

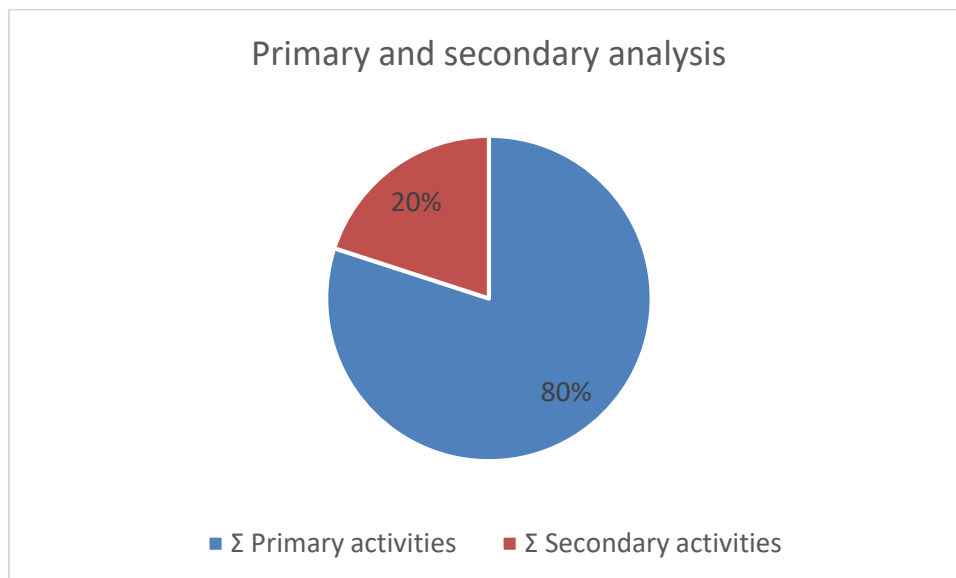
**Module name:** MTM Universal Analysis System (UAS) (FhG - IWU & LP)

- **Main functionalities:**

System of predetermined time units to calculate the manual effort of the human in production environments. Results of the analysis are useful for

- planning future operations
- calculations
- change management
- optimisation
- visualisation of current process state (primary and secondary analysis)

Exemplary results of a primary and secondary analysis:



- **Technical specifications:**

MTM (Methods-Time Measurement) is a procedure for analysing work processes and determining planned times.

MTM is ideal to create work processes to achieve high benefit and to eliminate waste already in the planning phase. In this case, workplaces can be ergonomically designed and ensure that work does not make the worker / employee sick.

MTM finds its justification especially in the planning processes. To create an analysis only knowledge about the structure of the work system as well as an idea of the planned work processes are necessary. In contrast to the time recording by means of a stopwatch (REFA), it is not necessary to find an existing process or workplace for the application of the MTM method.

MTM Basics:

Using MTM, all movements made by the human are attributed to certain basic movements for which the time is known.

The smallest movement elements are recorded in MTM-1, in which the main workflow is divided into basic motion elements, the so-called MTM control loop. The basic movements of the control loop are "reach", "grasp", "bring", "place" and "release", supplemented by moving elements such as "walking", "bend over and straighten up", "visual control", "handling tools" etc.

Due to the worldwide uniform coding of the movement elements, MTM is valid worldwide and is understood by all trained employees.

It can be assumed that the time determined by MTM corresponds to that which a person skilled in the art can achieve over a whole working day.

For further information on MTM related issues, such as training possibilities, consult the MTM website: <https://www.dmtm.com/index.php?lng=14>

#### Preconditions:

Worker with average talent and good practice level as well as appropriate parts.

#### Not detectable by MTM codes:

Mental work and process times such as screwing times, soldering processes etc. These things have to be estimated or measured and added to the MTM calculation sheet as a PT (Process Time).

#### MTM UAS:

In practice, MTM UAS is mostly used because this system combines certain basic movements into compound motion types. This considerably shortens the analysis time with almost the same accuracy.

### • **Inputs and outputs:**

#### Inputs:

- System boundaries
- General framework
- System layout
- Process sequences
- Access to workplace and photo permission
- Pictures of delivered material
- Component variance
  - Properties
  - Geometrics
  - Assembly requirements
  - Joining process
- Operating procedures

#### Outputs:

- Durations of each process step and thus of complete production process
- Statement about critical process steps, i.e. process steps that are poorly designed

- Classification of process steps into value-adding and non-value-adding processes (primary and secondary analysis)
- Visualisation of process steps with pictures as in given example of our associated partner:

Process step 1



Process step 2



Process step 3



Process step 4



- **Interface specification:**

In case of using MTM-UAS calculation sheet including primary and secondary analysis, developed by LP-Montagetechnik GmbH, the Information is to be entered into the provided boxes in the Excel sheet. However, the operator must be trained in MTM.

The analysis of the primary and secondary expenses is done automatically by Excel sheet. Depending on the individual case, occasionally a manual intervention in the assignment may be necessary.

- **Formats and standards used:**

- MTM time block tables (to fill in and calculate manually)
- Computer-aided procedures like TiCon4 or ILMOPLAN (interactive layout and assembly planning)

- MTM-UAS calculation sheet including primary and secondary analysis, developed by LP-Montagetchnik GmbH (based on an Excel calculation sheet)

- **Availability:**

TiCon4 and ILMOPLAN is available at the MTM association (for Costs ask MTM association)

MTM-UAS calculation sheet including primary and secondary analysis, developed by LP-Montagetchnik GmbH is available at LP (costs are to be negotiated).

- **Application scenarios:**

We conducted a MTM Analysis at one production line of our associated partner ERCO GmbH. The process steps at the production line are all executed manually, thus the MTM analysis can be used in order to identify process times. The results of the analysis are the time for the assembly process and a distinction of primary and secondary activities. The results can be used for optimisation and planning of another production line with comparable demands.

- **Offered for internal / external use**

MTM-UAS calculation sheet including primary and secondary analysis, developed by LP-Montagetchnik GmbH is available for internal use only without any fee. For external use, costs are to be negotiated.