



Predetermined Motion Time Systems

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1. Overview of Predetermined Motion Time Systems
2. Methods-Time Measurement
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PMTS Defined

A database of basic motion elements and their associated normal time values, together with procedures for applying the data to analyze manual tasks and establish standard times for the tasks

- Basic motions include:
 - Reach
 - Grasp
 - Move
 - Release



PMTS Procedure

1. Synthesize method that would be used to perform the task
 - The method is described in terms of basic motion elements
2. Retrieve normal time values for each motion element
 - Sum the element times to determine the task normal time
3. Evaluate method to make improvements
4. Apply allowances to determine standard time



PMTS Levels and Generations

- First-level PMT Systems use the basic motion elements
 - Reach, grasp, and move used separately to define the task
- Higher-level systems combine several motion elements into motion aggregates
 - Reach and grasp combined into one element called “get”
- First-level systems were chronologically the first to be developed and are called first generation PMTS



Comparisons

First-level PMTS

Most accurate

High application speed ratio

Most suited to highly repetitive short cycles

Basic motion elements

Very detailed

Highest flexibility

Higher-level PMTS

Less accurate

Less time to set standards

Longer cycle times feasible

Motion aggregates

Less detailed

Less flexible



Methods-Time Measurement

“Procedure which analyzes any manual operation or method into the basic motions required to perform it and assigns to each motion a predetermined time standard which is determined by the nature of the motion and the conditions under which it is made”

- Time units are TMUs

1 TMU = 0.00001 hr = 0.0006 min = 0.036 sec

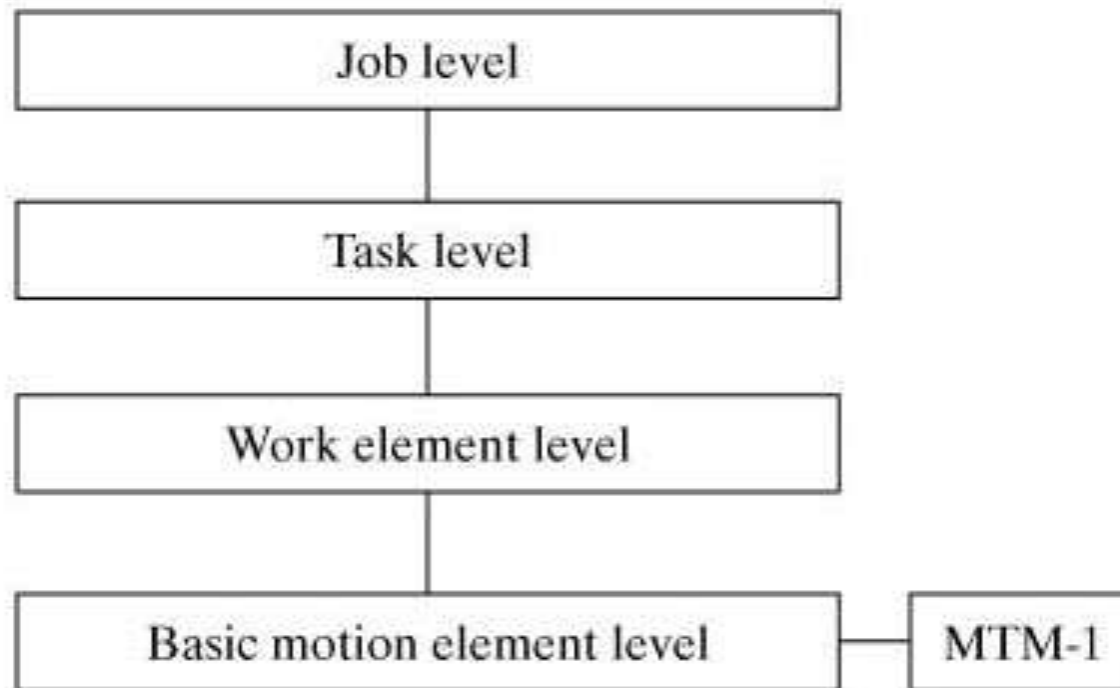
1 sec = 27.8 TMU

- MTM is a family of products available through the MTM Association in Des Plaines, Illinois



Methods-Time Measurement

Hierarchy of Work Activity





MTM-1

- Operates at the basic motion element level in our pyramidal structure of work
 - Most MTM-1 basic motions involve hand and arm movements
 - Also includes elements for eye, leg, foot, and body actions
- Many of the basic motion elements correspond to the original therbligs developed by Frank Gilbreth



Other MTM Systems

- MTM-2 – Second-level PMTS in which basic motion elements are combined into motion aggregates
 - GET – combines Reach and Grasp
 - PUT – combines Move and Position
- MTM-3 – Third-level PMTS which has four motion categories
 1. Handle
 2. Transport
 3. Step and foot motions
 4. Bend and arise



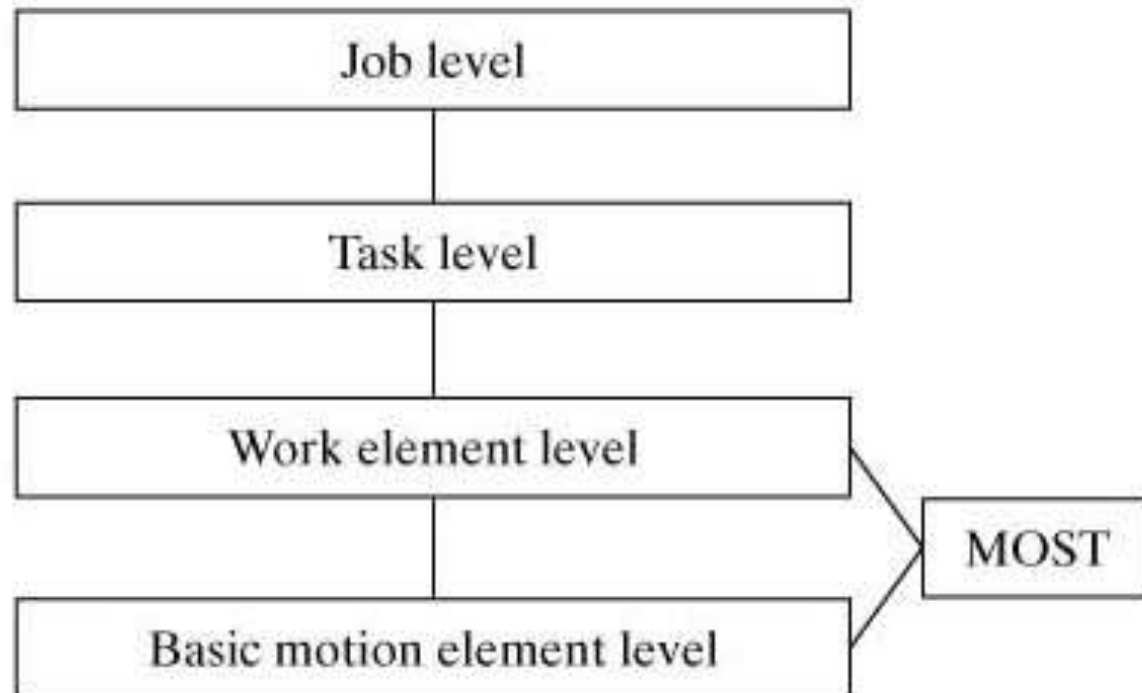
Maynard Operation Sequence Technique

- MOST is a high-level PMTS based on MTM
 - Same time units as MTM: TMU
 - Developed around 1967 under the direction of Kjell Zandin
 - MOST is a product of H.B. Maynard and Company, Pittsburgh, Pennsylvania



MOST in the Work Pyramid

Hierarchy of Work Activity





Basic MOST

- Focused on work involving the movement of objects (e.g., parts, tools) from one location to another in the workplace
 - Uses motion aggregates
 - Called *activity sequence models*
- Three activity sequence models:
 - General move – object moved freely in space
 - Controlled move – object remains in contact with a surface
 - Tool use – use of hand tools (e.g., hammer, screwdriver)



Activity Sequence Model

- Consists of *sequence model parameters*, which correspond roughly to basic motion elements
- Sequence model parameters for General Move:
 - A – Action distance (move hands or feet)
 - B – Body motion (sit, stand up)
 - G - Gain control (closely related to grasp)
 - P – Placement (e.g., position, lay aside, orient)
- Standard sequence in General Move:

A B G A B P A



Other Versions of MOST

- Maxi MOST – for work cycles performed fewer than 150 times per week and there are variations in the cycle
 - Can be applied to tasks of several hours
- Mini MOST – for highly repetitive work cycles performed more than 1500 times per week
- Clerical MOST – similar to Basic MOST but designed for clerical tasks
- MOST for Windows – Computerized technique that allows user to apply Basic MOST, Maxi MOST, or Mini MOST to the task