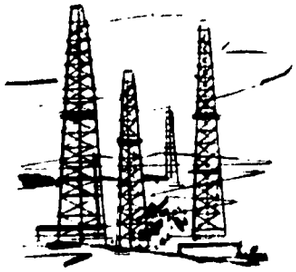
"Production Technology" is referred to as "The knowledge of efficient production practices." If we are going to do something efficiently, say for instance deliver papers or repair the engine on a mini-bike, we must be able to plan, organize, and control the different steps or operations that take place.

Any industry that produces goods must use these basic operations. They will plan the layout of their factory and the product they will manufacture. They will organize various steps of production. Personnel, materials, and equipment will be arranged throughout the factory enabling efficient production of the desired goods. A last step would be to control the production process. This includes providing a constant supply of materials, qualified personnel or supervisors, and means of controlling the finished product in terms of numbers produced, quality, and cost per product. These steps are vital in any organization producing goods with intent to make a monetary profit.

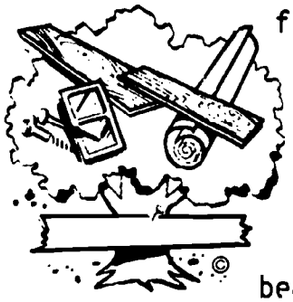
Stages of Production

There are five steps that take place when producing a product from raw materials. Before the final product is obtained, it passes through these stages in a logical order.

The first stage is "preparing raw materials." During this stage the producer receives a supply of natural materials and must refine or improve these materials so he can use them as a material for the final product. Most materials must be separated from unwanted or waste materials. This procedure is called re-



fining. These left over materials, that have been removed, may be useful for some other product. An example of this procedure is evident in producing lumber. During the first stage of production, the bark is removed from the trees. Although the bark is not a desirable material when making finished lumber, it can have other uses outside the lumber industry. The bark may be used in the garden of your home as a mulch to beautify and fertilize the plants. After processing, raw materials are stored for industrial use, usually in large quantities. This is called bulk storage. An example of bulk storage can be seen at your gasoline service station. The attendant sells oil in quart cans or he can pump it from a bulk tank that holds about 20 gallons of oil.

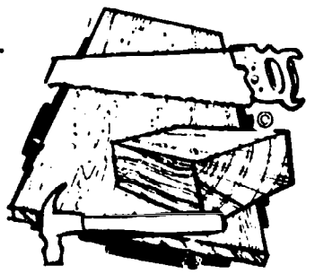


The second stage of production is called "making industrial materials." In this stage the processed raw material is formed into standard stock by various processes. Solid products can be shaped or formed into standard sizes. This includes lumber (2" x 4"), steel (rails for railroads), and other materials. These standard sizes are usually set by the specific industry that consumes the industrial material. The construction industry states that 2" x 4" lumber used in frame construction of houses will measure 1 1/2" x 3 1/2". This is a standard size or stock set up by the industry. Chemical products, such as liquids and gases, may also be produced to get uniform or standard properties.

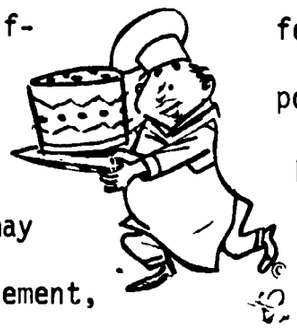
Standard stock may be used as a final product, such as rails for railroads, or it may be changed into a component. These components may also be used as final products, but are usually assembled with other com-

ponents to produce a product.

The third stage deals with making components. There are two basic methods of making components form standard stock. These are forming and separating. The materials that are to be formed into components can be cast, molded, compressed, stretched or conditioned. Materials that are to be separated can be sheared, sawed, cut or they can be submitted to chemical and electrical processes which will remove the unwanted material and produce the finished component.

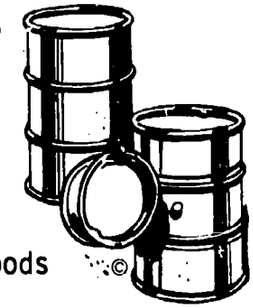


The fourth stage of production is combining the components to make final products. This stage can be accomplished by four different processes; mixing, coating, bonding or with mechanical fastening. The components may be mixed with other components. One example of this is the baking of a cake. Different components (flour, eggs, milk, sugar, baking powder, and others) are combined to make one final product, a delicious cake. Mixing of components may take place with a dry or powdered component, such as cement, or a liquid such as milk or gasoline. Components may be coated. Coating is usually done to protect or decorate the product. Automobiles are coated with paint to prevent the metal from rusting (protect) and to make the car good-looking (decorate). When two components need to be combined into one solid component, bonding is usually the method used to fasten them. Items that require a rigid joint may be glued, cemented, or fused. Although metal parts are usually fused together (welded, brazed, soldered), they may be cemented with special adhesives. Non-metal components are



usually combined with glues and cements, but they also may be fused together (plastic welding). Mechanical fastening is the most common way to combine components. This can be accomplished by tying, lacing, screwing, bolting, nailing, hinging, pinning, and others (zippers, snap hooks, swivels, etc.).

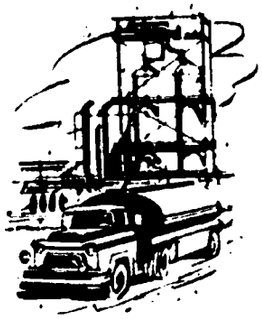
The last stage of production is preparing the final product for distribution. This is done to protect the final product during storage, shipping and delivery to the customer. To protect the product, wood frames may be build around the outside (crates), it may be covered with cardboard (cartons), it may be insulated, waterproofed, or a combination of two or more of these methods used to protect the product. Before the product can be shipped, it must be labeled and sometimes stored for long periods of time. During this time, the product may need to be moved from different storage areas. Packaging not only protects the product during shipping, but also during storage.



Production Practices

Industry uses many different operations when producing goods and services for people to consume. The operations or production practices can be divided into three main areas to simplify the study of industry. They are: pre-processing, processing, and post-processing.

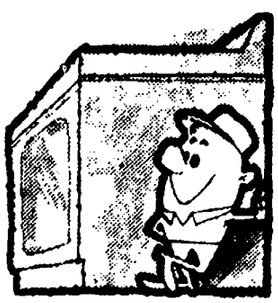
Pre-processing operations are concerned with moving materials where they are needed so the processing of the materials may take place. The materials must be moved in an efficient way to minimize the amount of human energy and time sometimes necessary in this operation. The system that moves these materials must also provide the right amount of material at the proper time.

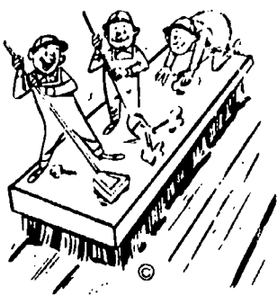


During pre-processing one or several practices are used. These include receiving, unpacking, handling, storing and protecting. The form of the materials is not changed during the pre-processing operations.

In the processing operations, materials are changed in their form. This can be accomplished by several operations. The materials can be formed, separated, or combined (check the previous section on "stages of production" for a review of these operations). These operations can take place during all stages of production.

The third area of operations is post-processing of materials and products. During these operations products are installed, maintained, repaired, and altered. Often these operations or practices are called "servicing." This includes installing appliances in homes, repairing autos, maintenance for buildings (janitorial services), altering clothing or parts of machinery, and many other operations (for more detail, look at the learning activity package on Service and Maintenance).





Activity: Production - I-1A

Name _____

Period _____

What is Production Technology?

In this activity you will analyze the term "production technology." Answer the questions below and construct a definition of "production technology" that you can understand and accept.

1. Using three different sources (such as a dictionary, book, encyclopedia, etc.) write the definition of "production", as given in each source. Production is;

   A.

   B.

   C.

2. Using the above definitions, write in your own words a simple definition of "production" that you can understand and accept.

3. Using three different sources, write the definition of "technology" as stated in each source. Technology is

   A.

   B.

   C.

4. In your own words write a definition of technology that you understand and accept. You may use the above definitions to help you formulate your own definition.

5. Using two different sources, write the definition of "production technology" as stated in each. Consult the media section of this package for resources. Production technology is

   A.

   B.

6. Review <u>your</u> definitions of "production" and "technology" and the definitions stated in question 5. Now write a simple definition of "production technology" that you can understand and accept.

Activity: Production - I-2A

Name _____

Period _____

In this activity you will work with one other class member. Together you will choose a raw material (approved by the instructor) and construct a display that will describe to the viewer the five stages of production to make the raw material into a finished product. Use pictures and samples at each of the various stages. Answer the questions below and submit them to your instructor before you start this activity.

What raw material did you choose?

What will you show in each of the five stages? (Brief statement)

1.

2.

3.

4.

5.

What materials will you use?

Activity: Production - I-3A

Name _____

Period _____

Using a project that you have made in class (required or elective) develop a presentation that will explain the practices of pre-processing, processing and post-processing as they apply to your project. Schedule a date and time with your instructor, when you have completed the questions below and feel you are ready to make your presentation to the class.

What kind of project are you going to use for your presentation?

Is your presentation going to be a group activity, discussion simulation, or something else? (explain)

Explain briefly the examples of pre-processing, processing and post-processing as they apply to your project.

What materials will you need for your presentation?

Student Evaluation

Introduction to Production Technology

Name _____

Instructor _____

School _____

Directions: Answer all of the following questions to the best of your ability. The questions are written to evaluate your knowledge and understanding of the area of industrial arts covered in this package. Choose the answer which best completes the statement.

1. Production technology may be defined as

   a. Keeping something in the state of repair.
   b. Decision makers who communicate with those beneath them of what is to be done, when it is to be done, and how the work is to be performed.
   c. The knowledge of efficient production practices
   d. Useful labor which does not produce a real product

2. To do something efficiently, we must

   a. Plan
   b. Organize
   c. Control
   d. All of the above

3. Which of the following is not a stage of production:

   a. Preparing raw materials
   b. Obtaining finances
   c. Making industrial materials
   d. Making component parts

4. Which of the following is not a process which could take place in the combining of components to make a final product?

   a. Packaging
   b. Mechanical fastening
   c. Coating
   d. Mixing

5. In production technology, when raw materials are processed and formed into standard stock by various processes, this is referred to as

   a. Making industrial materials
   b. Combining the components to make a final product
   c. Preparing the final product for distribution
   d. Making components

6. When stock is formed or separated, what stage of production is being used?

   a. Making components
   b. Combining components to make final products
   c. Preparing raw materials
   d. Preparing the final product for distribution

7. When we are crating, labeling, insulating and water-proofing products, what stage of production is being used?

   a. Making components
   b. Combining components to make final products
   c. Preparing raw materials
   d. Preparing the final product for distribution

8. Which production operation is concerned with moving materials where they are needed so the processing of the materials may take place?

   a. Pre-processing
   b. Processing
   c. Post-processing

9. Which production operation is concerned with the installation, maintenance, repair, and alteration of products?

   a. Pre-processing
   b. Processing
   c. Post-processing

10. Which production operation is concerned with changing the form of materials?

   a. Pre-processing
   b. Processing
   c. Post-processing