ROSE GPE

Rose-Hulman Institute of Technology Grand Prix Engineering

Wheel Center Modal Analysis

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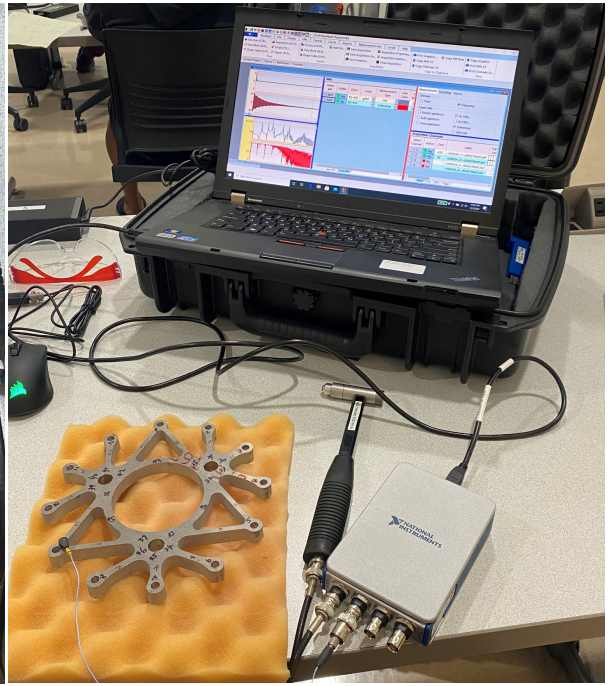
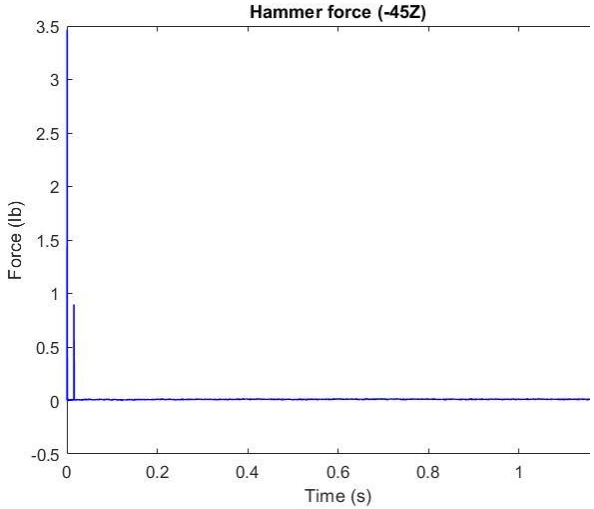
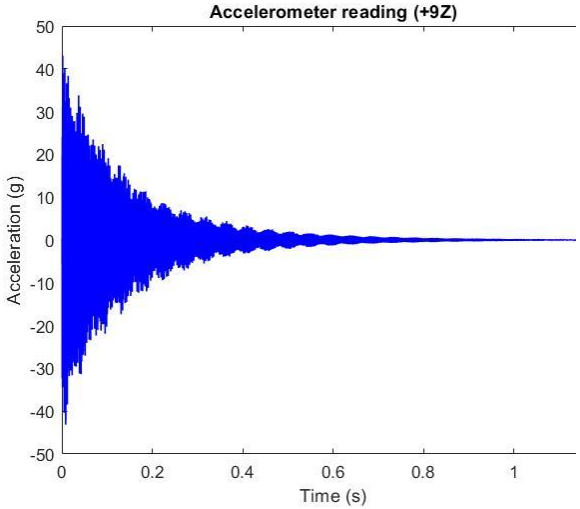
Testing setup captures modal response

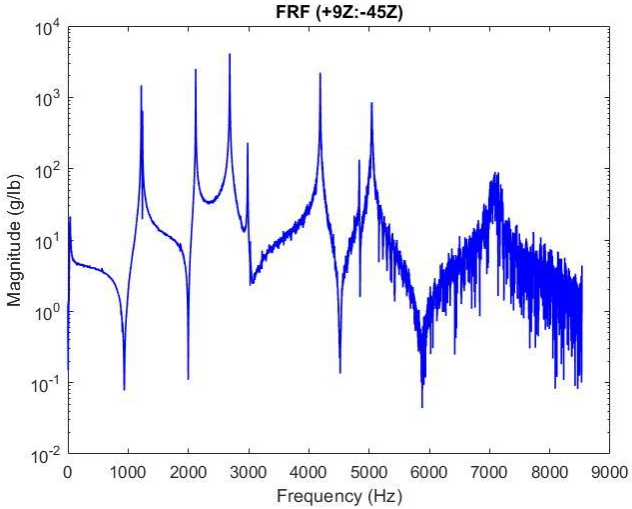
- Experimental procedure derived from lab 4 guidelines
- 45 test points
- Exponential windowing
- Steel hammer tip



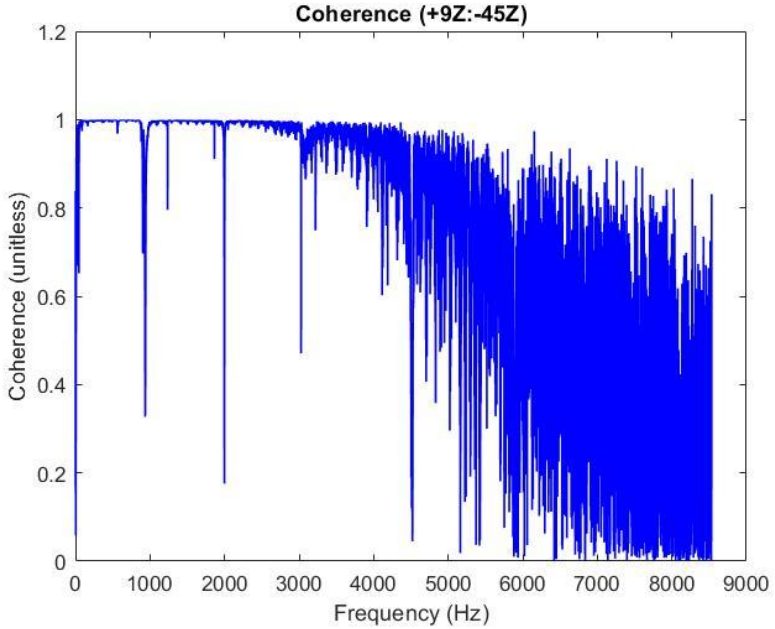
Steel tip hammer and exponential window produced an appropriate response

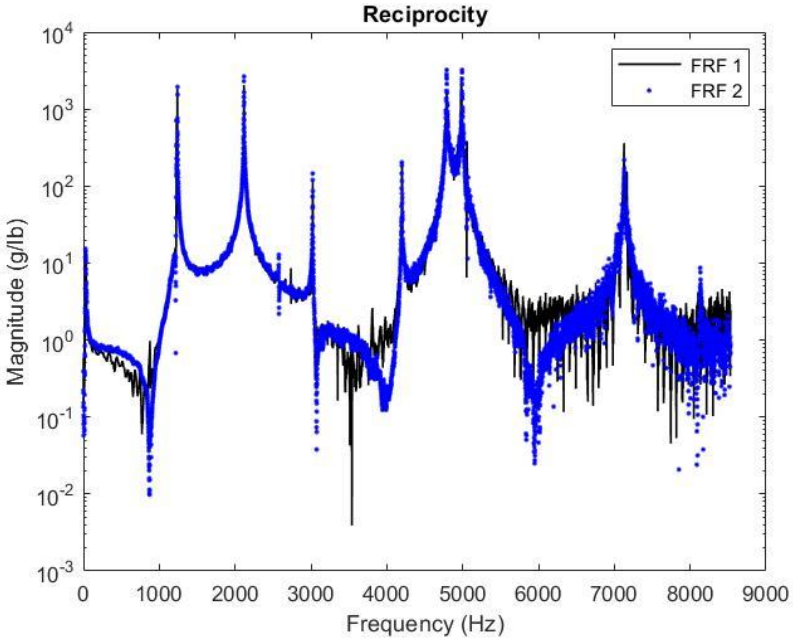






Reciprocity Test and Coherence suggest good correlation below 5000 Hz

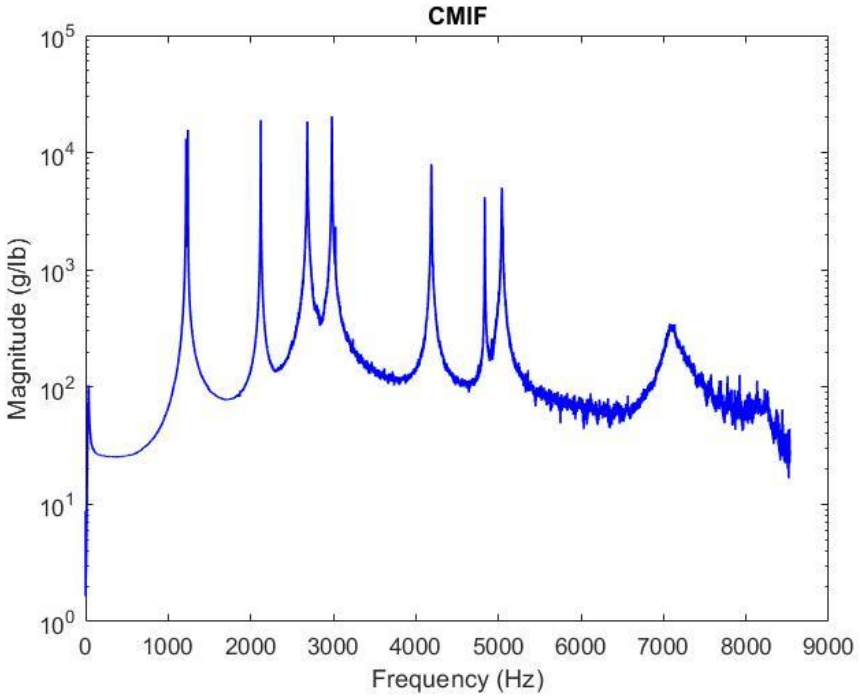




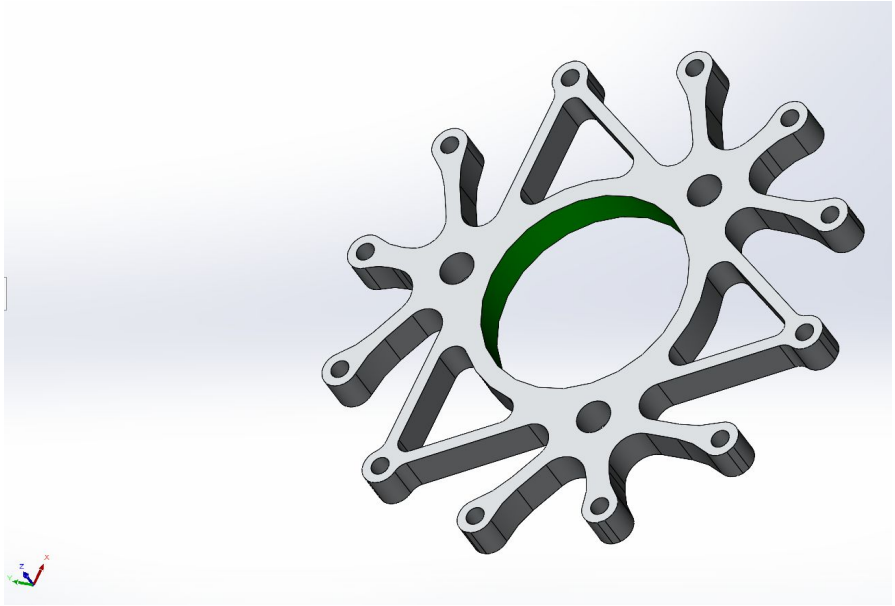
Natural frequencies identified by peak picking

Measured frequencies:

1. 1240 Hz
2. 2122 Hz
3. 2687 Hz
4. 2984 Hz
5. 4189 Hz
6. 4836 Hz

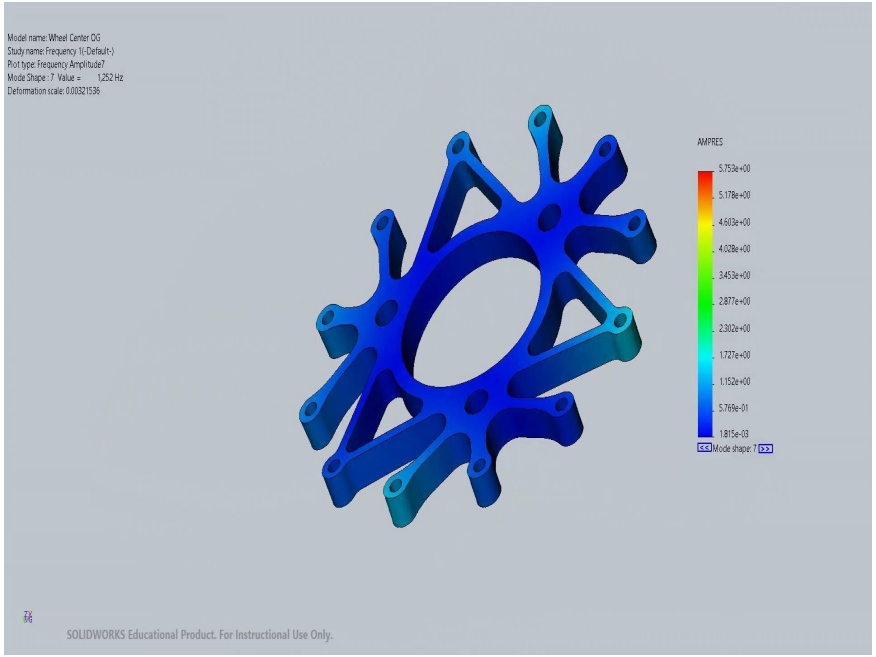


Solidworks FEA Modal Analysis



Mode 1

f = 1252 Hz



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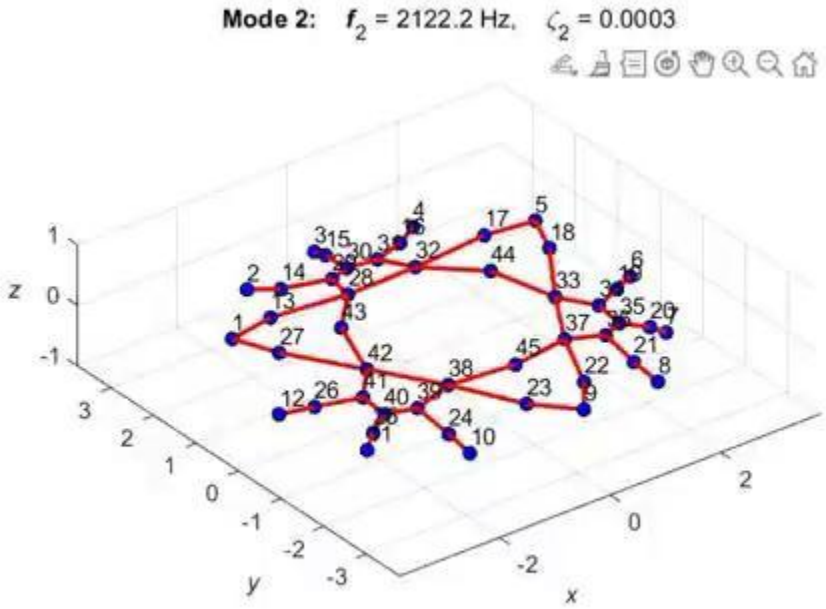
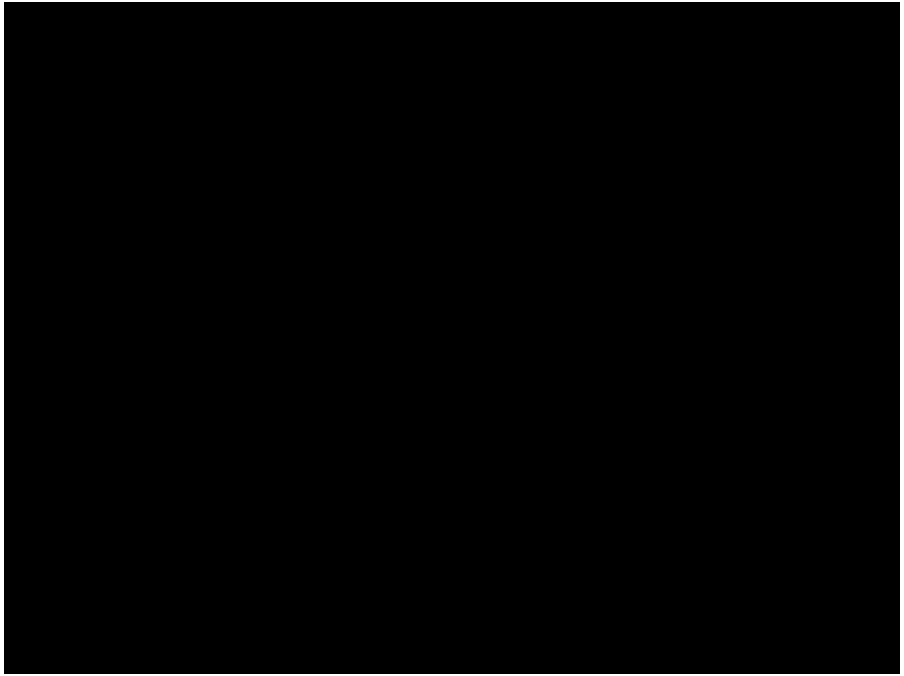
Mode 2

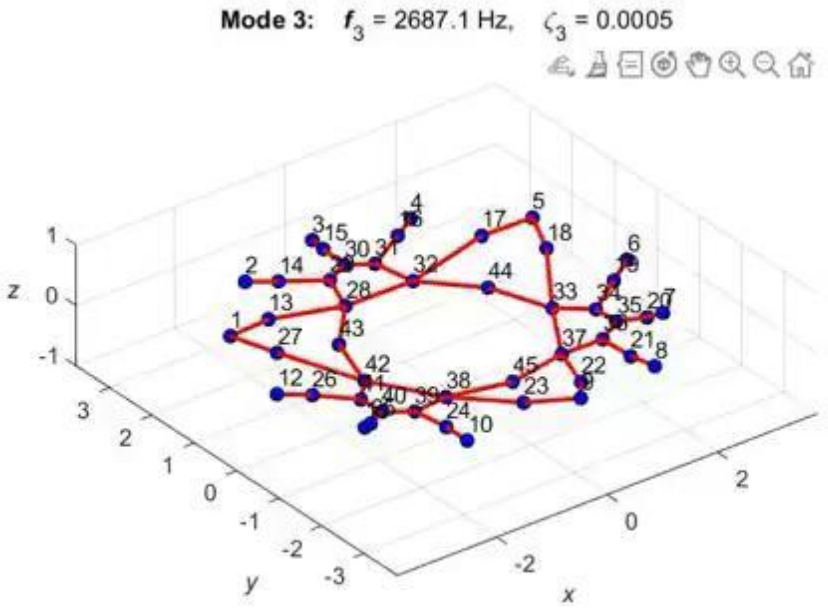
f = 2150Hz





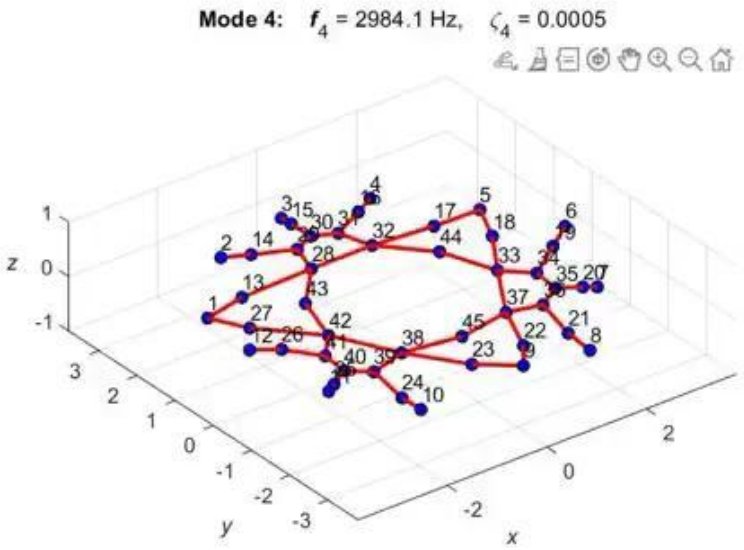
Mode 3

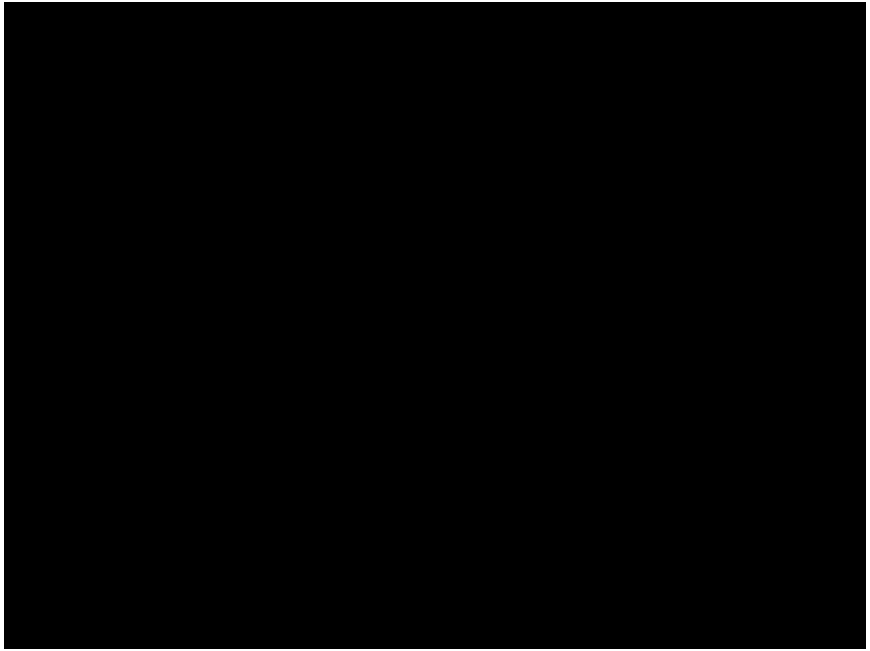
f = 2764 Hz



Mode 4

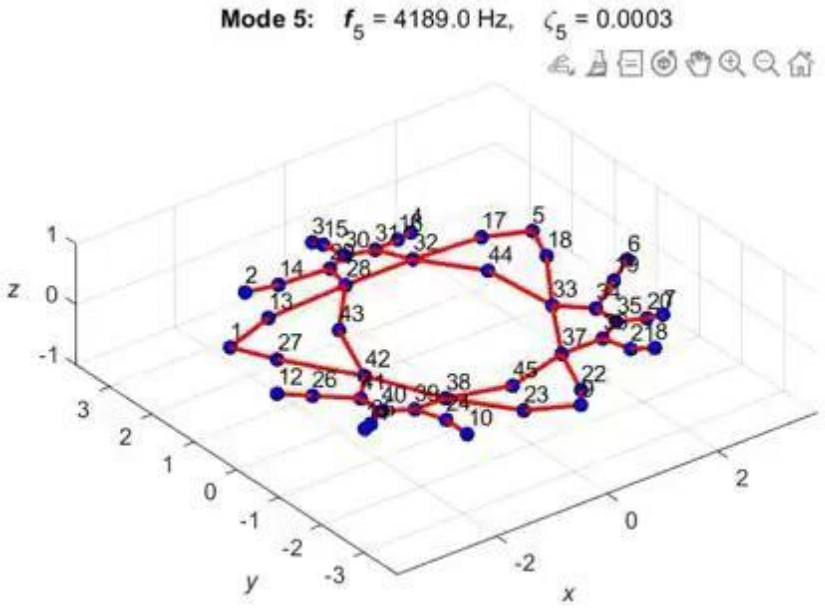
f = 3080 Hz

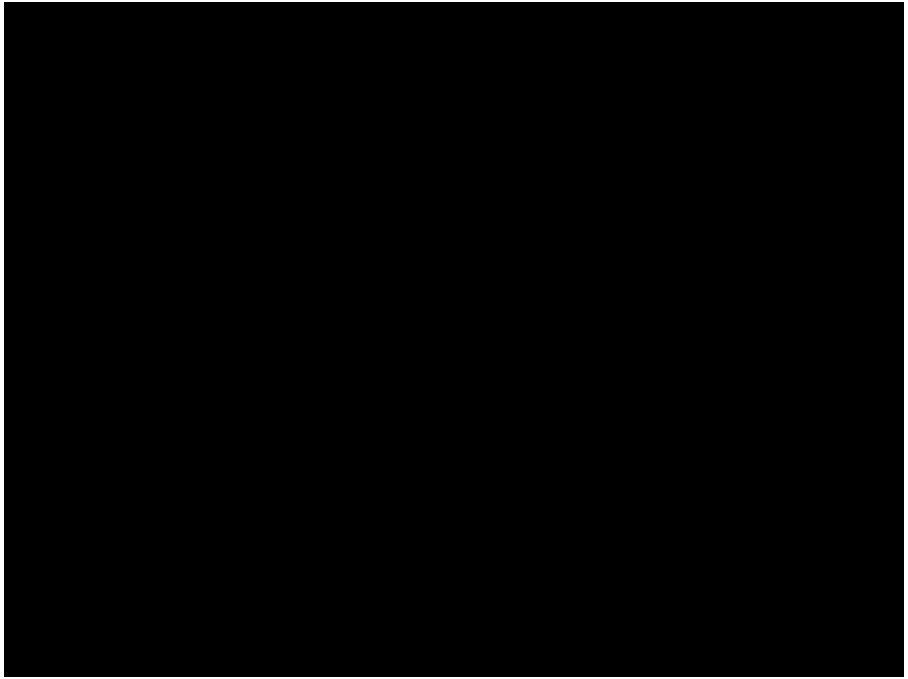




Mode 5

f = 4260 Hz





Mode 6

f = 4938 Hz

Discussion

- Poor coherence at higher frequencies
- Frequent double hits with steel tip
- Strain hardening from waterjet

Mode	EMAP Result	Solidworks FEA Result	Difference
f1	1239.9	1252	0.97%
f2	2122.2	2150	1.29%
f3	2687.1	2764	2.78%
f4	2984.1	3080	3.11%
f5	4189	4260	1.67%
f6	4835.8	4938	2.07%

Questions?