

Deflection analysis test:

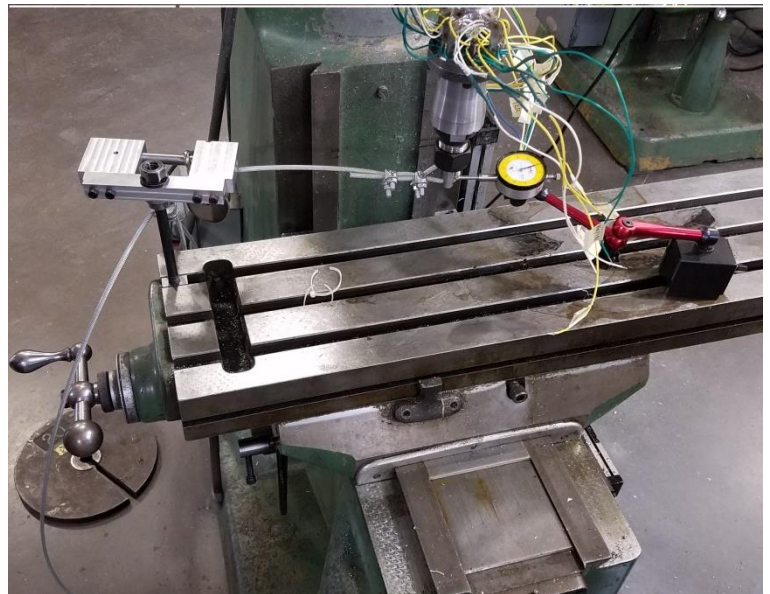
Reasoning: Validation of the deflection shown through simulation in order to validate the other aspects of the simulation that are more difficult to mechanically validate

Procedure:

1. Build a mount that affixes to the mill for a pulley and a mock tool that can have a steel cable fed through it
2. Acquire steel cable, pulley, cable clamps, weights equivalent to 50N, 100N, 300N and 500N, and plunge indicator
3. Mount device in the mill with a 7/8" collet
4. Feed the cable through the mock tool and affix the clamps
5. Find a location that the weight hanger can freely hang and affix the clamps to form a loop
6. Mount the plunge indicator so that its line of action is parallel to the cable
7. Adjust the height of the table such that the cable runs parallel to the table surface
8. Apply the given load and record the experimental values

Results and physical setup:

Force [N]	Deflection [in]	
	Simulation	Experiment
50	0.0015	0.0015
100	0.003	0.004
300	0.009	0.015
500	0.015	0.0285



Conclusions and Discussion:

The results at low load almost perfectly correlate to the simulations while at the higher load the deflection is slightly more than simulated. The likely reasons behind this are that the mock tool is simulated as carbide without a hole in it while our actual mock tool is a steel shank with a hole in it for the cable and that the device was clamped in the mill over a slightly shorter length than it was simulated as well.