

Motor Starting Comparison Case # 2

Comparison of ETAP Motor Starting Results Against Transient Stability

Excerpts from Validation Cases and Comparison Results (TCS-MS-083)

Highlights:

- Comparison of ETAP Motor acceleration (MS) results against Transient Stability (TS) results that have been validated against field measured data and hand calculations.
- Motor is rated at 200 HP at 0.46 kV, RPM = 1800, %PF = 91.71, and %Eff = 92.75.
- Motor CKT model is a Single (Single-cage with deep bars)
- The mechanical load model (Torque) is represented by the following polynomial equation $T = 100 * \omega$ (constant slope ramping load).
- The compared results include the motor current, motor real and reactive power demand, and the motor slip. Please note that the Motor Starting study can predict the acceleration time very accurately.
- Refer to cases 1 to 5 published in <https://etap.com/products/quality-assurance/qa-verification-validation-cases> for additional TS validation results

System Description:

This is a 3-Phase system that consists of three induction motors. One of the induction motors at the 0.480 kV bus is being started at $t = 0$ sec. The CKT model parameters are as shown on the Model page. The motor being started is **50St100Ld-1**.

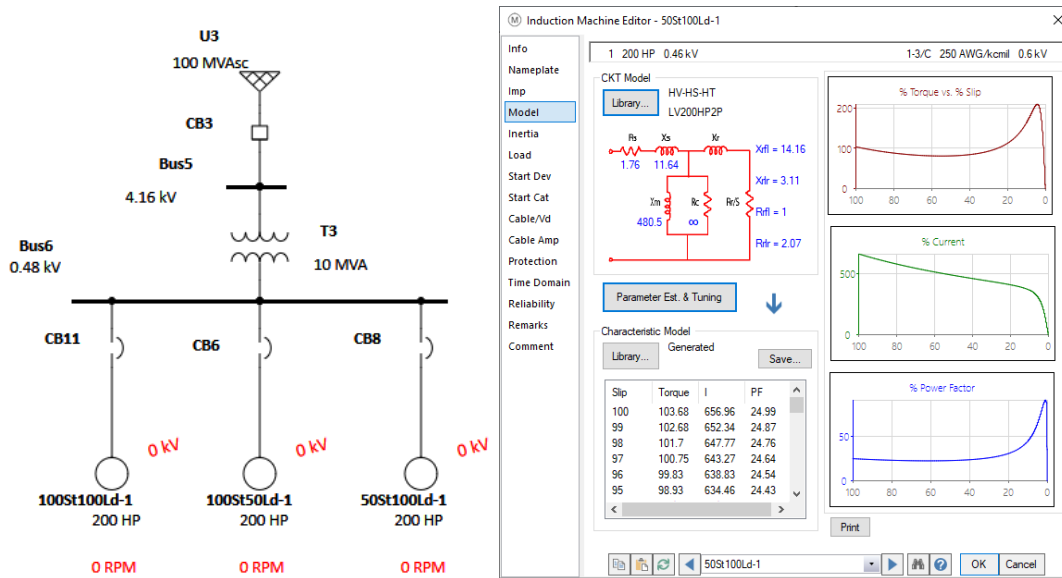


Figure 1. Test system studied for this validation case along with motor circuit model parameters.

Comparison of Results:

The following plots show the similarity between motor acceleration results obtained using ETAP Motor Starting and those obtained using ETAP Transient Stability. The TS model has been validated against hand calculations and field measured results as shown in the TS Verification & Validation Test Cases published on the ETAP Website.

The compared plots are the Motor Current (Amps), Motor Electrical Power Demand (MW), Motor Reactive Power Demand (Mvar) and the Motor Slip (%).

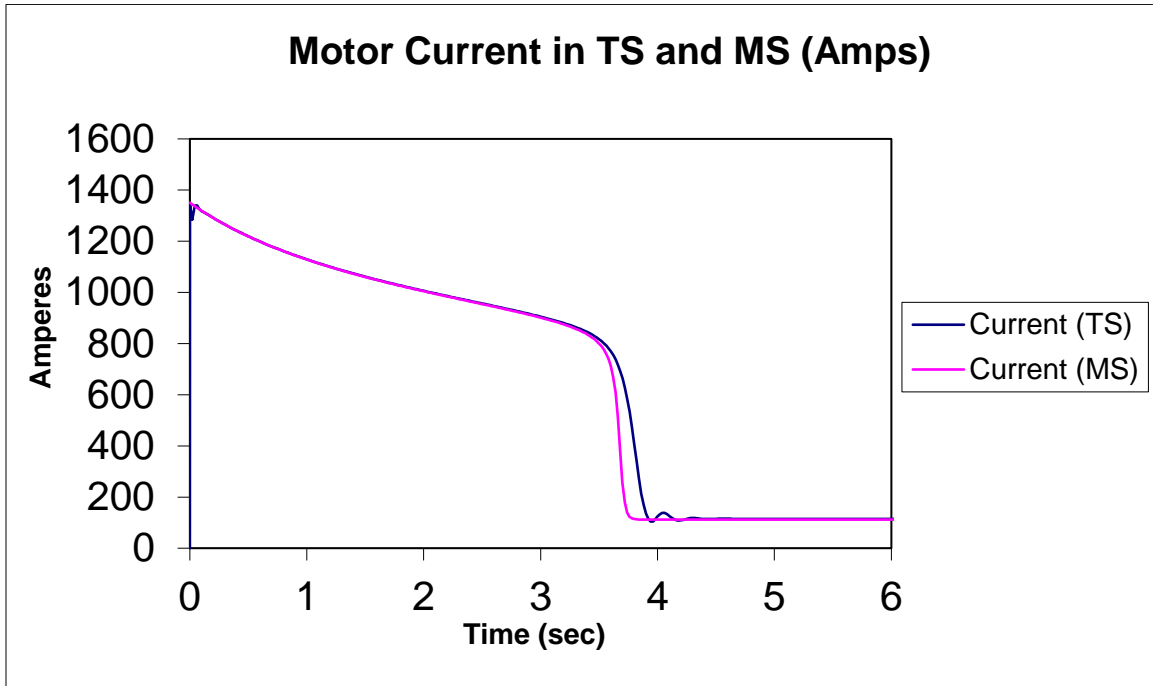


Figure 2. Motor current comparison between MS and TS results.

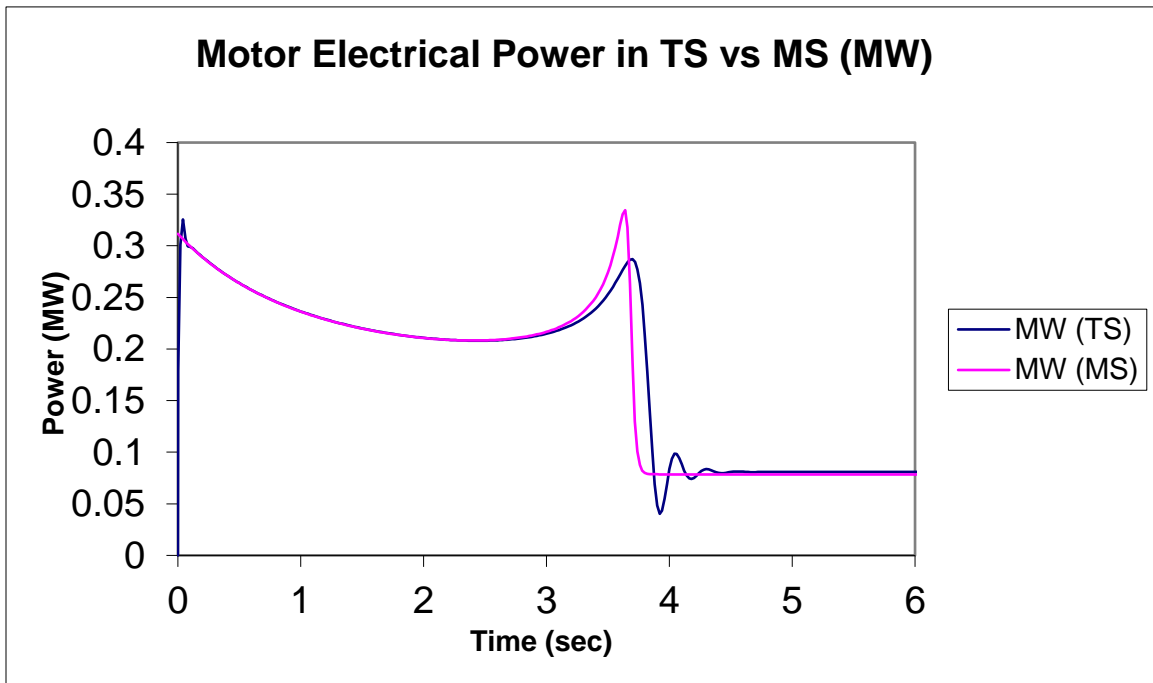


Figure 3. Motor electrical power comparison between MS and TS results.

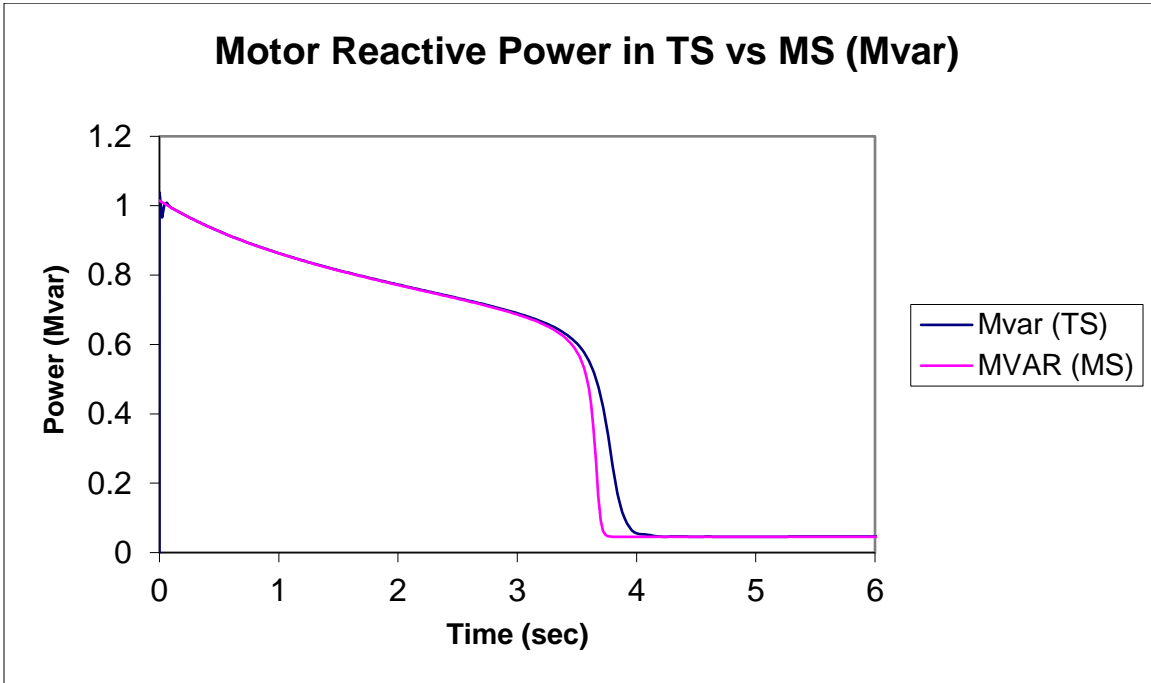


Figure 4. Motor reactive power comparison between MS and TS results.

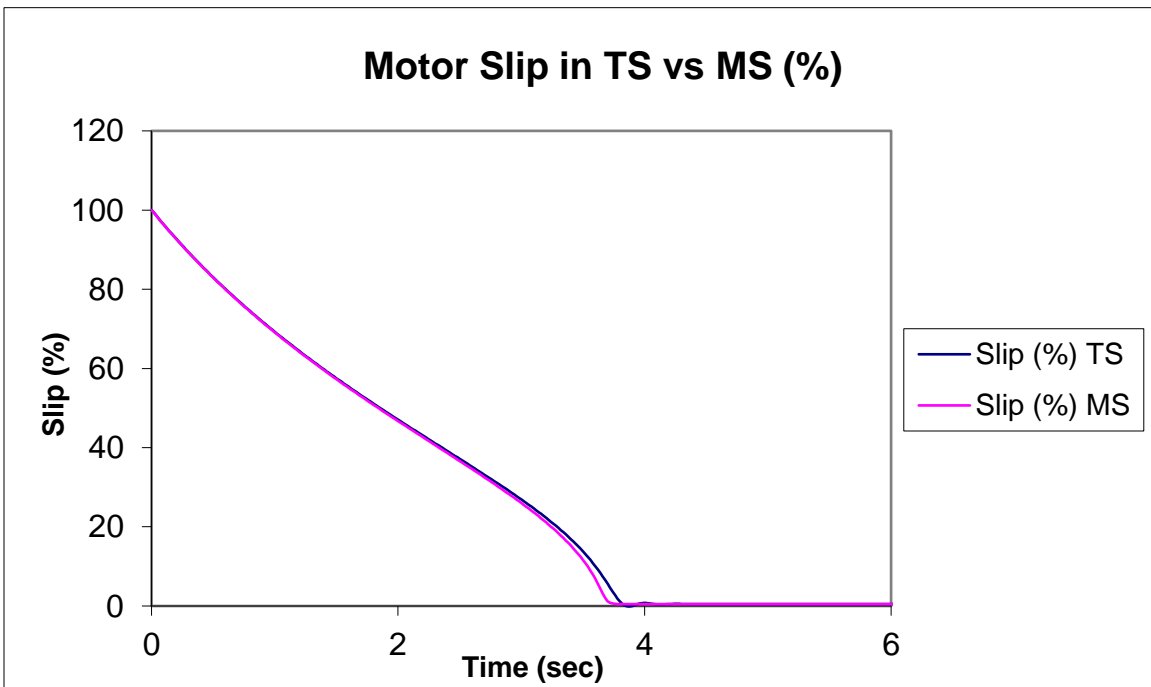


Figure 5. Motor slip comparison between MS and TS results.

Reference:

1. ETAP Motor Starting V&V Documents, Case Number TCS-MS-083.