Dormitory Students like working in bed because they have small rooms and thus no room for a freestanding desk. An adjustable bed-mounted desk is the solution to the problem.

**CTQ Customer requirements**
- Height and angle adjustment
- Ability to deploy along the bed
- Locking mechanism
- Easily deployed and put away
- Does not block bed access
- Minimum storage space

**Market estimate**
- Residential Hall: 8245 beds
- Leonardtown: 625 beds
- Other apartment complexes: 2593 beds
- Total: 11463 beds at the University of Maryland

**Design**
A fully adjustable bed-mounted table used to hold laptops or books. The end-user moves the table along the track, adjusts height and angle.

**Sacrificed Characteristics**
- Inward translation
- Under bed storage

**Adaptable Parts**
- Vertical Height
- Position on track
- Angle of table

**Prototype and Testing**
Table is 20" by 14"
- L = 12"
- 18" \( H_{\text{min}} \) ≤ H ≤ 26" \( H_{\text{max}} \)
- \( 0^\circ \leq \Theta_{\text{top}} \leq 90^\circ \)
- \( W_{\text{laptop, max}} = 20 \text{ lb} \)
- \( W_{\text{book, max}} = 5 \text{ lb} \)
- \( W_{\text{table}} = 3 \text{ lb} \)
- \( W_{\text{hands, max}} = 10 \text{ lb} \)
- \( W_{\text{Horizon, Arm}} = 0.5 \text{ lb} \)

Prototype will be mounted to the bed frame and tested
- Withstands the maximum load \( (W_{\text{max}} = 35 \text{ lb}) \)
- Translates along the bed
- Adjusts height and tilting angle
- Locking mechanisms are stable
- Stores behind the footboard

**Test Results and Future Work**
Max Principal Stress (34,733 psi) < Tensile Yield Strength (63,800 psi)

The CAD process was used to transform the features from the final concept into a realistic design

FEA analysis gave insight on material selection and feasibility.

In the future we need to reduce the deflection under load by:
- Choose stronger and lighter materials
- Re-evaluate dimensions to reduce material volume