



# MILAN RATHOD

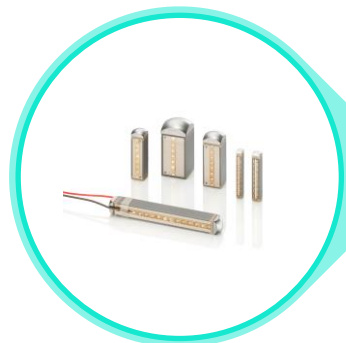
MECHATRONICS ENGINEER  
PROJECT INVOLVEMENT: DIGIMAN



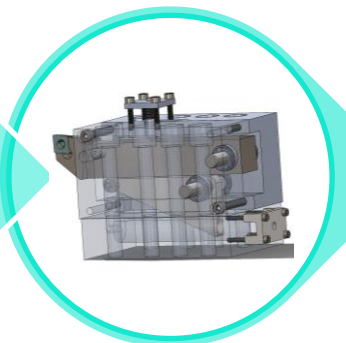
# PROJECT: DIGIMAN

- Research and development of piezo-sensorized advance tool for chatter suppression in the machining process

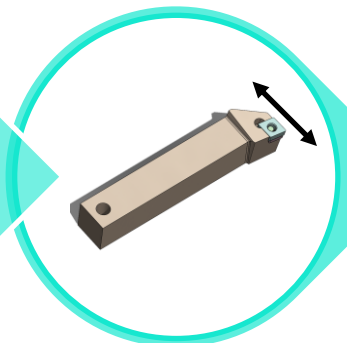
- Goals:
- Chatter Suppresion during machining process
  - Increase Stability limit of the machining process
  - Increase productivity, decrease production as well as operational cost and production time



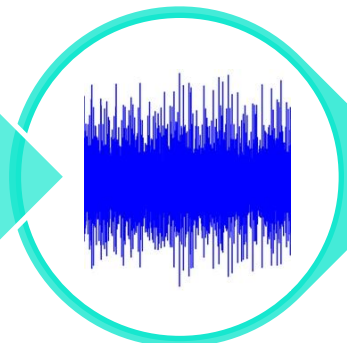
Piezo-electric stack actuator



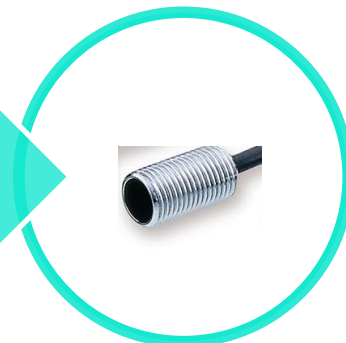
Custom Designed Tool Holder



Controlled vibration in feed direction impose



Vibration and Force signal analysis



Tool tip displacement Feedback signal measured by sensor

# DIGIMAN



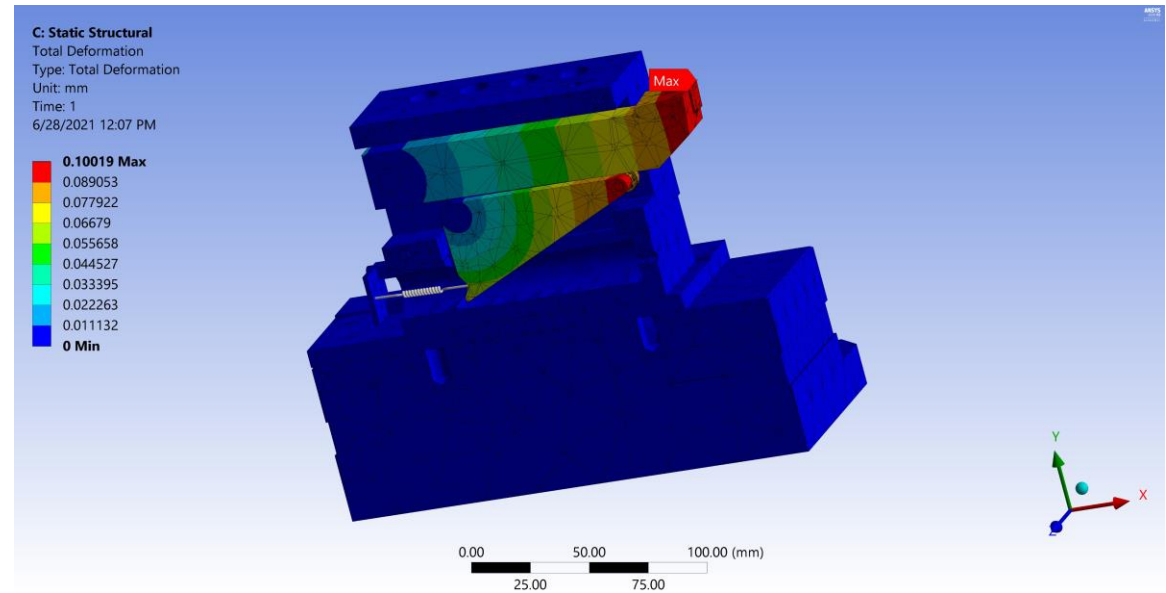
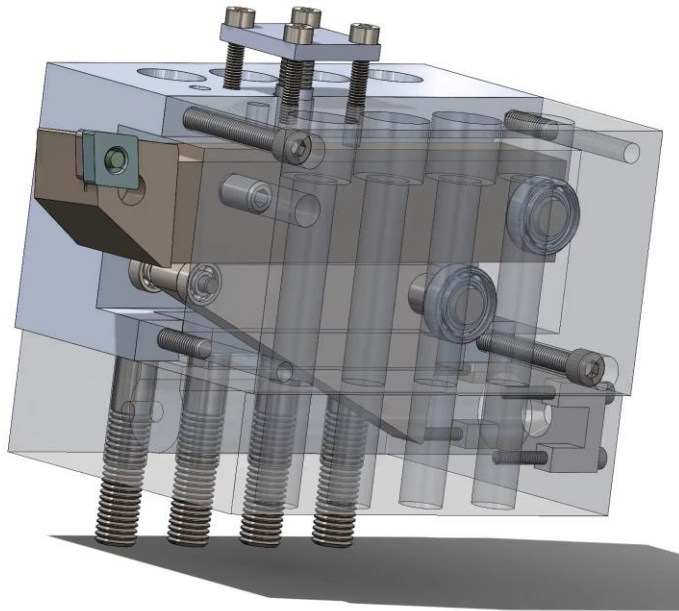
## PROJECT OUTLINE

- 1 *Literature Review & Concept Development*
- 2 *Simulation Model Development & Physibility check of the concept effectiveness*
- 3 *Selection of the piezoelectric actuator to satisfy the simulation requirement & finalize the design of custom tool holder along with piezo actuator housing*
- 4 *Manufacturing of the tool holder and Initial testing of the piezoelectric actuator*
- 5 *Final experimental validation of the simulation results & vibration attenuation*

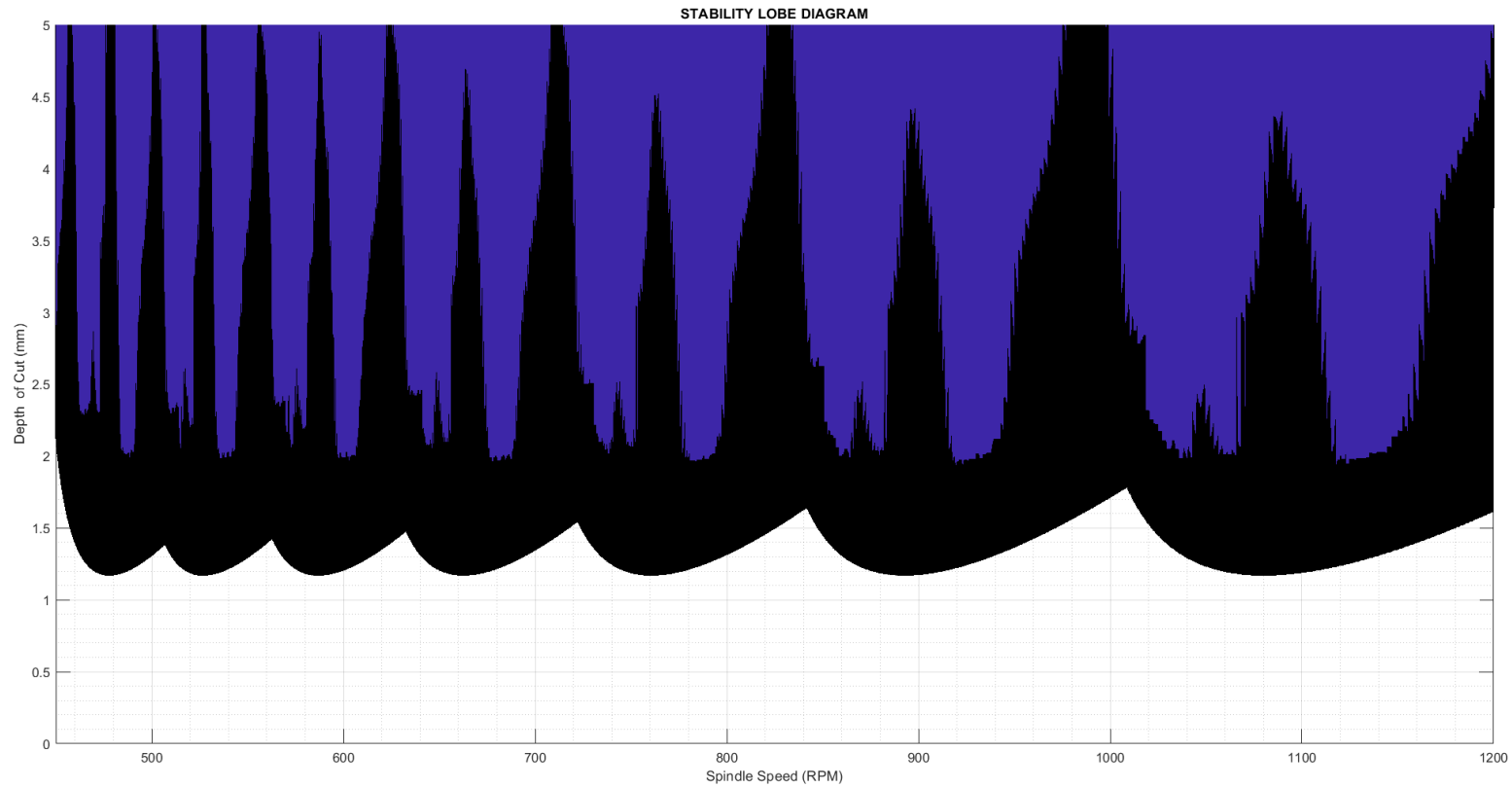
# DIGIMAN



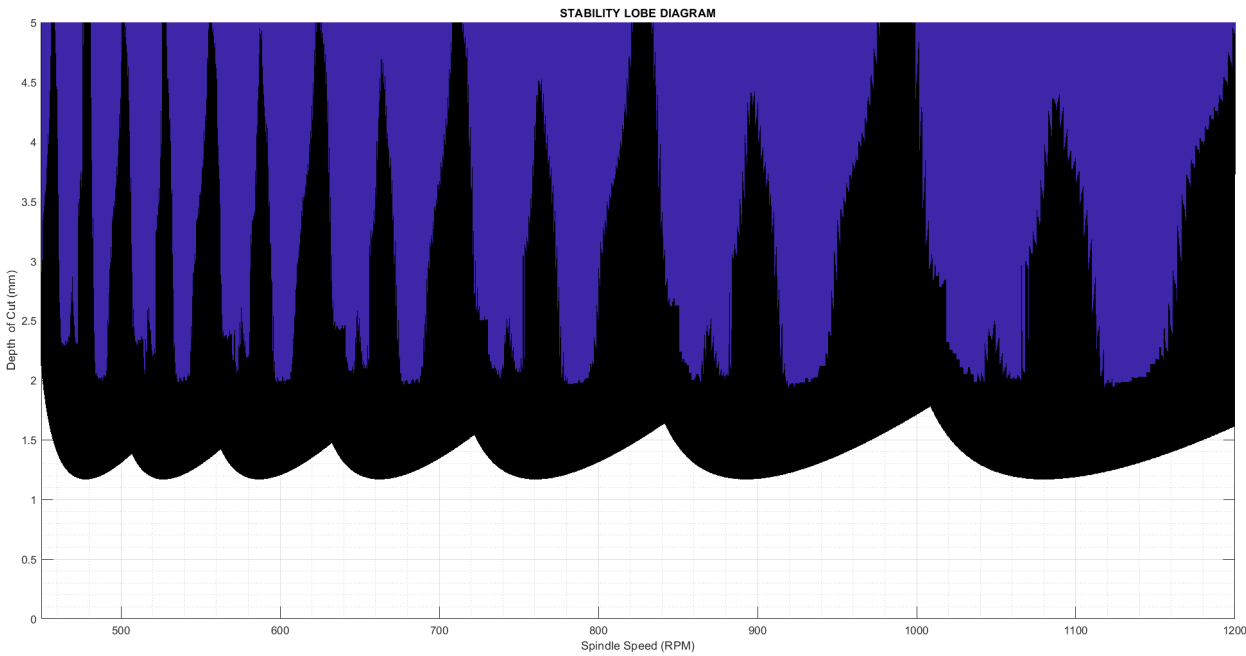
# CUSTOM TOOL HOLDER DESIGN FOR PIEZO ACTUATOR HOUSING



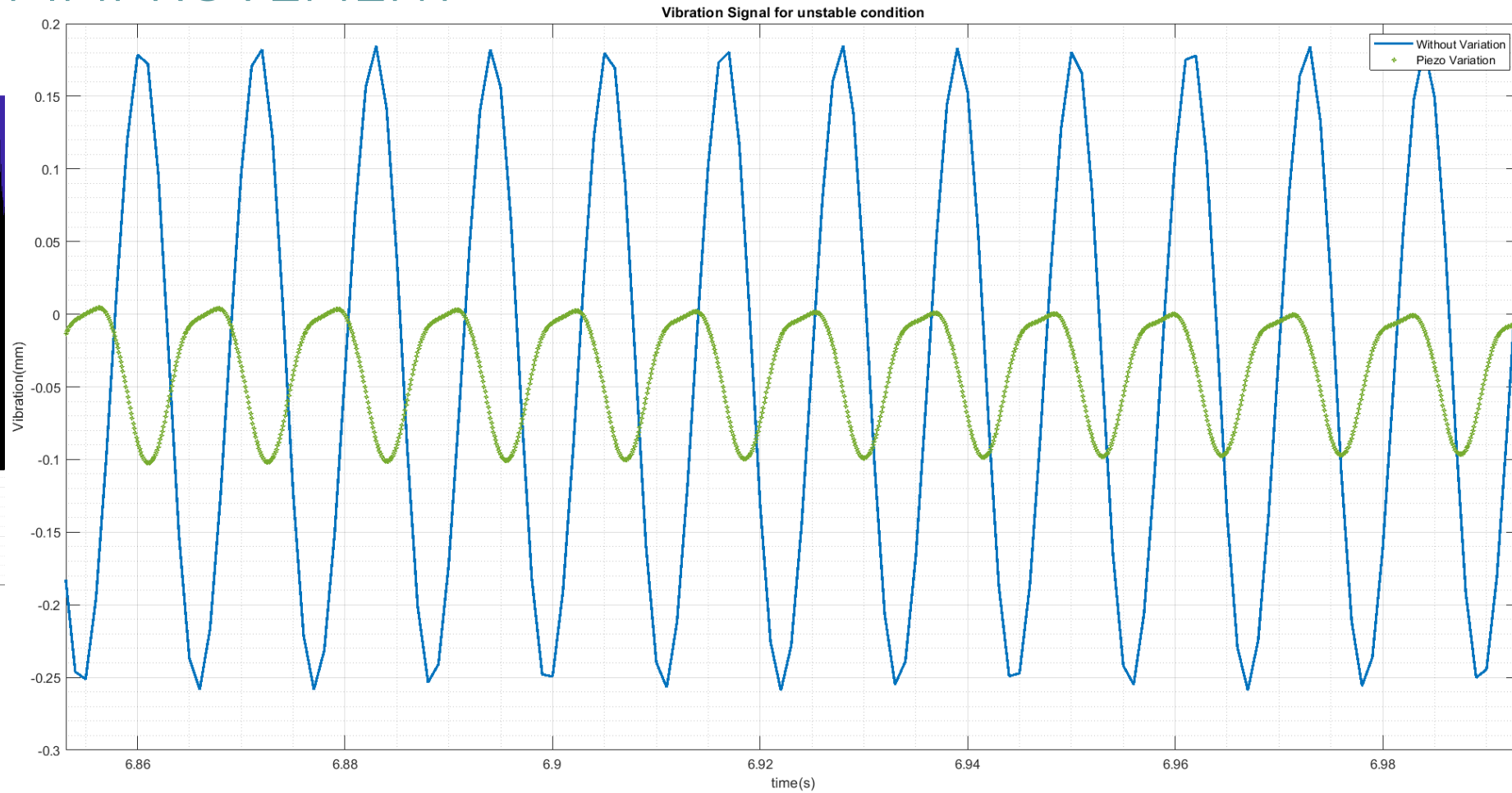
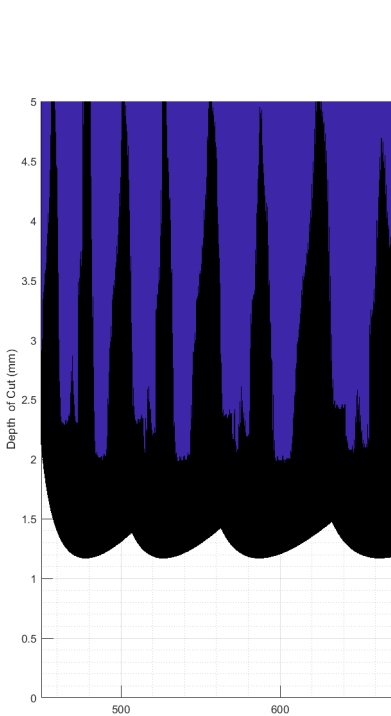
# STABILITY IMPROVEMENT



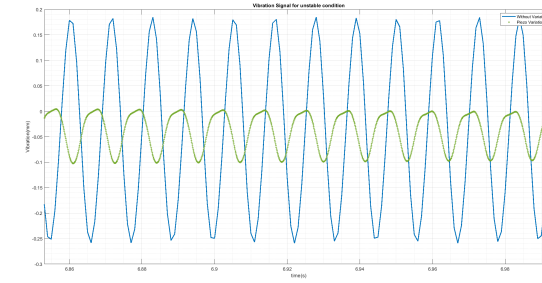
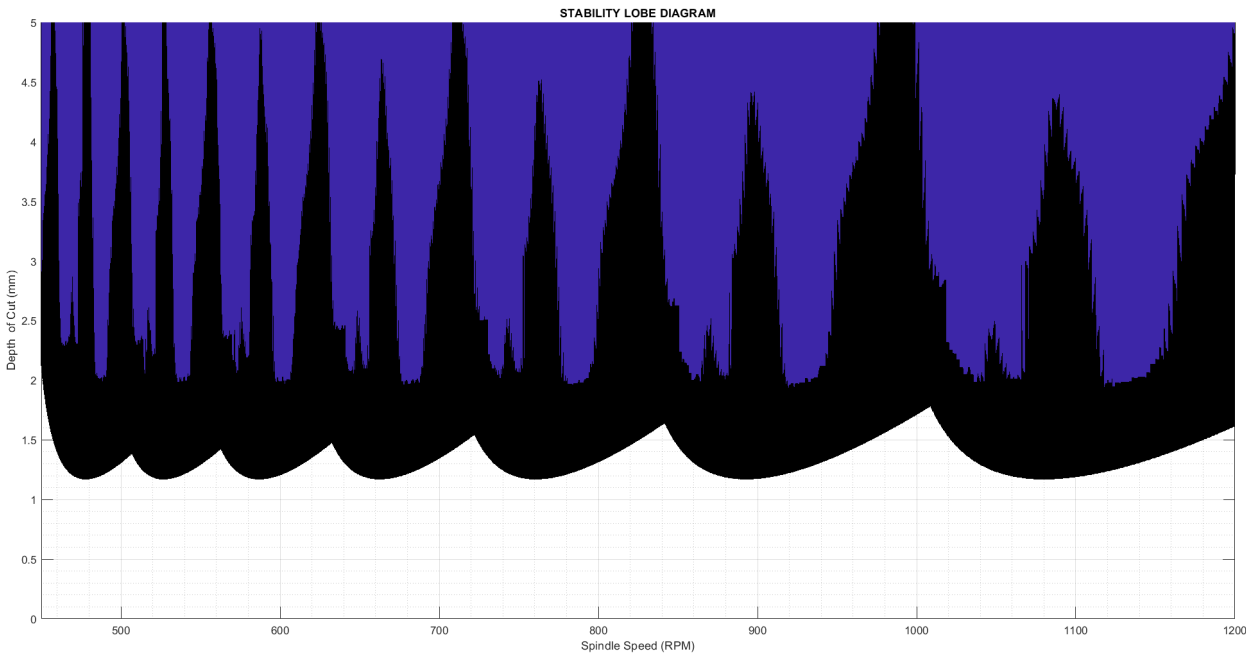
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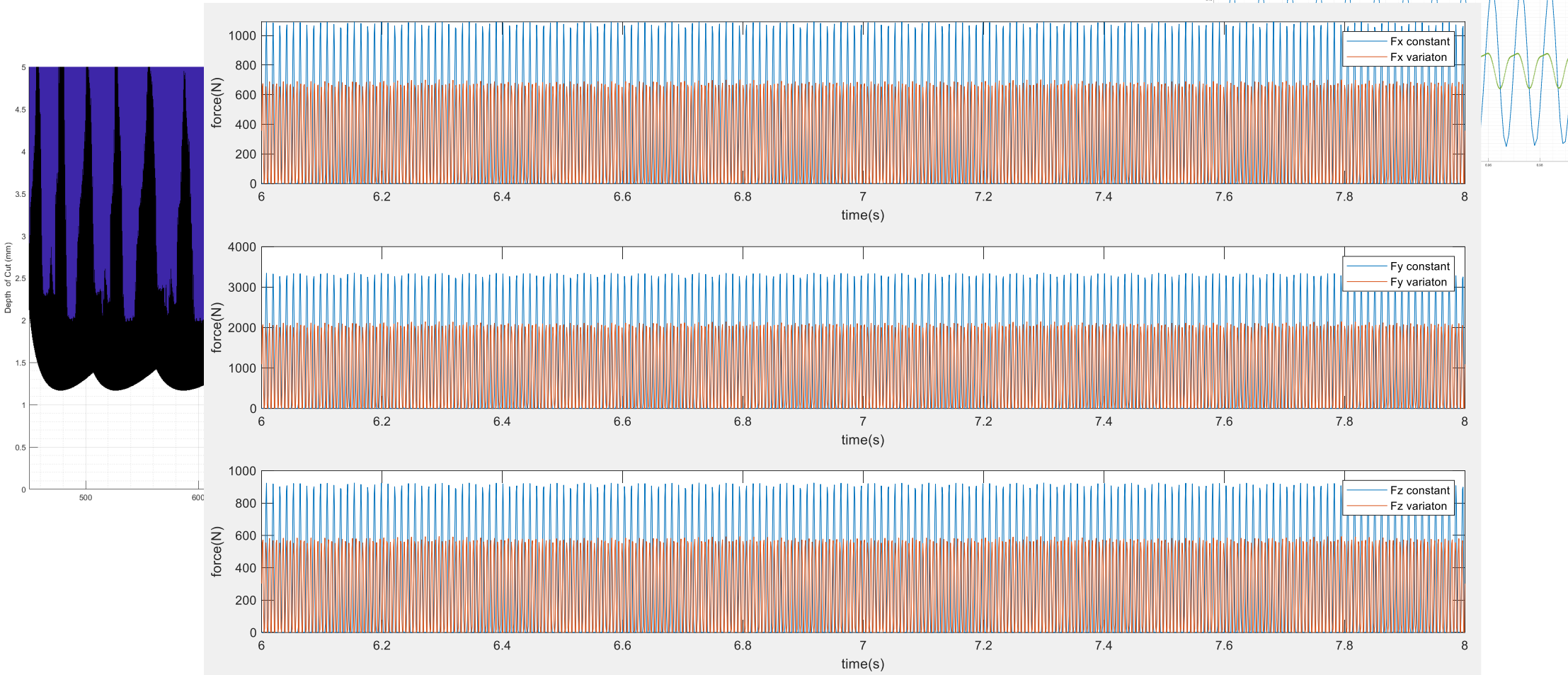
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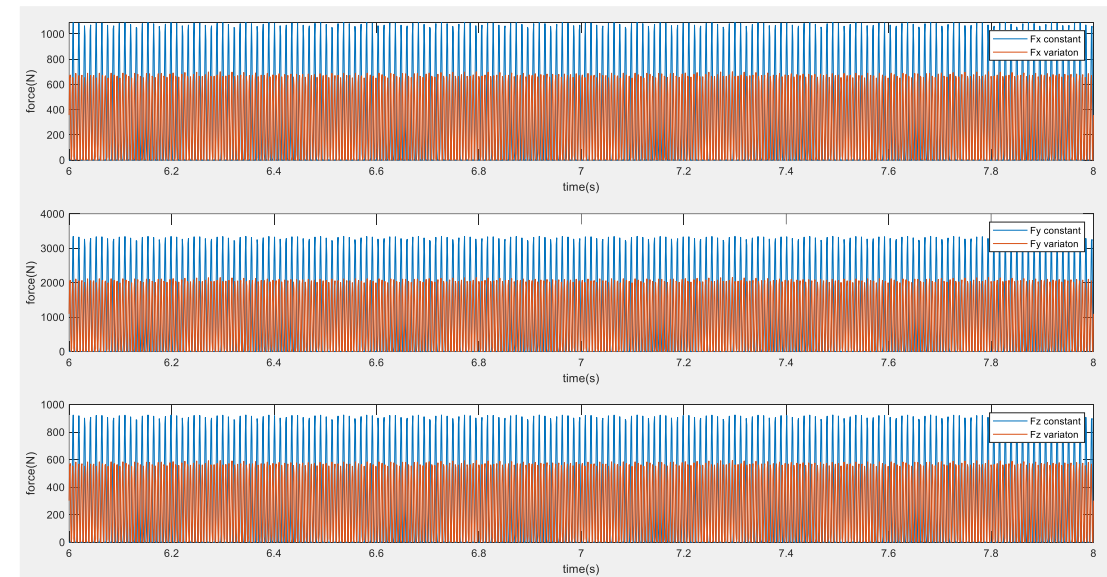
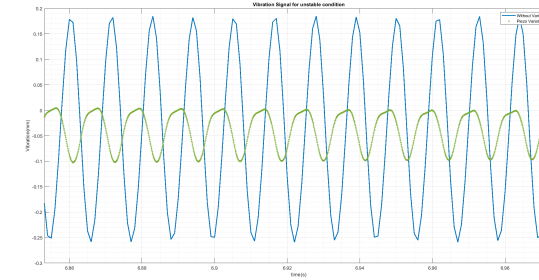
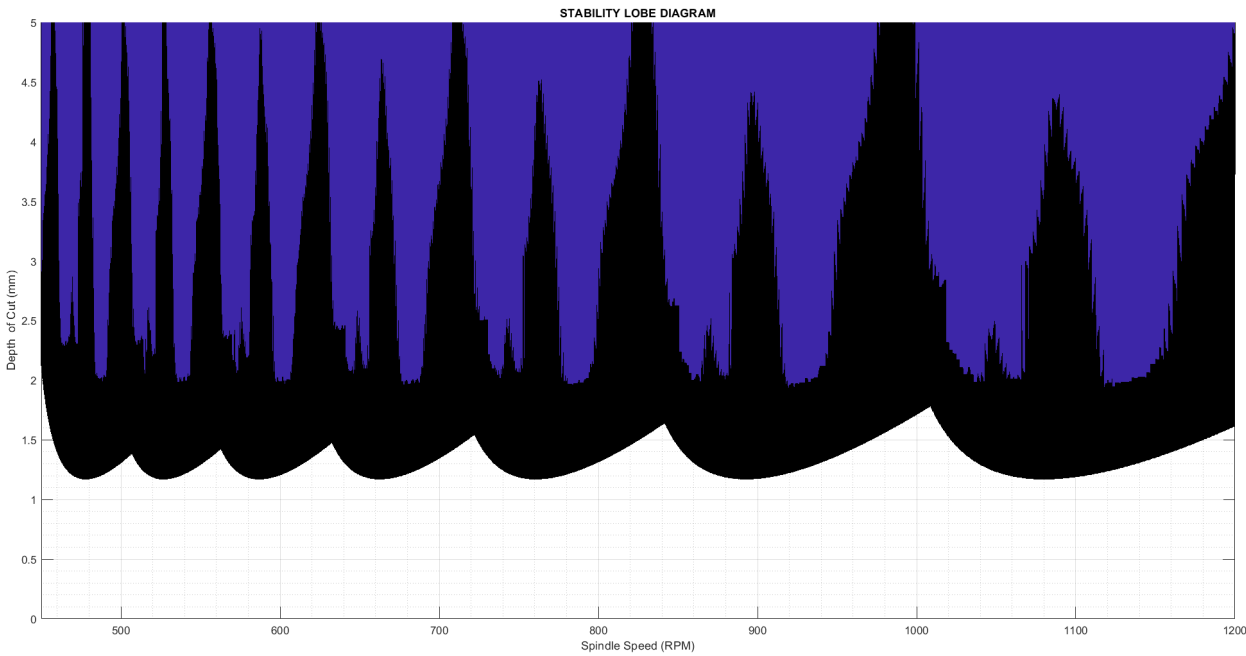
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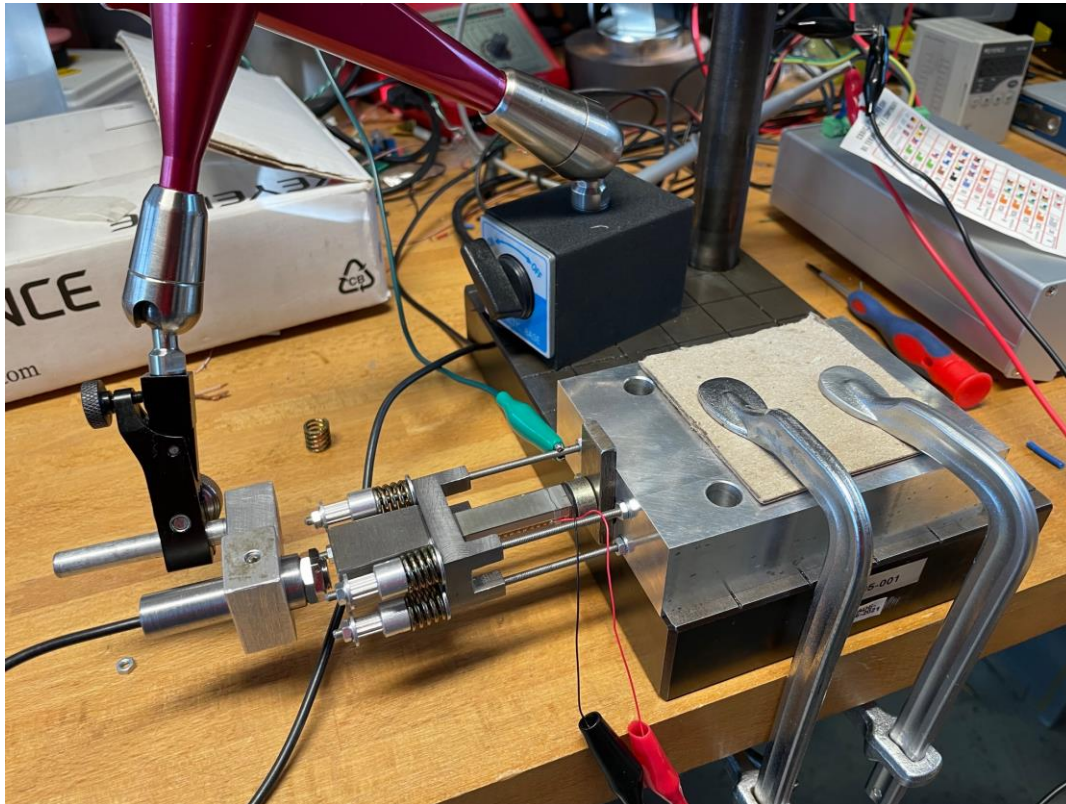
# STABILITY IMPROVEMENT



# STABILITY IMPROVEMENT



# INITIAL TESTING OF PIEZOELECTRIC ACTUATOR



## OUTCOME

Attenuate the machining vibrations

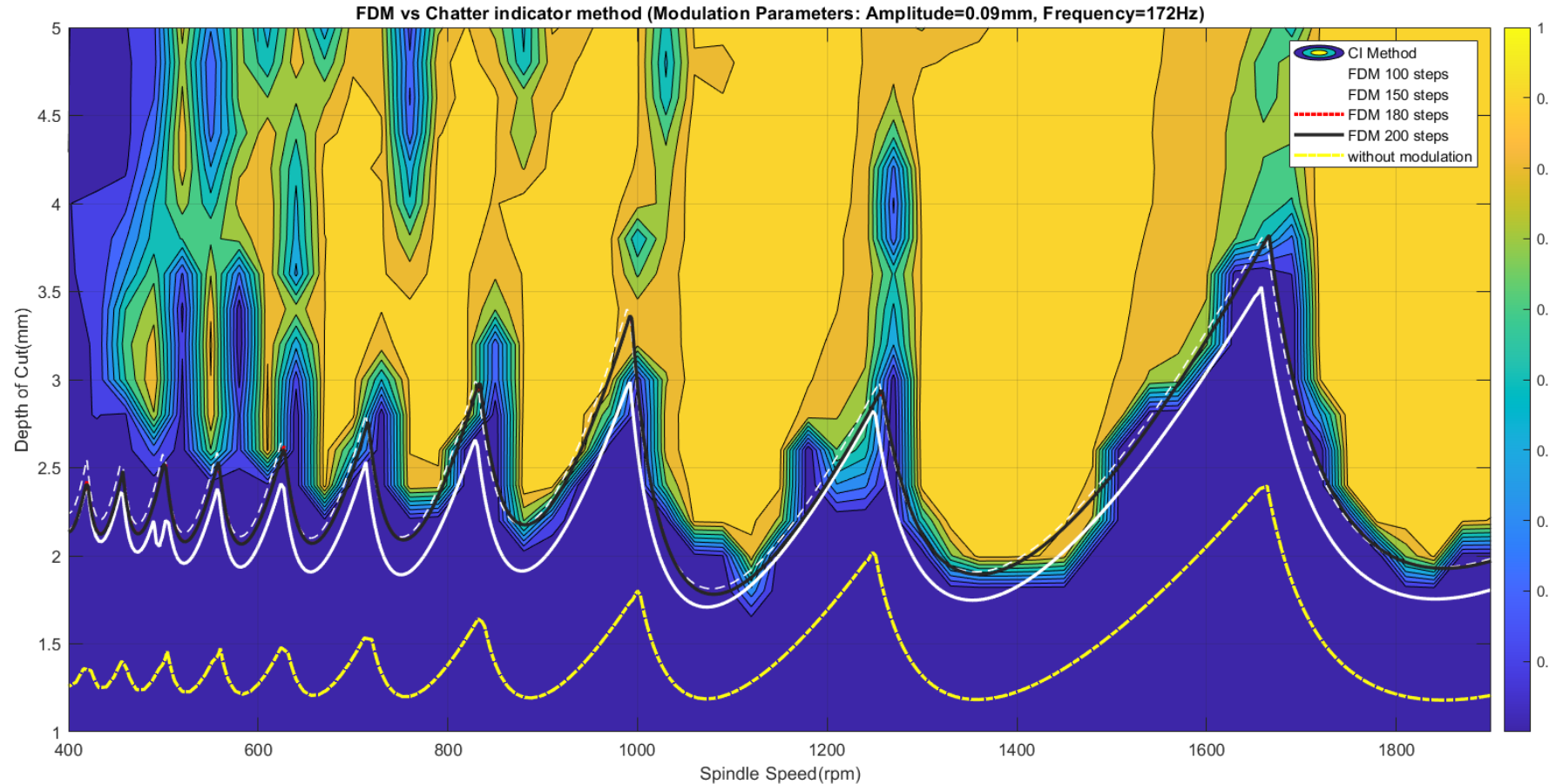


Increase the stability limit of the process

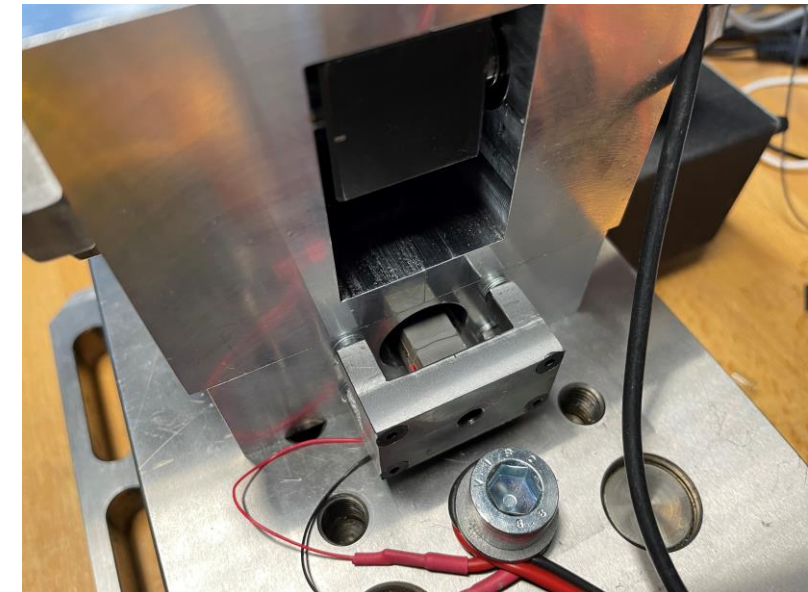
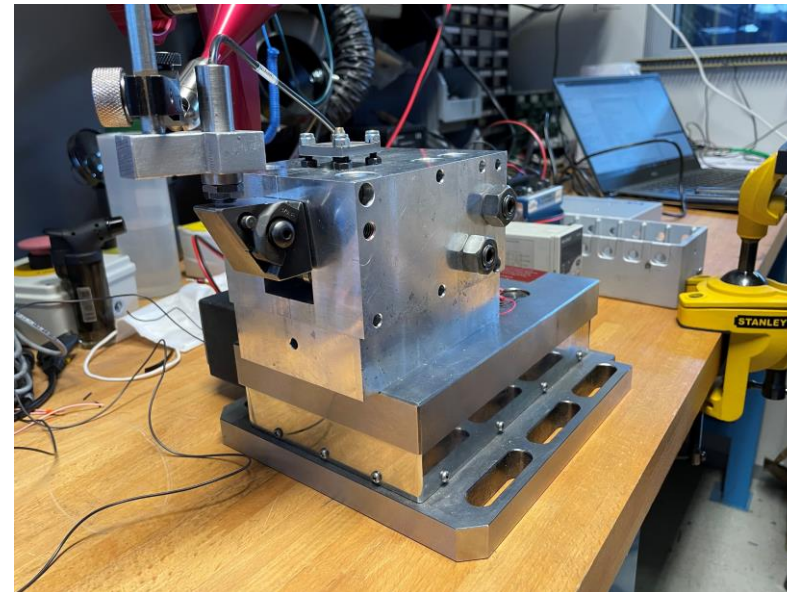
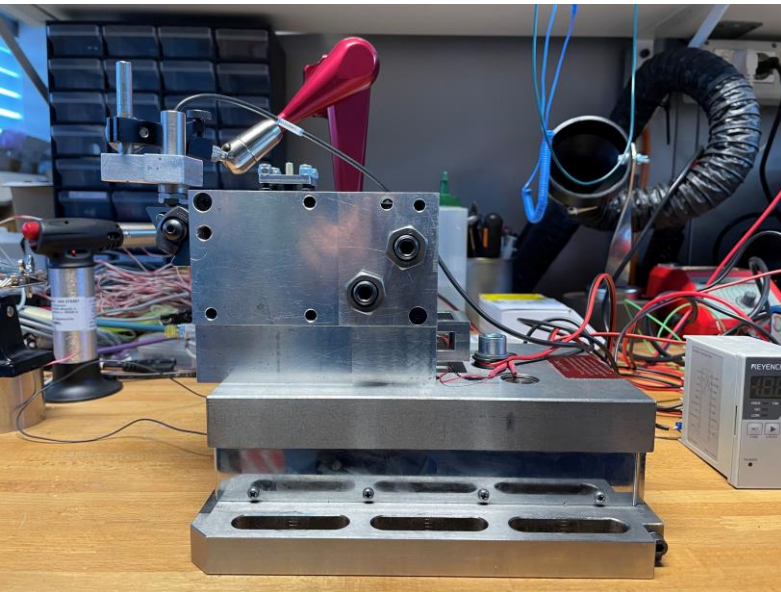


Increase Productivity and reduce manufacturing time

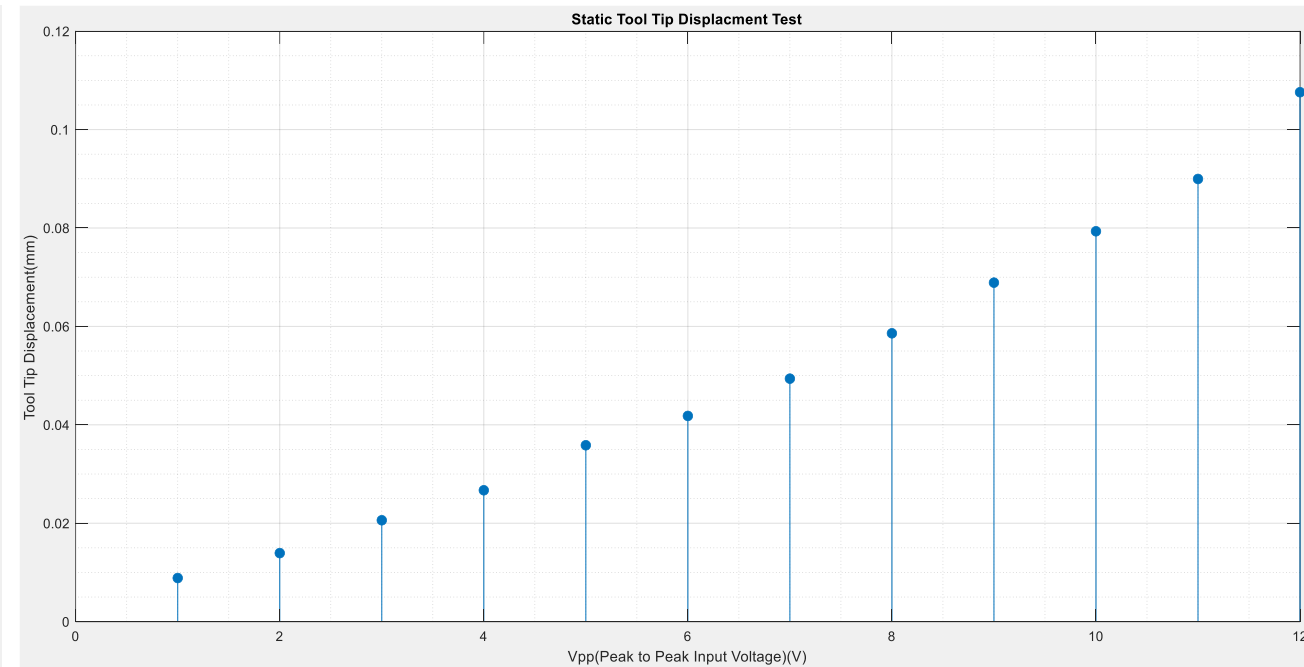
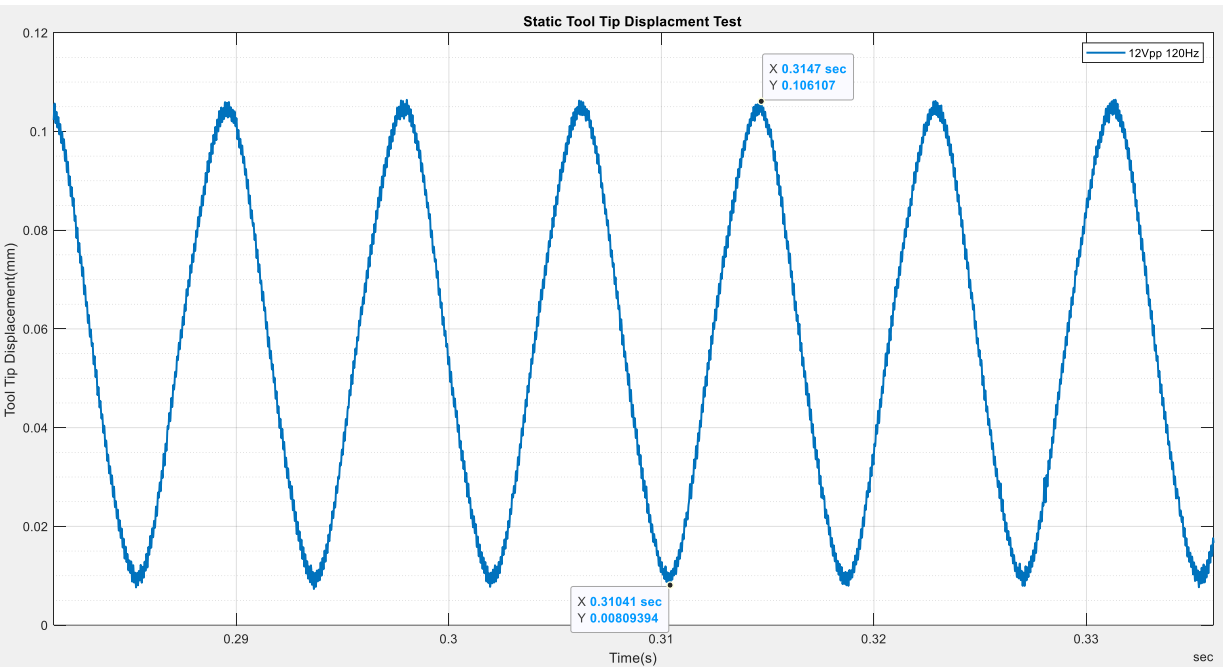
# NEW METHOD FOR ANALYTICAL FORMULATION FULL DISCRETIZATION METHOD



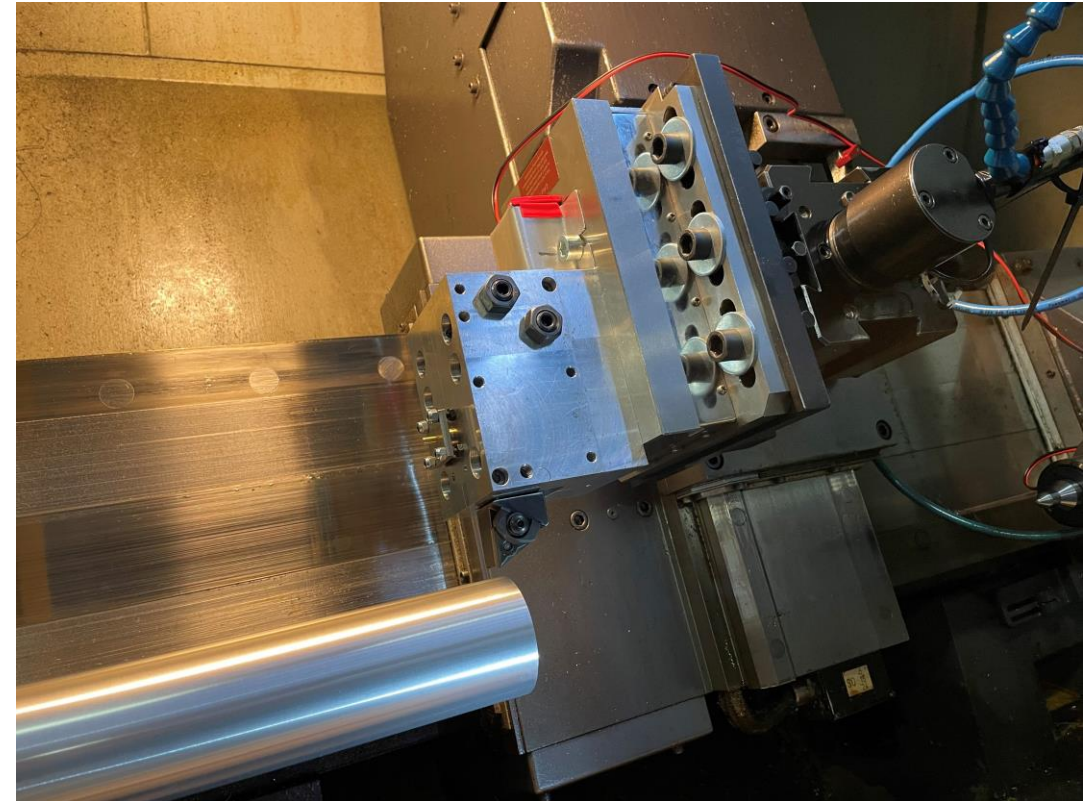
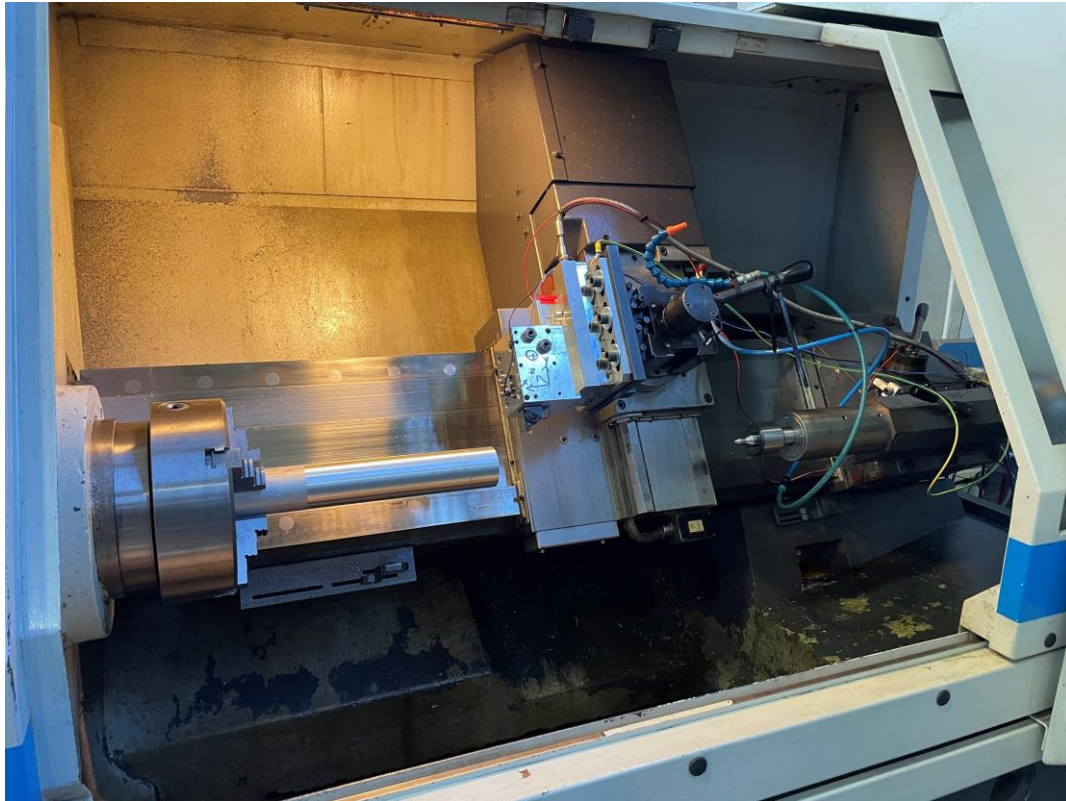
# SETUP FOR STATIC VIBRATION TEST AT THE TOOL TIP



# STATIC VIBRATION TEST AT THE TOOL TIP



# DYNAMIC VIBRATION ATTENUATION TEST SETUP





**GRAZIE**

