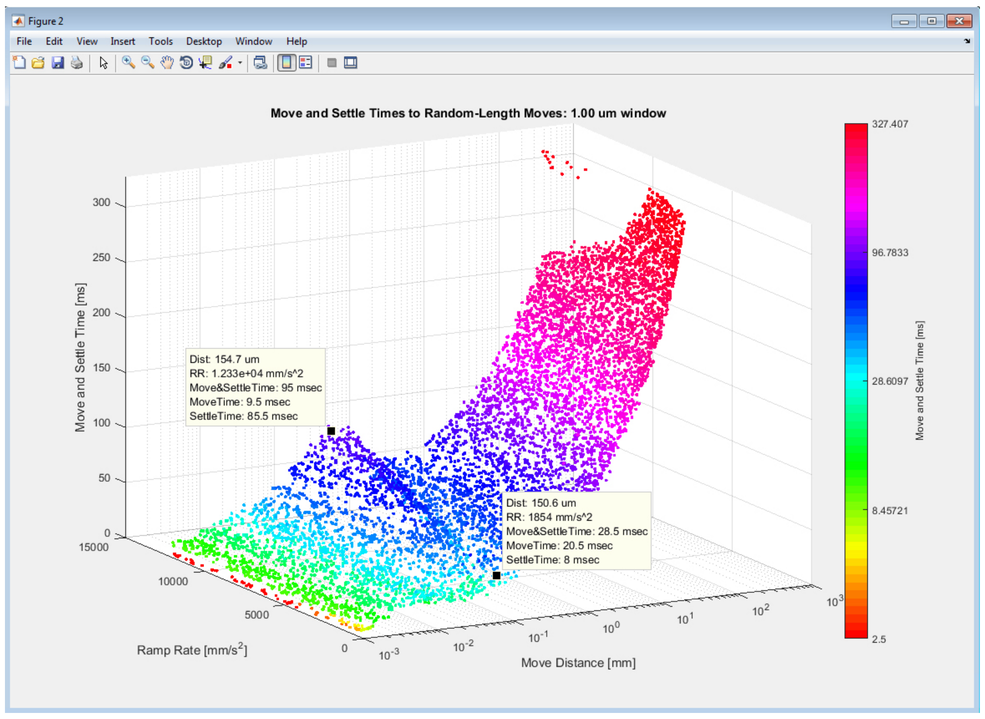
AEROTECH | CASE STUDY

Tuning can only do so much. The trajectory also needs to be optimized for peak performance.

Question: For any given move length, what is the optimal ramp rate?

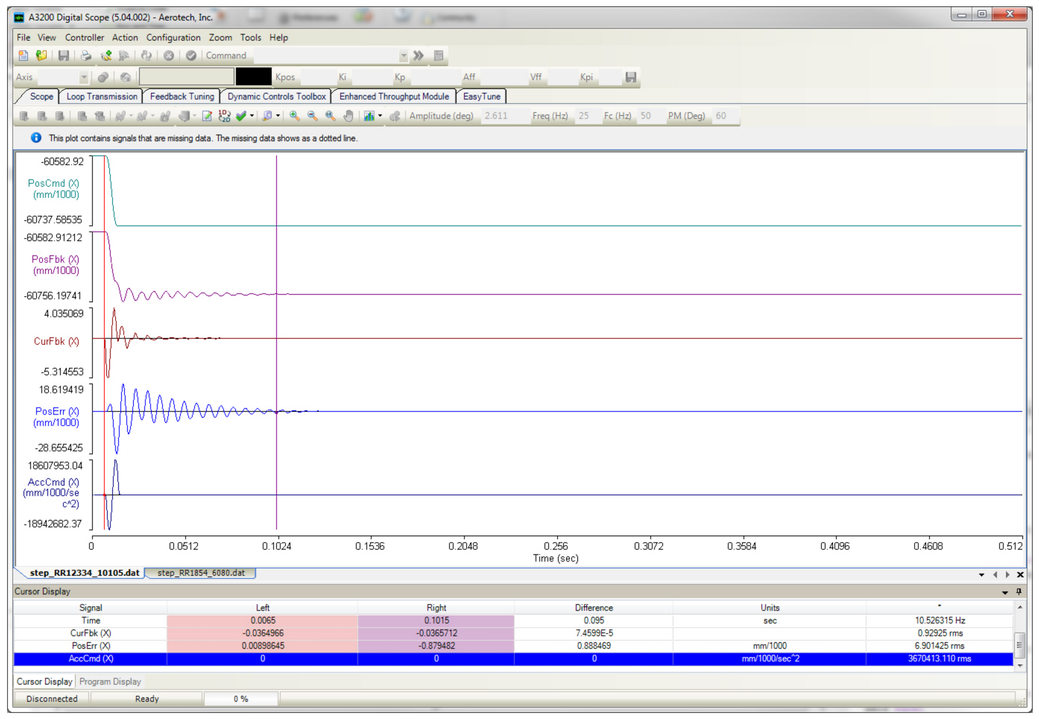
Collect Data For Analysis



Took a bunch of plots of random move distances and acceleration rates.

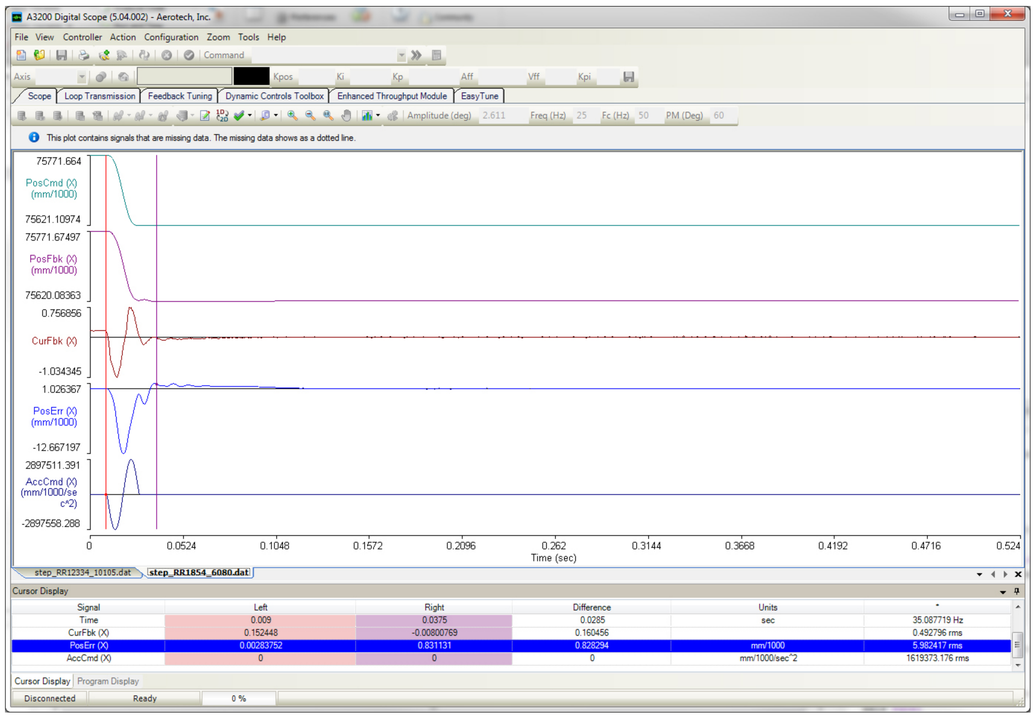
The dip in the middle showed an anomaly in the move profile caused by the base of the stage.

Ramp Rate Too High



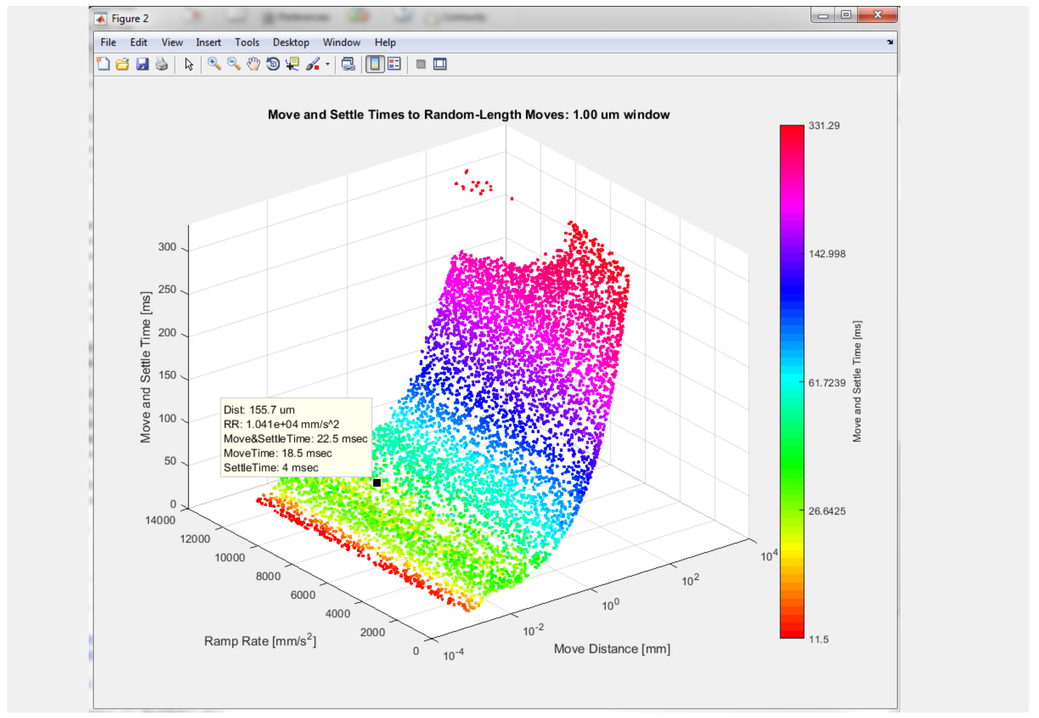
Notice ringing at end of moves with acceleration rates that are too high.

Optimal Ramp Rate



An optimal ramp rate does not show this oscillation.

Command Shaping Fix



After finding the frequency that caused the anomaly we were able to use command shaping to remove the frequency component from the acceleration command, which removes the excitation that caused this anomaly.

Conclusion: Ramp rate is selected based on allowable error for a given system, which allows lowest cycle time.