Electric Motor Systems
EMSA

Version 1.6
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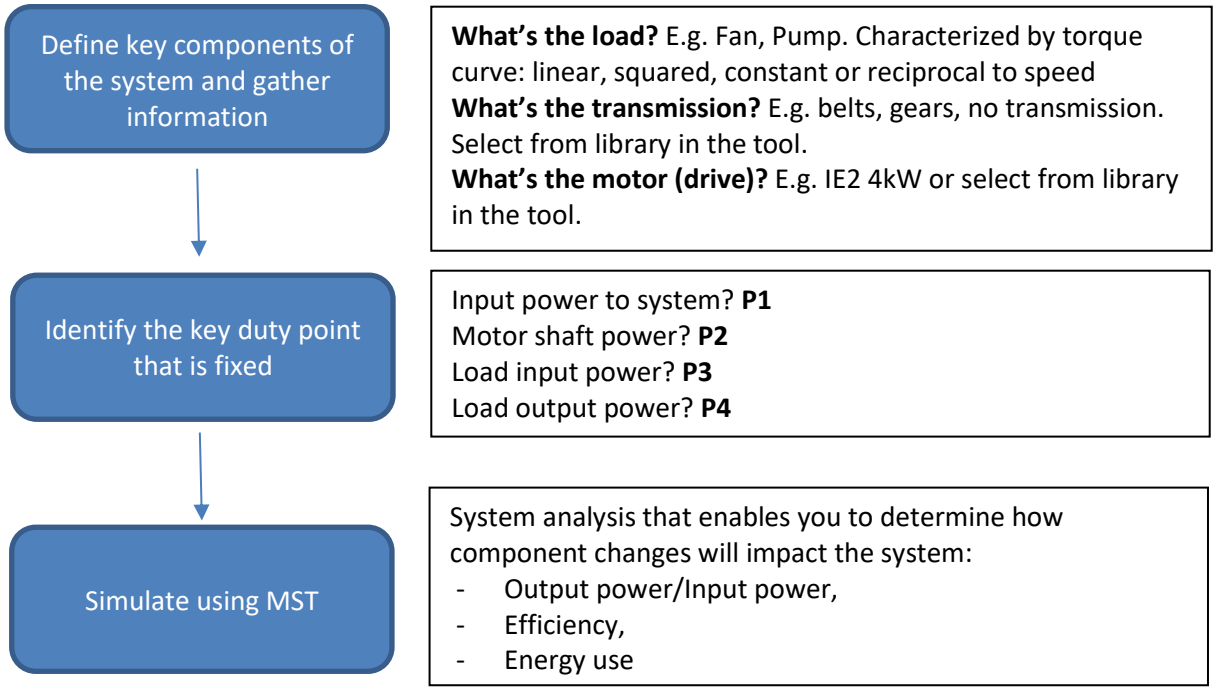
Quick guide for the Motor Systems Tool (MST)

Introduction

This guide is to provide an overview of the 4E EMSA Motor Systems Tool, its main components, and functions. The MST is intended to model a motor system comprising three components: motor/drive, transmission, and load. The MST can be used to model a real-world motor system and estimate the impact of changes e.g. changing the motor, adding a drive, changing the transmission, changing the load – on various system metrics including input power, output power and efficiency.

Having a few input data e.g. measurements of electrical input power, flow and pressure, one can estimate (calculate) the load percentages and efficiencies throughout the system. From this point on one can change and calculate other system configurations to evaluate gains and benefits. For a full understanding of the tool please see the webinar: Optimization of Motor Systems: the Motor Systems Tool - YouTube.

Process overview



Sections

Main screen "System overview"

Provides a high-level overview of the main screen where the motor system components are input into the tool.

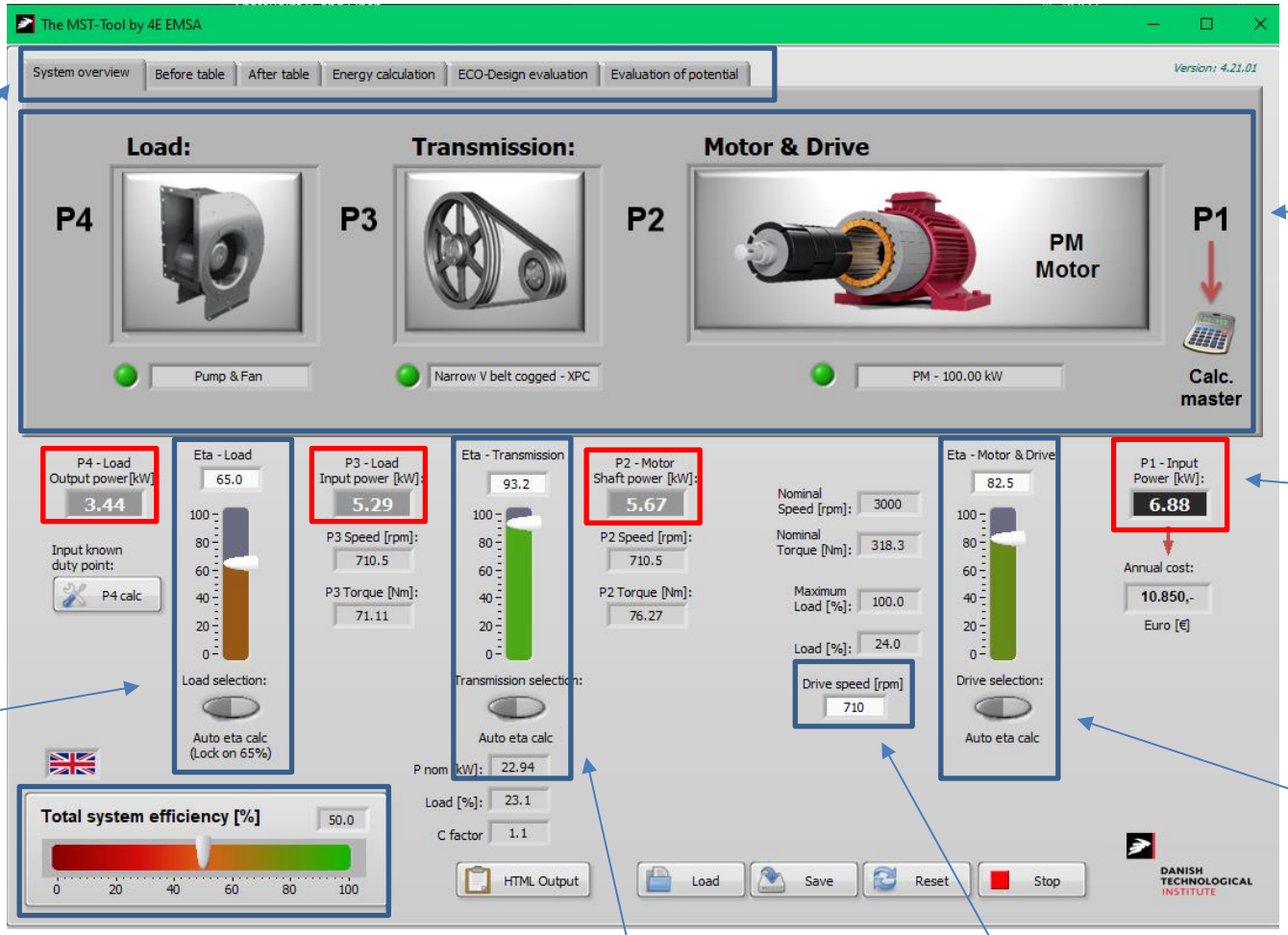
Before table, After table, and Energy calculation

Using all three tabs together allows you to compare the original system with changes to the system including the energy savings available

Before table is for the original system (the baseline system) Red

After table is for the changed system (the improved system) green

Main screen “System overview”



Tab selection

System overview. Click on a picture to add or change a component

Duty point (red boxes). P1 is selected

Load efficiency (default set at 65%). Use toggle to turn off auto calculation

Motor efficiency

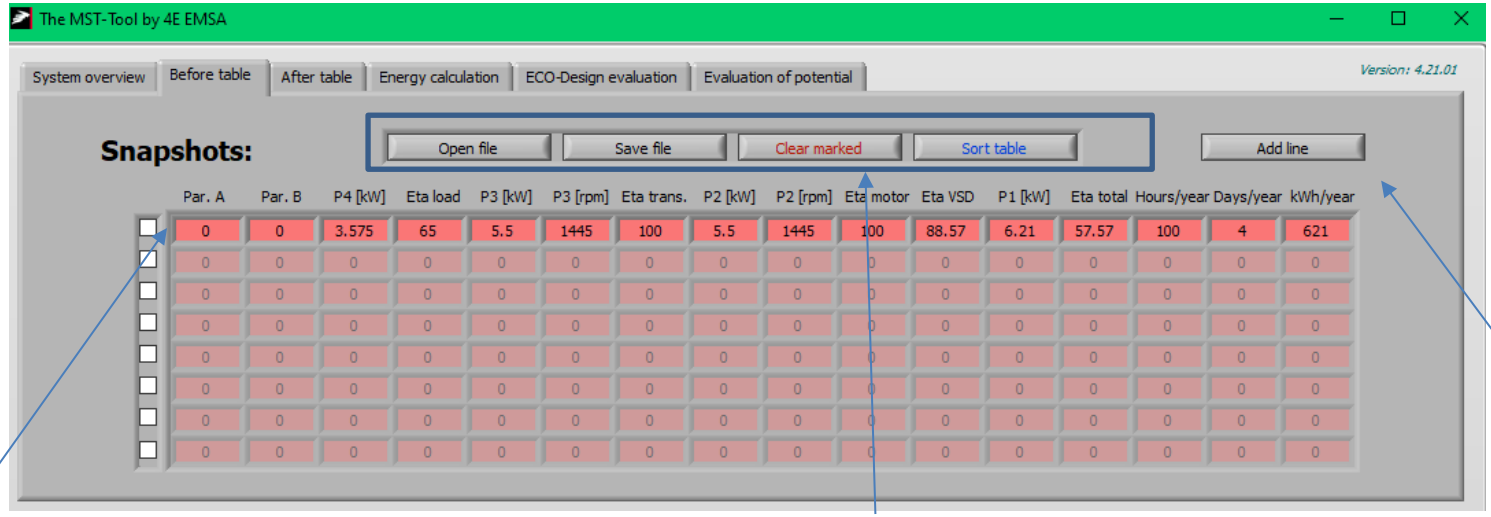
Overall system efficiency

Transmission efficiency

As you change components, make sure the drive speed is the same as the original system or if changed is accounted for e.g. different point on load curve

Before table, After table, and Energy calculation

Before table

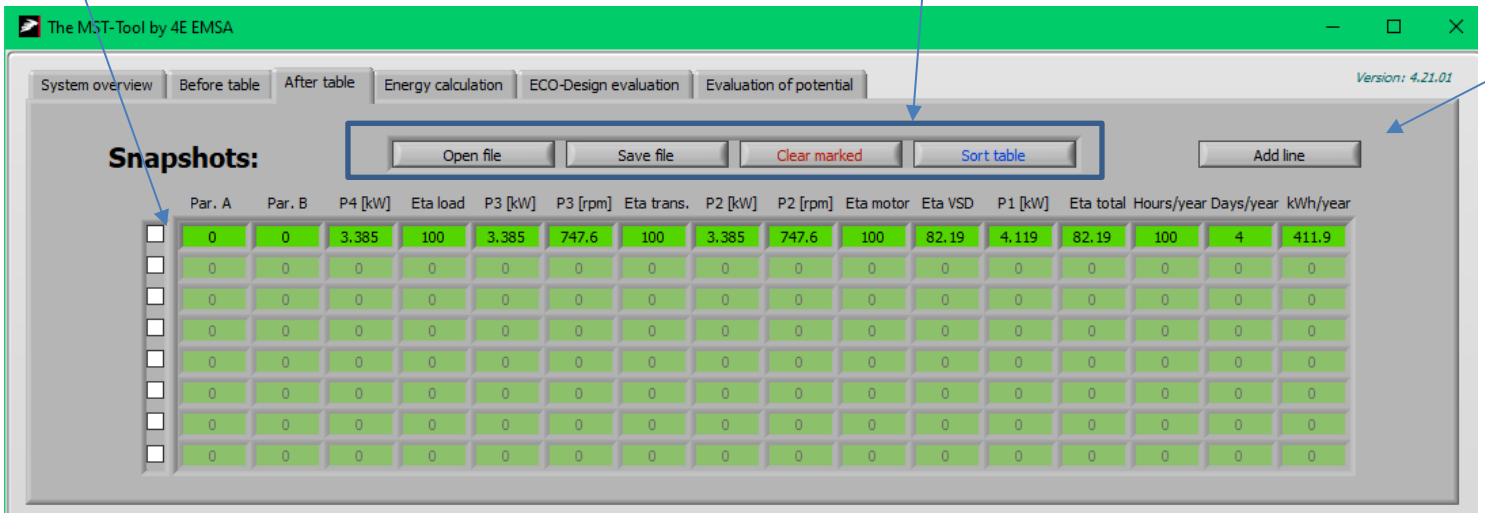


Added systems. Can have system with different running hours per year

Controls to save, clear lines, sort table by attributes

Adds system as a new line

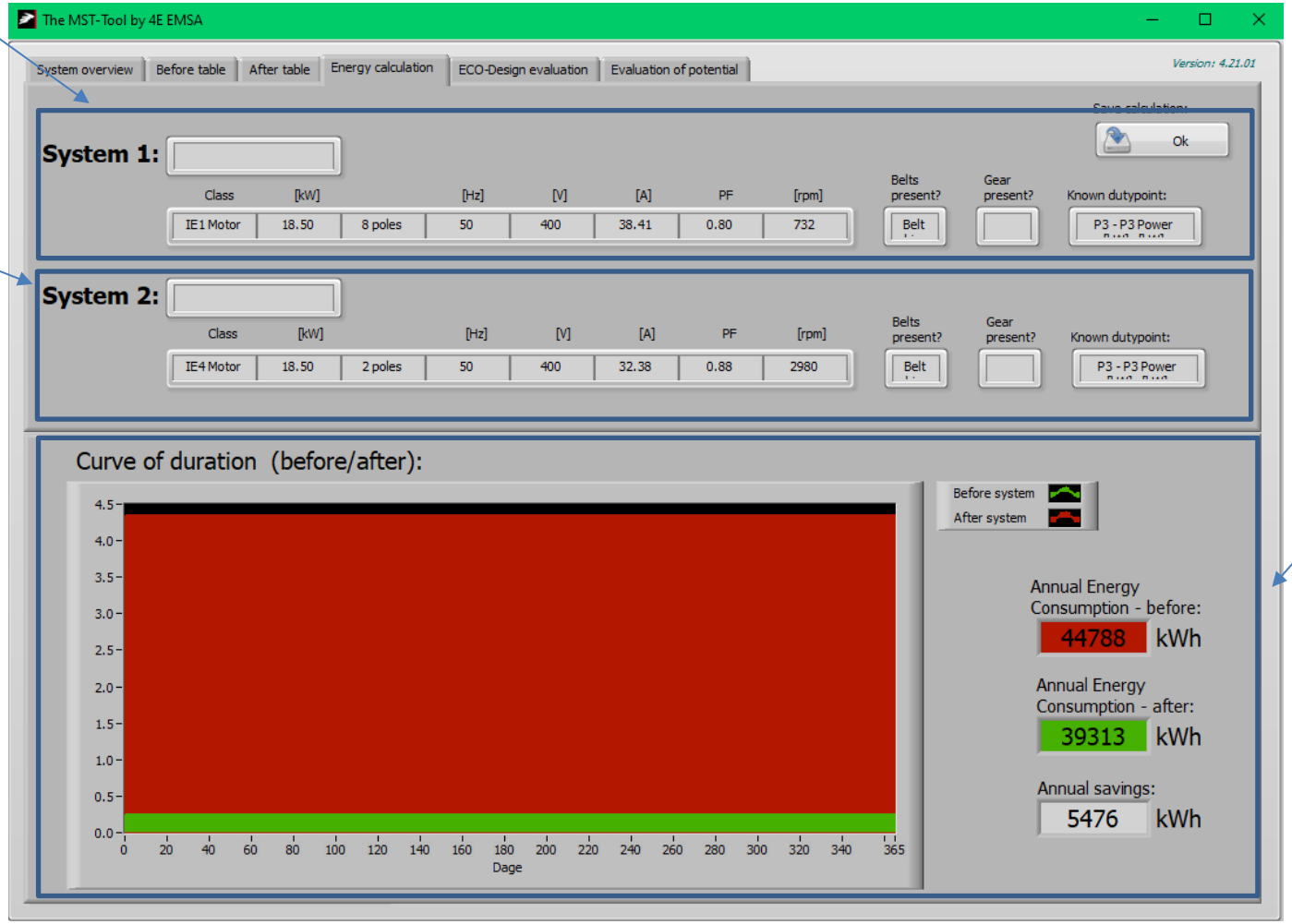
After table



Energy calculation

Original system “before table”

Improved system “after table”

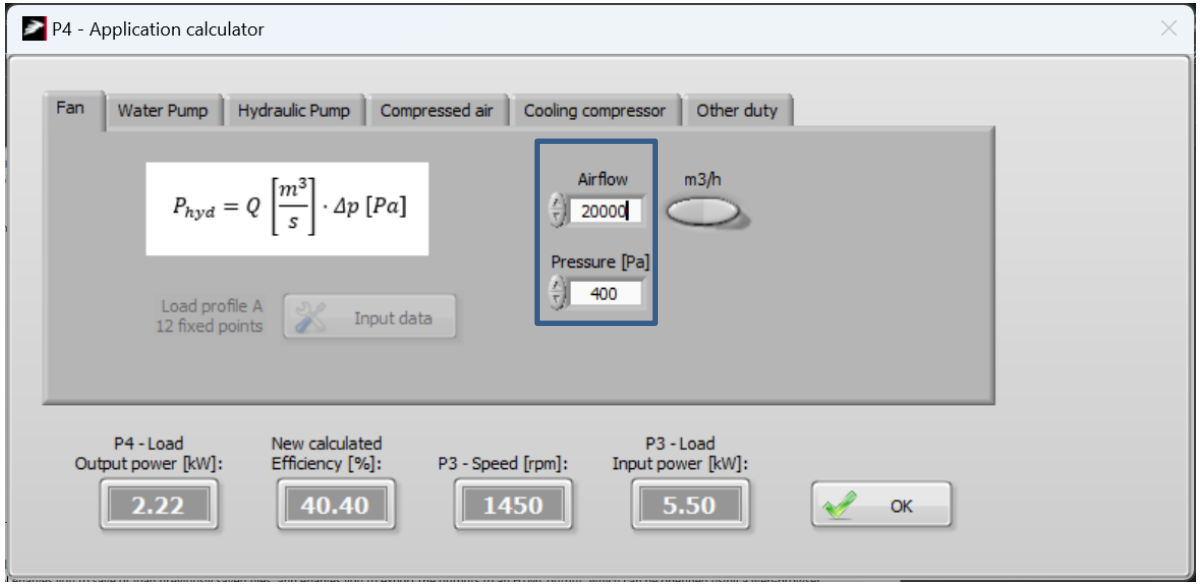


Energy saved from system

Simulating different load duty points

The tool allows you to calculate the efficiency of the system at different duty points of the load, which is useful when the system may operate at different load points.

This can be completed by entering the different system outputs on the load screen, in the example below this is airflow and pressure for a fan:



The MST will use this information to calculate the motor loading based on the duty point of the load.

Exporting results from the tool

The tool enables you to save or load previously saved files, and enables you to export the outputs to an HTML output, which can be opended using a web-browser.

More information

For more information on the MST tool: see https://www.iea-4e.org/emsa/our-work/emsa-tools/