

Quick guide for the Motor Systems Tool

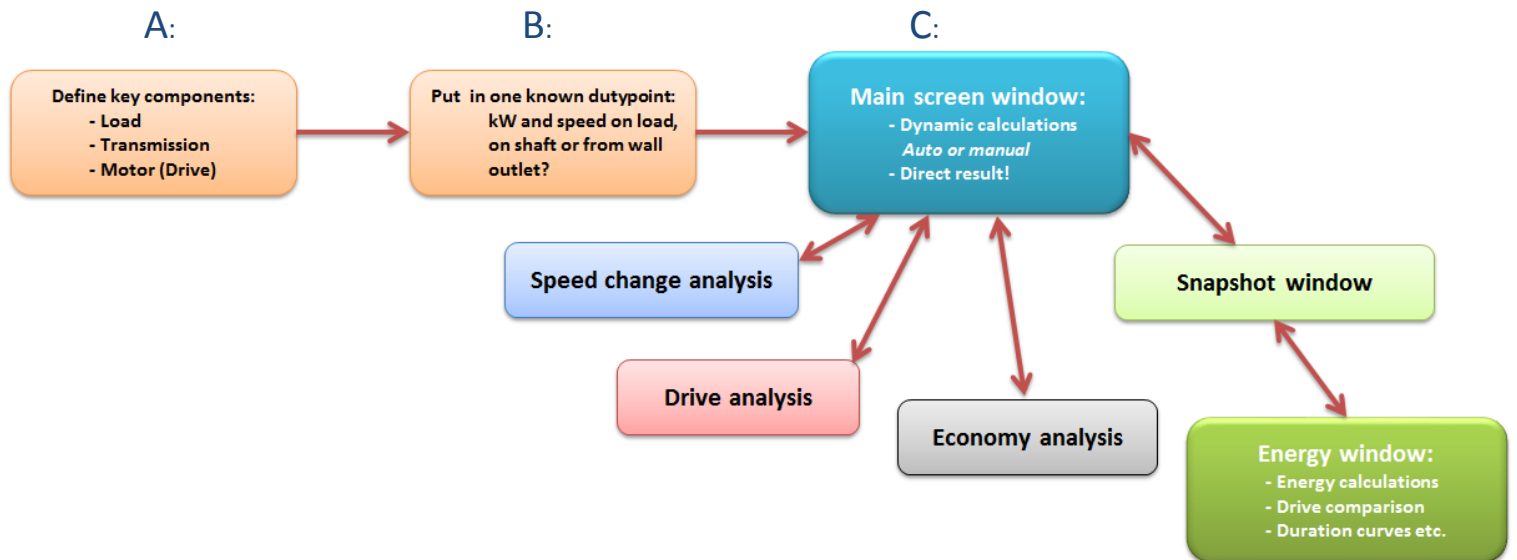


Figure 1: Motor Systems Tool (MST-Tool), program structure

A: Define system by putting in key components:

- **Load**, characterized by torque curve: linear, squared, constant or reciprocal to speed
- **Transmission**, no transmission, *gearboxes* or belt drive selected from a library with multiple variants including belt type, pulley diameter, ratio etc.
- **Motor & Drive**, put in known motor data or select from table of standard motors followed by drive ID: no drive (D.O.L), Soft starter or frequency converter

B: Put in a known duty point:

- **Duty Point**, defined by speed (rpm) and power (kW). Select a duty point from which all calculations origin. Selections range from P4 (hydraulic power) to P1 (wall outlet)

C: Main page of The MST-Tool:

- **Main Page:**
 - Instant result of input data
 - Dynamically calculated efficiencies on changes
 - Annual cost estimate included
 - Snapshots of current conditions etc.
 - Flashing lights in case of overload, underload, etc.

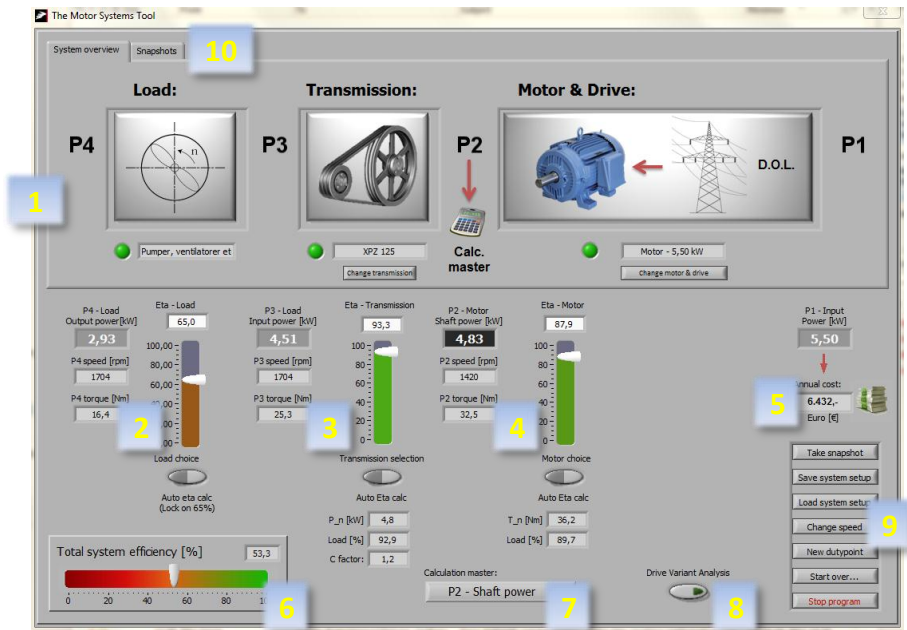


Figure 2: MST-Tool, main page

First tab – “System overview”

- Upper half, first tab, illustrates the selected system and the “Calculation master” – the known duty point on which all other results are based. In this case P₂ motor shaft, 4,83 kW at 1420 rpm.
- Calculated load values: delivered power, torque and speed. Eta is fixed at 65% on “auto” but can be switched to manual input if wanted.
- Calculated transmission values: efficiency, delivered power, torque and load percentage. Eta can be switched to manual input if wanted. Also includes C-factor which influences P_{nominal} of the belt.
- Calculated motor values: efficiency, shaft torque and load percentage. Eta can be switched to manual input if wanted.
- “Annual cost” – Input button for running hours and energy prices for annual cost calculus.
- Total system efficiency – $\eta_1 \cdot \eta_2 \cdot \eta_3 \cdot \eta_4$
- Selector for “Calculation master”- Can be changed at any point in time.
- “Drive Variant Analysis” – compares current shaft conditions with variants of drives selected by the user. Delivers results in kWh and annual cost as selected in “Annual cost”
- “Master selector button” – From here user can:
 - Take a snapshot of current conditions (for use in the energy analysis on Snapshot tab)
 - Save/load system setups
 - Change speed at P₄. Based on the selected torque profile this calculates the entire system at other speeds
 - Change the actual duty point (“Calculation Master” values)
 - Start all over
 - Stop the program

Second tab – “Snapshots”

- This is the table of snapshots made by the user. The snapshots can be used for an energy analysis including curve of duration and comparison with other drive equipment at the same duty points. Which duty points are used is selectable by the user as are the drive equipment to compare with.