

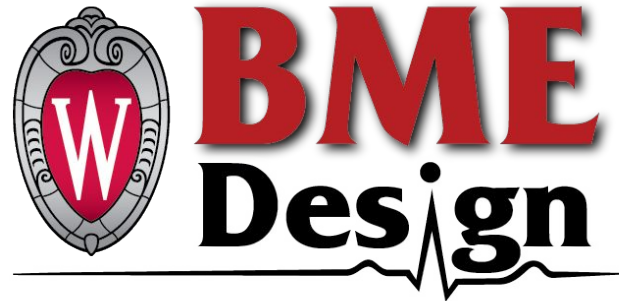
VET Stand

Team Members:

Norah Greer (Co-leader)
Cole Hwang (Co-leader)
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Ethan Abitz (BWIG)
Isabel Hillwalker (BPAG)
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Clients: Dr. James Sohn

Advisor: Dr. Randy Bartels



Problem Statement

Isabel



Client

Dr. James Sohn

Affiliation

Radiation Medicine

UW School of Medicine and Public Health

Motivation and Goals

- Adjustable to a variety of breeds
- Easily adjustable
- Holds animal's head securely without use of dental putty

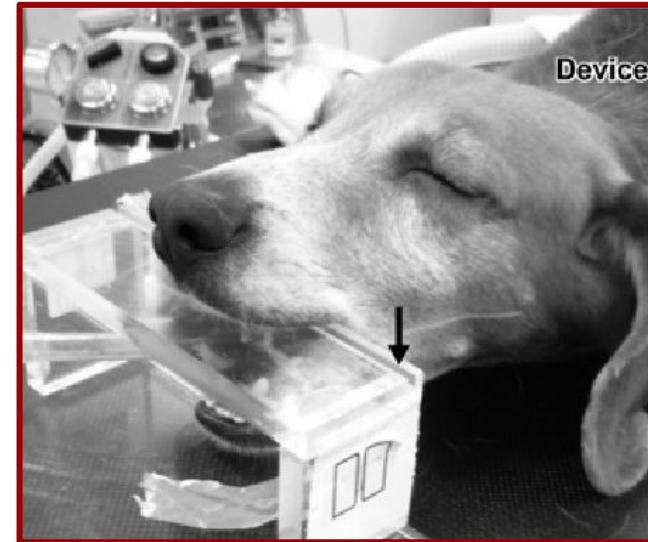


Fig. 1. Dog under anesthesia with bite block [1]

Background

- Animals must be immobilized
- Repeated treatments
- CT scan then Radiation



Fig. 2. Bite block used at mspca angell [2]



Fig. 3. Dog undergoing radiation therapy at UIUC [3]

Current Designs



Fig. 4. Dog positioned with a dental putty bite block [4]



Fig. 5. Dog positioned without a bite block [5]



Fig. 6. Dog positioned without a bite block and the endotracheal tube secured to the top of the snout [4]



Product Design Specifications

- 0–15 cm of height
- Provide markings
- Minimize injury/discomfort
- 7 kg of weight
- Locking system



Fig. 7. Dog receiving a CT scan [6]

Design 1 - Lever Clamp Stand

- Clamp
 - Clamp on base allows stand to be secured to the table
- Height indicators
 - Height markers on central post
 - Location of upper post can be marked to repeat
- Teeth
 - Teeth on base allow discrete measurement creating more repeatable adjustments
- Lever
 - Spring-loaded lever attached to upper post
 - Squeezed to adjust the stand, release to secure

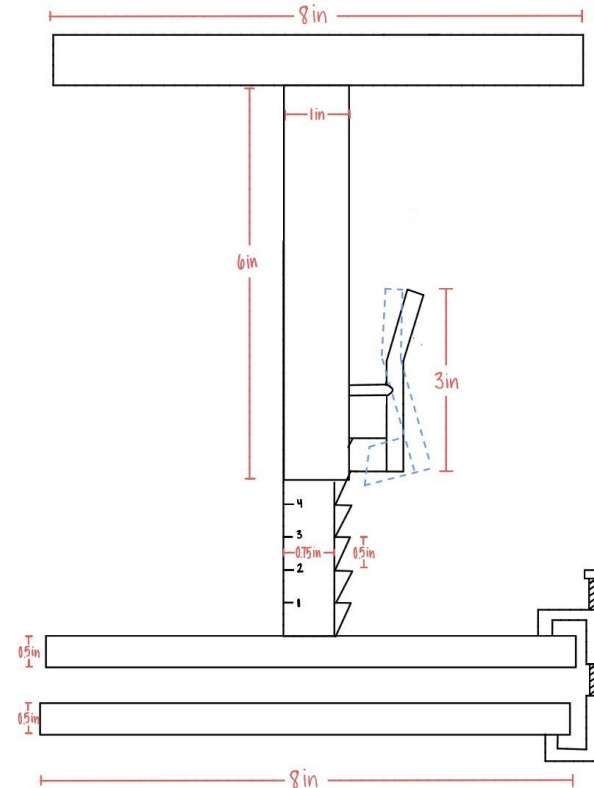


Fig. 8. Sketch of Lever Clamp Stand



Design 2 - Dual Rack-and-Pinion Clamp

- Two rack-and-pinions
 - Two rack-and-pinion system housed inside of a hollow base
 - Both pinions move in unison using a common gear
 - Racks fixed to either side of the top platform
- Height indicators
 - Height markings located on outer side of right rack
 - Base has a cutout and indicator, allowing height setting to be read
- Clamps
 - 2 clamps on base to allow stand to be secured to table

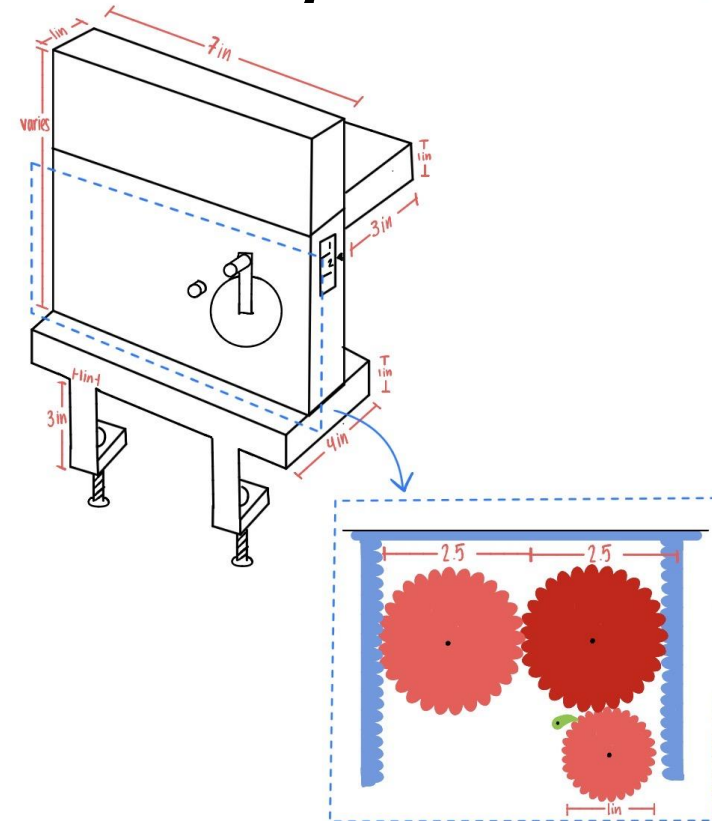


Fig. 9. Sketch of Dual Rack-and-Pinion Clamp

Design 3 - Rack-and-Pinion Stand

- Two rack-and-pinions
 - Two rack-and-pinion system housed within hollow legs
 - Each fixed pinion meshes with a sliding rack
 - Pinions are connected by a axle to synchronize rotation
 - Racks are connected to the table to top to allow both sides to raise and lower together
 - Spring-loaded pawl engages pinion to prevent table lowering under load
- Height indicators
 - Height markers on the back of the left rack
 - Viewing window on the right leg displays current height

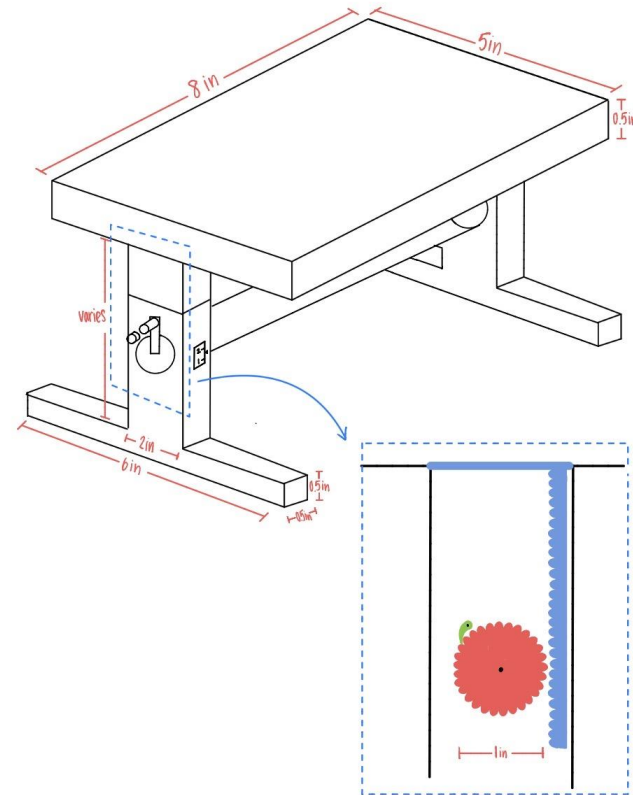
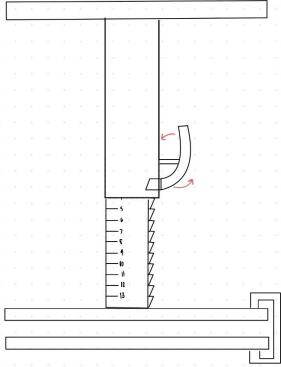
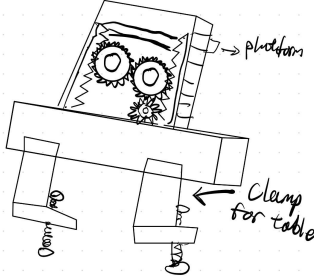
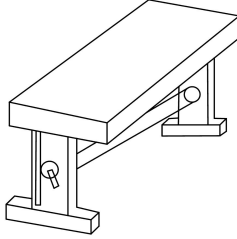


Fig. 10. Sketch of Rack-and-Pinion Stand

Design Matrix

Cole



Design	 <i>Design 1: Lever Clamp Stand</i>		Table 1: Design Matrix  <i>Design 2: Rack and Pinion Clamp Stand</i>		 <i>Design 3: Rack and Pinion Stand</i>	
Criteria (weight)						
Efficiency of Adjustment (25)	4/5	20	5/5	25	5/5	25
Precision (25)	5/5	25	4/5	20	4/5	20
Stability (15)	4/5	12	4/5	12	5/5	15
Safety (15)	3/5	9	5/5	15	4/5	12
Cost (10)	5/5	10	3/5	6	4/5	8
Durability (10)	4/5	8	4/5	8	4/5	8
Total (100)	84		86		88	

Testing

- Weight Capacity
 - Deflection Testing
- Material Radiation Exposure
 - 6 MV Photon Beams [7]
 - X-Ray Visibility
- Adjustability Testing
 - Fatigue Testing
 - Tolerance ($\pm 2.5\text{mm}$)

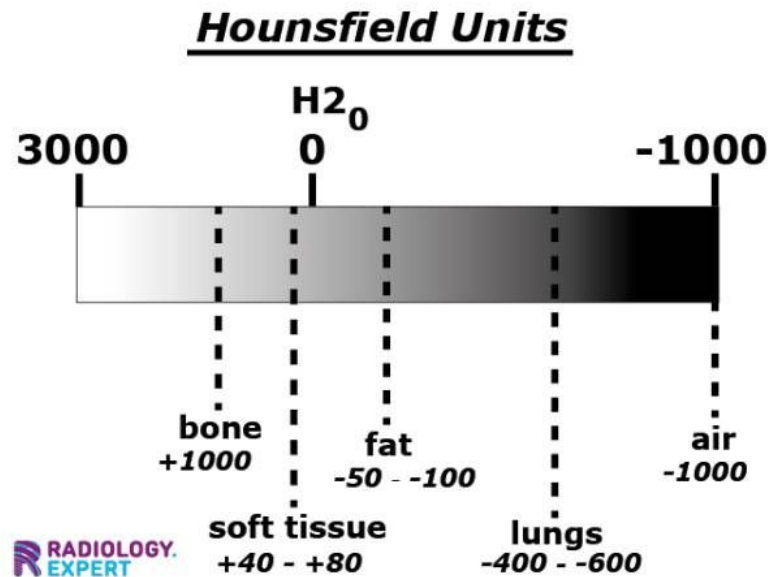


Fig. 11. Hounsfield Unit Scale for X-Ray Visibility [8]

Future Work

- Solution to remove the usage of dental putty for canine molds.
- Further work on current stand itself to fit operation dimensions and indexing bars.

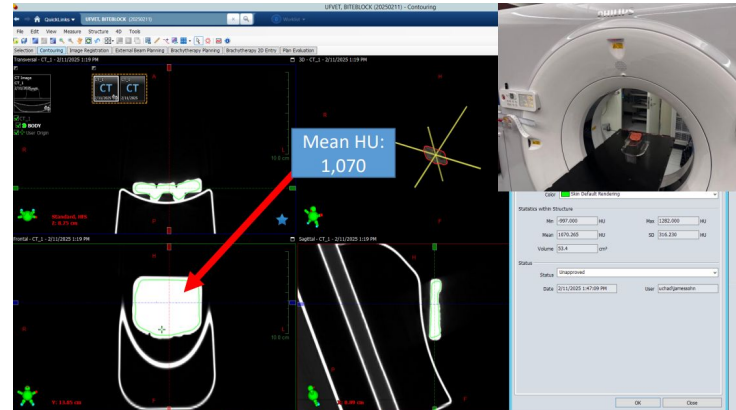


Fig. 12. CT Scan capturing high-Z materials [9]



Fig. 13. Index bar of operation table [10]

Acknowledgements



Fig. 13. Dr. James Sohn [11]



Fig. 14. Dr. Puccinelli [12]



Fig. 15. Dr. Randy Bartels [13]



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Questions?

