

A decorative graphic consisting of a thin yellow circle. A thick black left square bracket is positioned on the left side of the circle, and a thick yellow right square bracket is on the right side. A horizontal bar with a yellow-to-white gradient is overlaid across the middle of the circle, containing the main title text.

**PRODUCTIVITY, METHODS AND
STANDARD SCOPE, METHODS
ENGINEERING**

IENG 301

**FUNDAMENTALS OF
WORK STUDY AND
ERGONOMICS**

[Productivity]

- Most commonly associated with labor effectiveness in industry.
- Broad sense; productivity is the ratio of output to some or all of the resources used to produce the output.
- $\text{Productivity} = \text{output} / \text{input}$

[Productivity]

- Labor productivity = units produced / hours worked
 - Unit: output per unit of time, output per labor hour.
- Capital productivity = output / capital input
- Material productivity = output / materials input

[Technological Innovation]

- Changes in technology are taking place at a rapid rate in many areas and with these changes an *increase* in productivity is expected.
- Technological innovation;
 - increased labor output,
 - reduction in costs,
 - reduction in the price.
- Ex. The price of a hand-held calculator has been reduced from \$1500 to less than \$10 in a single decade (Texas Instruments).

Measurement of Individual Worker Productivity

- The productivity of the individual employee in a factory can be measured in a different way.
- If 100 employees produces 3000 units of a single product in one day, the average output might be stated as 30 units/person/day.

Measurement of Individual Worker Productivity

- Standard time for a specific task can be established by means of;
 - Time study,
 - Predetermined time systems,
 - Work sampling.

- Standard(expected) output for the day =
(no. of pieces produced by a worker in one day)
x (standard time per piece)

Measurement of Individual Worker Productivity

- Ex.
 - Standard time to assemble a bench grinder = 2.00 min/unit,
 - Operator assembles 275 grinders/day,

Output = $2.00 \times 275 = 550$ standard mins.

- Operator works an 8hr day (480 mins)

Input = 480 mins

Operator's Performance Index = $550 / 480 \times 100 = 114.6\%$

[Productivity of Capital]

- Tools, machines, and other operating facilities of concern.
- Factors such as energy consumption, maintenance and obsolescence, utilization of facilities may have a major affect on productivity and costs in capital-intensive industries.
- For example, downtime is one of the most important factors affecting productivity of equipment in steel mills (factories).
 - In one modern high-speed slab mill a crew of eight people per shift operates the mill which has an operating cost of about \$4500 per hour.
 - A crew of 20 people is required for the hot strip mill and the cost is \$8500 per hour.

Motion and Time Study and Productivity

- Objectives of motion and time study;
 - Elimination of unnecessary work,
 - Design of methods and procedures which are
 - most effective,
 - require least effort,
 - suited to the person who uses them.
 - Provides methods of measuring work for determining a performance index (productivity index) for an individual or for a group of workers.

[Motion and Time Study]

- Time study;
 - originated by Taylor,
 - used mainly for determining time standards.

- Motion study;
 - developed by the Gilbreths,
 - employed largely for improving methods.

[Motion and Time Study]

- Motion and time study is the systematic study of work systems with the purposes of;
 1. Developing the preferred system and method – usually the one with the lowest cost,
 2. Standardizing this system and method,
 3. Determining the time required by a qualified and properly trained person working at a normal pace to do a specific task or operation, and
 4. Assisting in training the worker in the preferred method.