

# Phased Array Inspection Station Optimization

Cummins-Meritor



## PROBLEM STATEMENT

- Lack of work-space organization
- Need for increased comfort for station operator
- 3D-printed parts that are prone to failure



## REQUIREMENTS

#	Description
1	Increase test gear ergonomics
2	Strengthen 3D-printed details
3	Increase workspace efficiency
4	Create value stream map
5	Perform Cost-Analysis for 3D printer

## CONCEPTS

### Requirements Matrix 1: Test Handle

	Ease of Manufac	Ergonomics	Ease of Implement	Adaptability	Total
Design 1	14	10	14	13	51
Design 2	14	14	14	11	53
Design 3	13	12	14	13	52

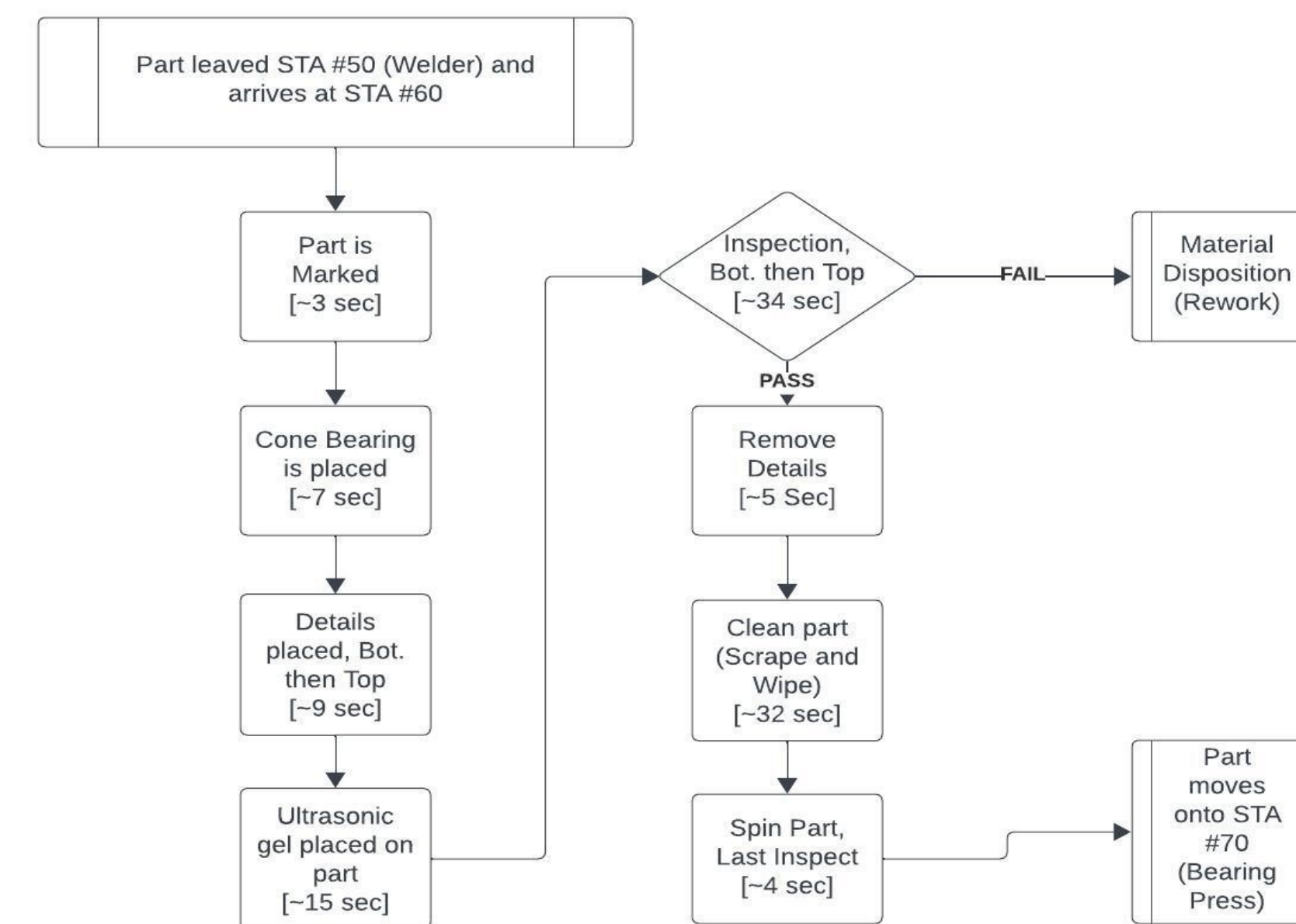
### Requirements Matrix 2: Detail Organization

	Ease of Install	Cost	Space Efficiency	Obtainability	Safety	Total
Design 1	12	11	10	12	15	60
Design 2	10	8	13	13	15	59
Design 3	15	15	9	10	12	61

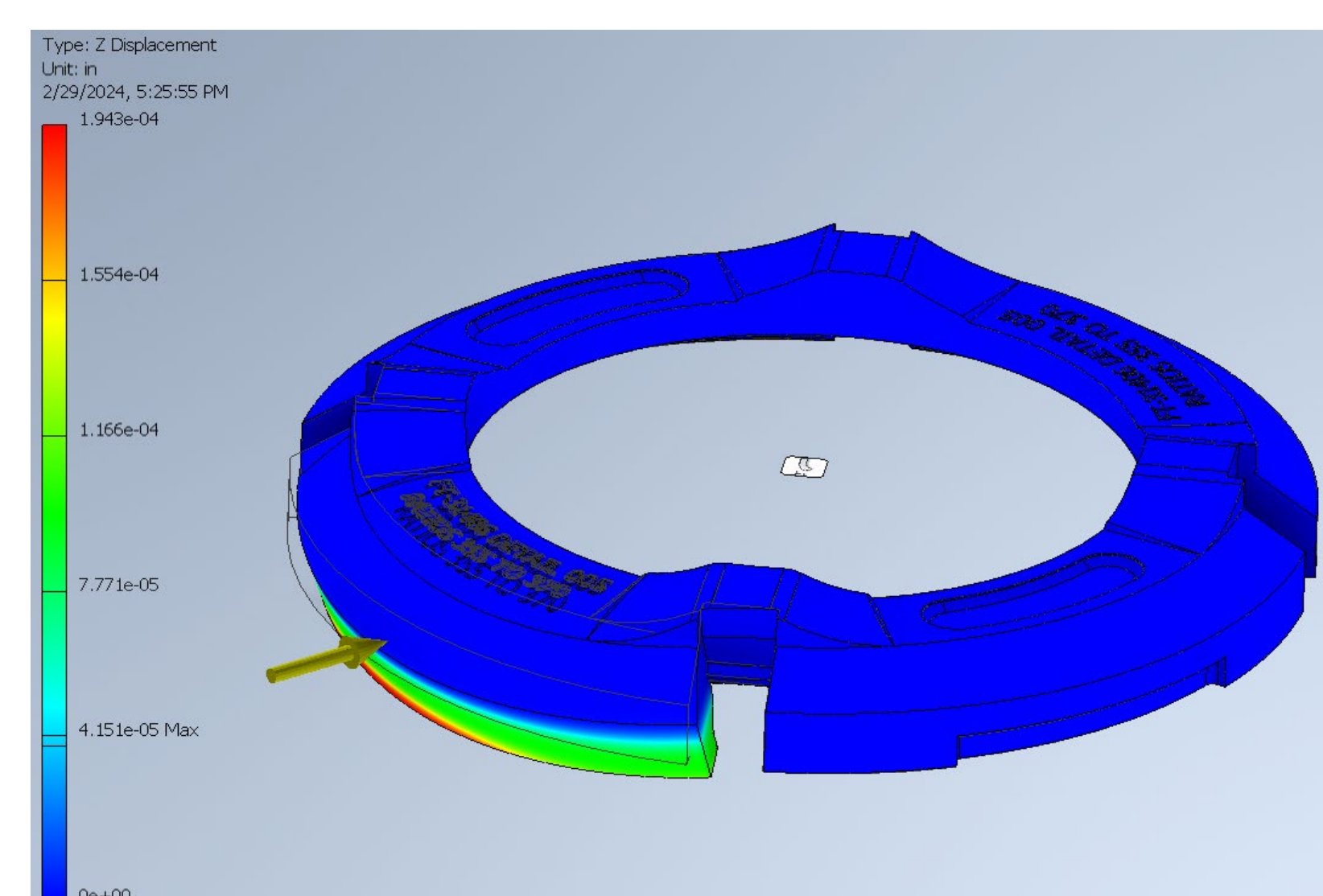
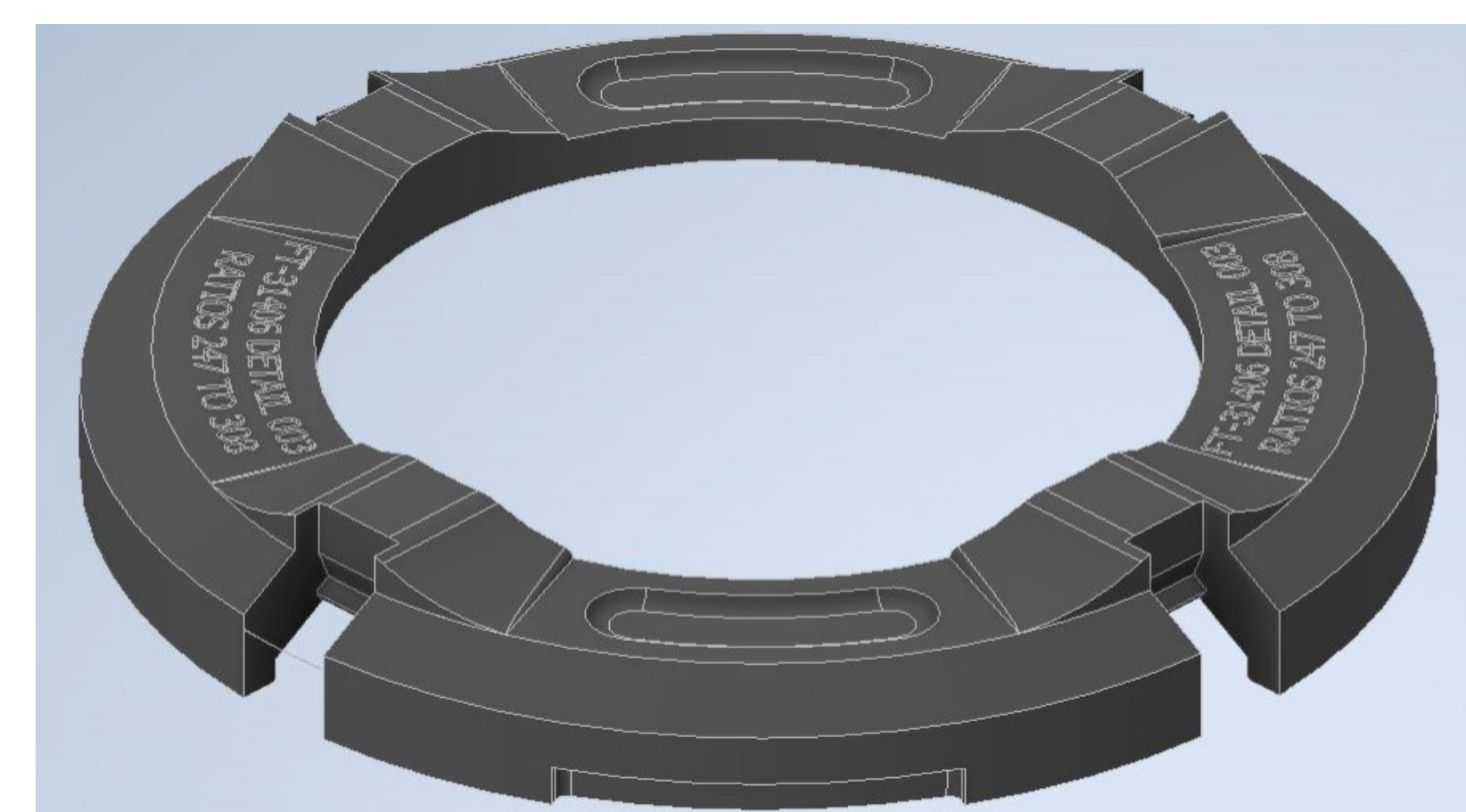
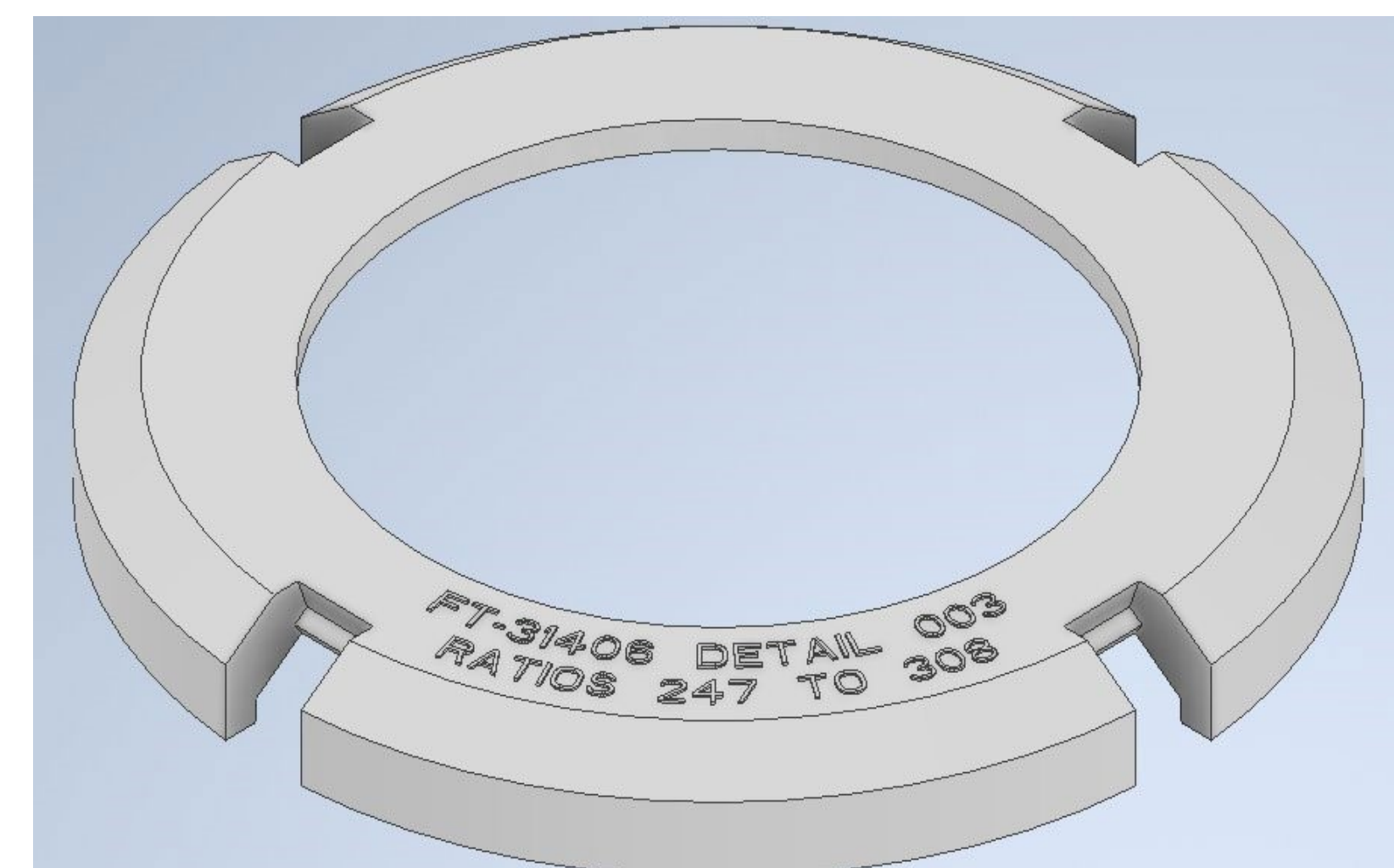


## FINAL DESIGN, APPROACH, PLAN

- FEA analysis performed on different detail designs to determine possible weak spots.
- Tool balance/test gear handle designed.
- Impact test completed to determine optimal material/infill for 3D printed details.



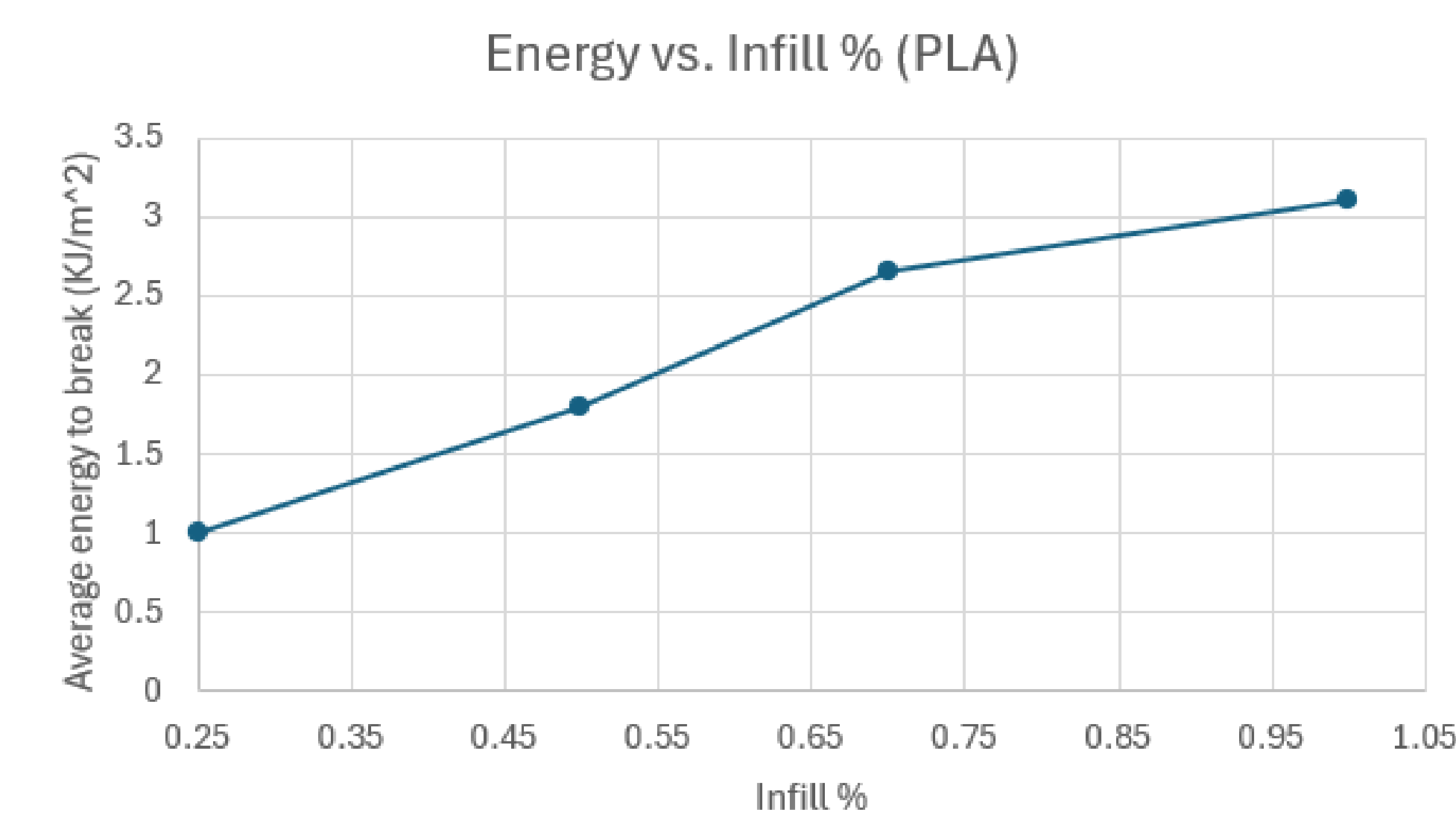
## Example Detail Redesign & FEA



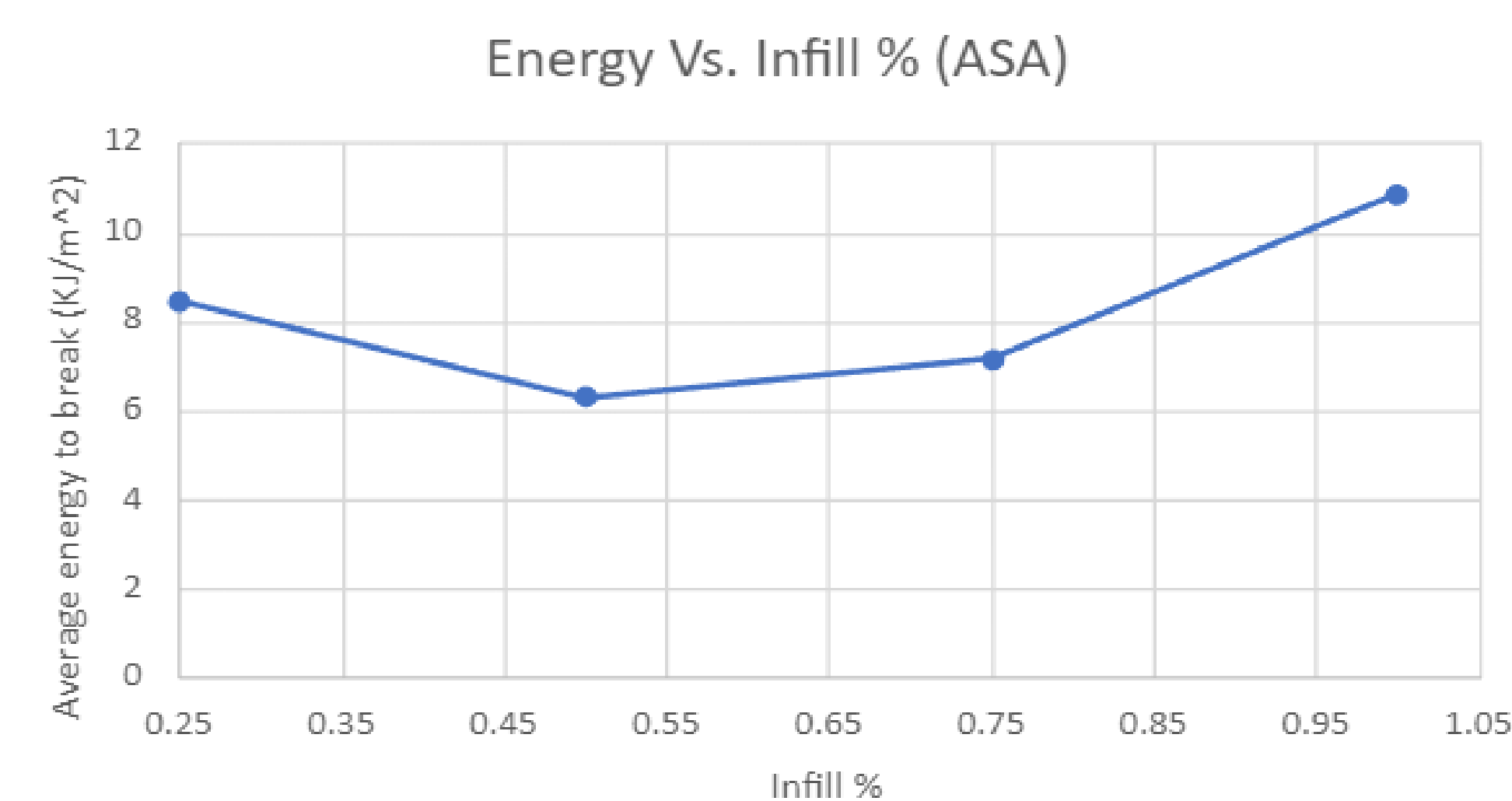
## RESULTS



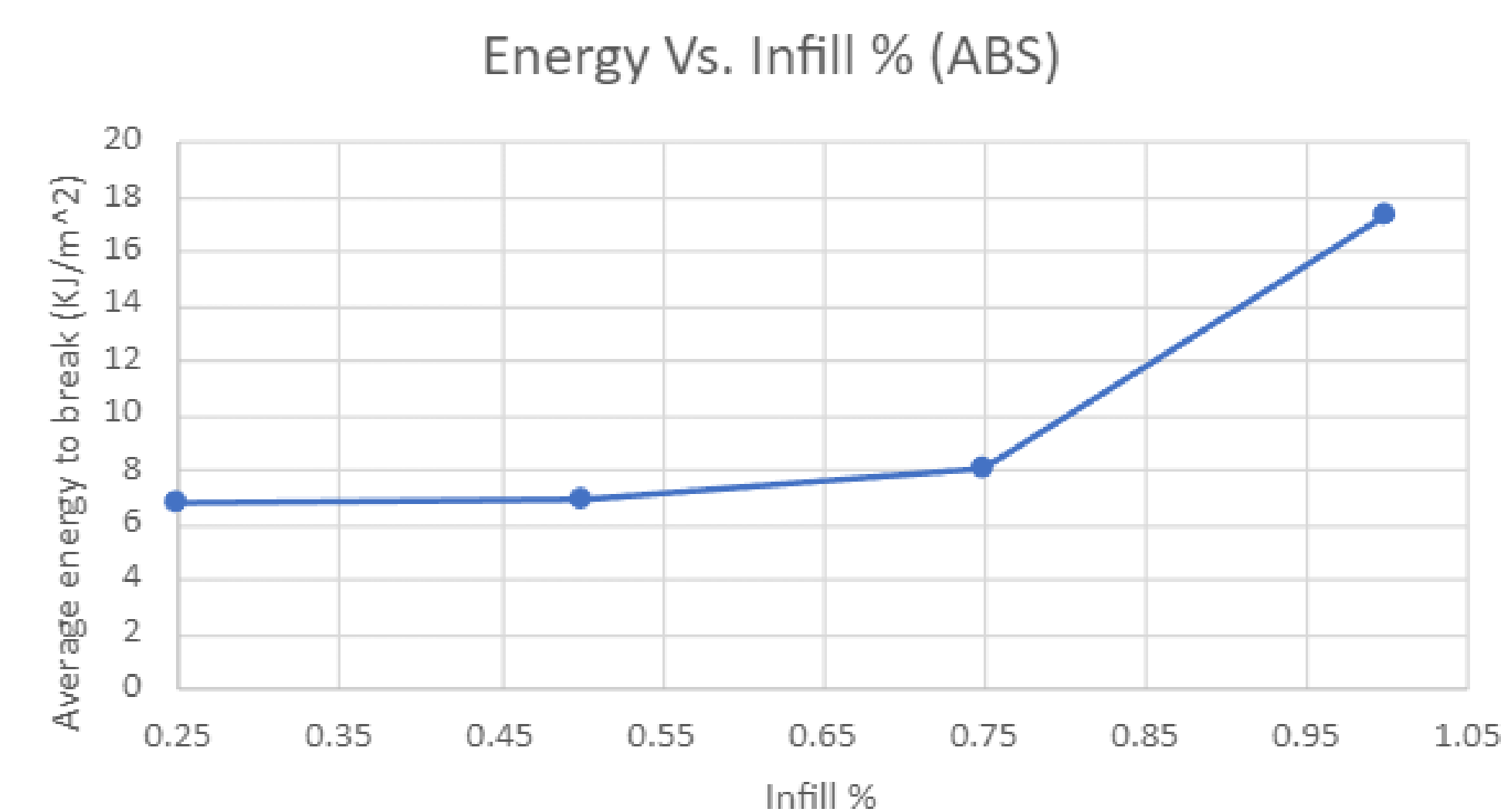
### Material Test Results (PLA)



### Material Test Results (ASA)



### Material Test Results (ABS)



## SUMMARY AND CONCLUSIONS

- Team 8 worked to design a tool handle assembly that will be used during the weld inspection process. This will help increase operator comfort as well as workspace organization.
- Material tests performed and recommendations made to sponsor for changes related to 3D printable parts.
- A cost analysis study has been performed to help justify the purchase of a 3D printer

## FUTURE WORK

- Tool handle assembly must be installed on the production line by the sponsor. The test gear also needs to be attached onto the 3D-printed handle.
- Cost analysis needs to be evaluated and proposed in business case.

## TEAM & ACKNOWLEDGEMENTS

- Team Members
  - Joe Robertson, Engineering Technology
  - Brett Towery, Mechanical Engineering
  - Devin Weidman, Mechanical Engineering
- Faculty Mentor
  - Dr. Basel Alsayed Ahmad
- Sponsor Contact
  - Benjamin Thomas
  - Mark Pless

