

# PTW TMS

## *Transient Motor Starting Analysis*

The Transient Motor Starting Analysis module (TMS) is a state-of-the-art time simulation program to analyze all aspects of motor starting problems accurately.

TMS models up to 1500 motors dynamically throughout starting, stopping or reacting to load changes. In order to completely examine motor starting problems, TMS has the capability to dynamically represent motors which are already on line at the beginning of the simulation.

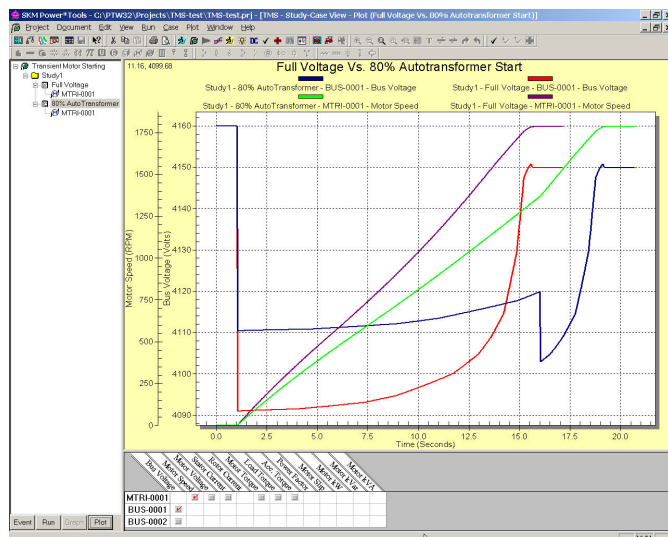
The complete network is continuously modeled throughout the time simulation in order to properly represent the interactions between motors and to be able to examine the effects of static loads, transformer taps, generator voltage setpoints, and all other network parameters.

### ***Benefits***

- Quickly examine and evaluate motors in your system for a variety of situations including; group motors starting, motor starting with different system load configurations, motor start heating problems, and evaluation of up to 9 motor starter types for reduced voltage starting schemes.
- Design efficient systems by determining optimal timing of staggered motor starting and re-acceleration schemes.
- Customize solutions with adjustable source voltage, include/exclude utility source equivalent impedance, and user definable time step for analysis.
- Communicate designs effectively with professional graphics and reports.

### ***TMS Output***

- Bus voltage
- Motor voltage
- Motor rotor current
- Load torque
- Motor speed
- Motor stator current
- Motor torque
- Accelerating torque
- Motor slip
- Reactive power (kVAR)
- Power factor
- Real power (kW)
- Total power (kVA)

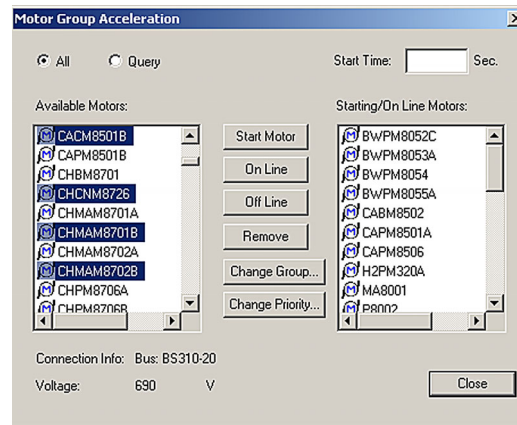


## **Features**

- Compare alternative designs graphically on a single plot.
- Analyze torque speed characteristics of motors in actual system operation.
- Analyze motor load changes.
- Determine voltage dip impact of motor starting.
- Determine motor accelerating times.
- Create user defined graphical data for loads and motors.
- Includes typical models for pumps, fans, compressors, grinders, blowers, and MG sets.
- Evaluate the interaction between multiple motors during starting conditions.
- Evaluate motor starting with different system load conditions and network configurations.
- Evaluate motor starting heating problems (I<sup>2</sup>t).
- Evaluate application of reduced voltage starters.
- Determine the optimal timing of staggered motor starting and re-acceleration schemes.
- Determine the impact of motor starting on other on-line motors.
- The time related output data includes: bus voltage, motor speed, motor slip, motor torque, load torque, accelerating torque, stator voltage, stator current, input power, VARs, power factor, and rotor current.
- Time and voltage dependent switching is provided to start or trip motors or to enact motor load changes.
- Switch motors based on group and priority in motor group acceleration setup.

## **Motor Starter Options**

- Series resistance
- Series reactance
- Solid state, current limit
- Solid state, voltage ramp
- Solid state, current ramp
- Full voltage
- Auto transformer
- Part winding
- Star-delta
- Shunt capacitors



Motor Group Acceleration Setup

## **Solution Modeling**

- Models stator and rotor circuits of multiple motors with the entire system network in order to model interaction between motors.
- Load models include torque-speed equations for fans, pumps, linear functions of speed, and user specified torque speed curves.
- Utilizes a load flow solution to model multiple motors within the full network for each time step.
- Network may include any combination of constant kVA loads, constant current loads, and constant impedance loads as well as generators which can schedule power and voltage within VAR limits.