

FAMU-FSU
College of Engineering

Secure Fit Football Undershirt

Team Members

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Objective:

The objective of this project is to reduce injuries of football players through the improvement of shoulder pads

Key Goals

Optimal Fit

Lifespan and Durability

Protect against impact

Metrics:

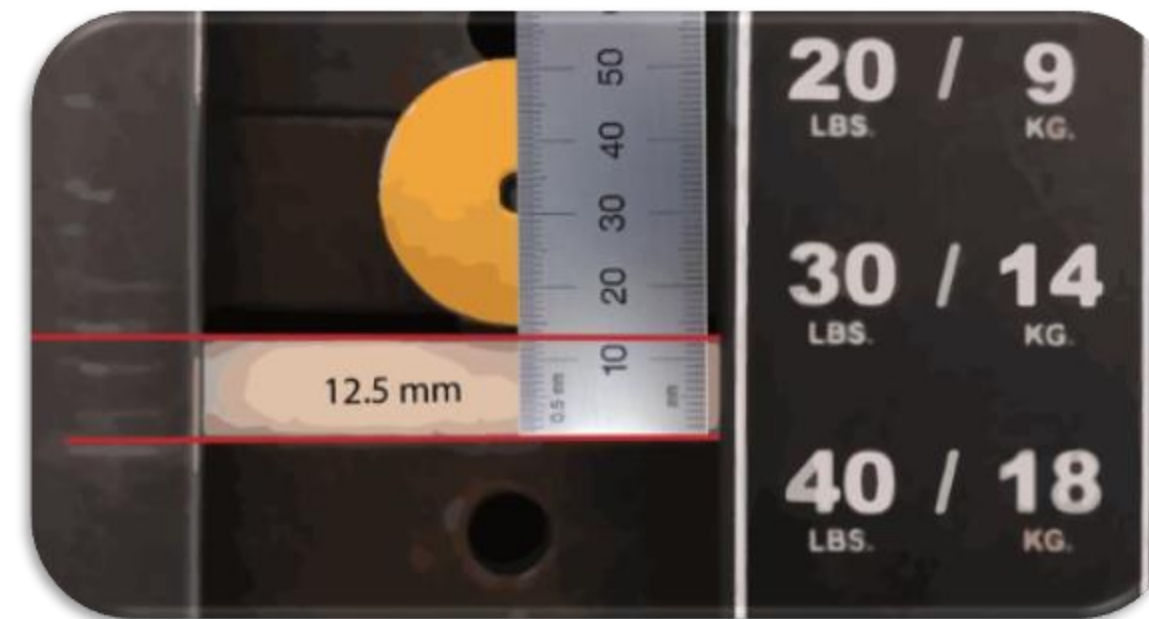
- ✓ **Absorb Impact (lbf):** Reduces impacts by at least 75%
- ✓ **Adapts to Fit (in):** 40% reduction of movement during contact
- ✓ **Maintain Shape (in³):** No change in volume

Most Common Injuries:

- Collarbone fractures
- Rib fractures
- AC joint injuries
- Rotator cuff
- Shoulder separation
- Shoulder dislocation

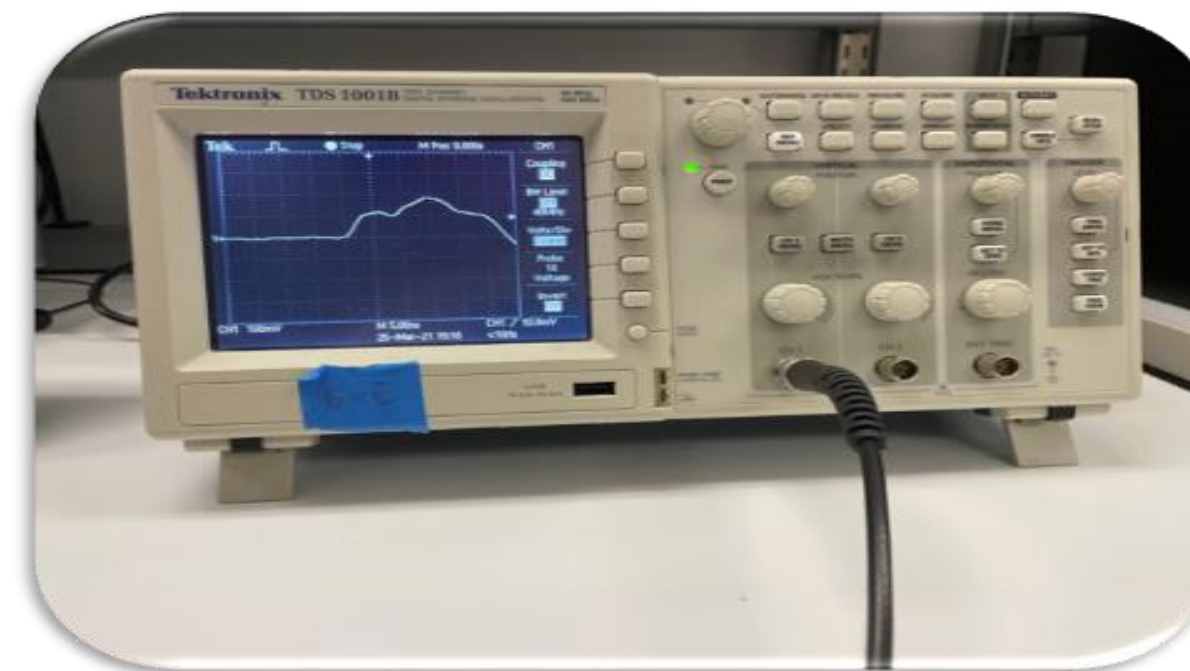


Compression Test



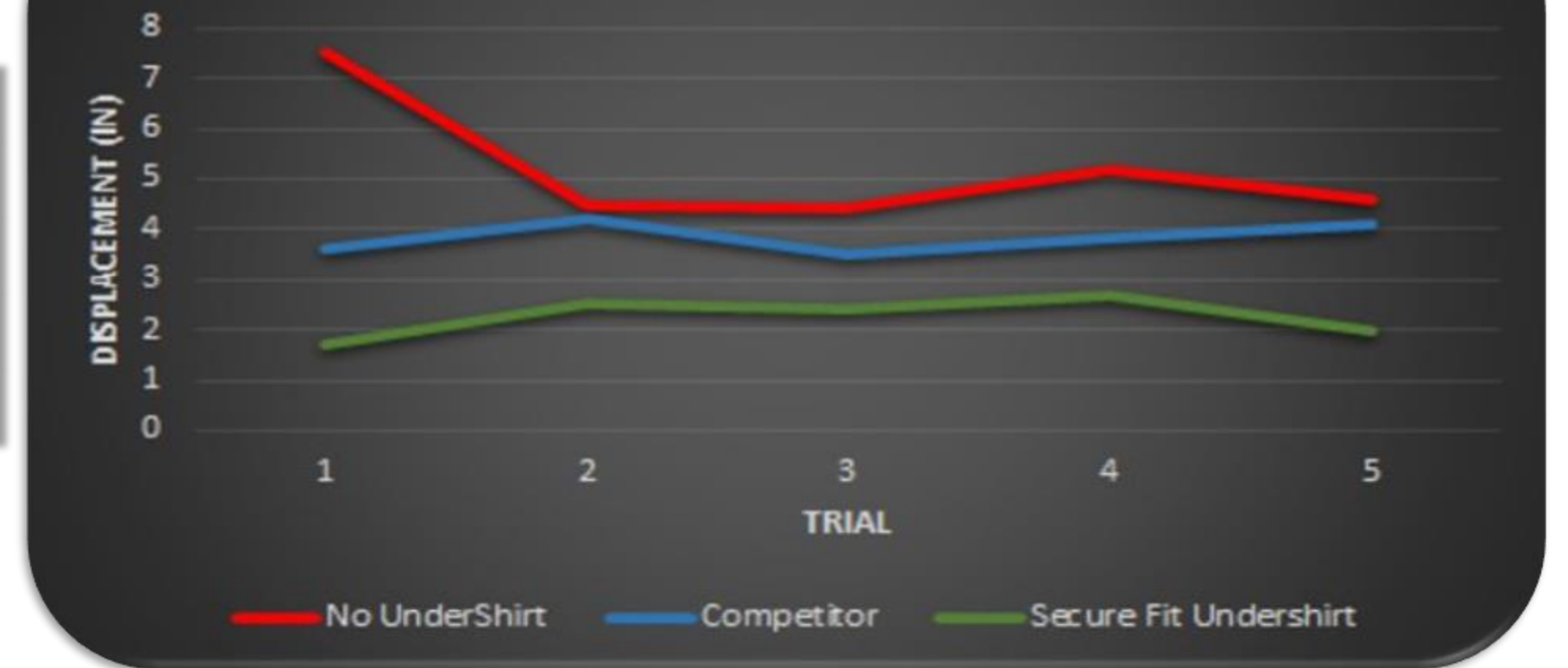
Mean Percent Height Reduction	
Polyurethane Foam	0.0288 %
Polyimide Foam	0.0400 %
Open-Cell Polyurethane Foam	0.0745 %
Organic Latex Shredded Foam	0.0867 %
Gel Shredded Memory Foam	-0.0207 %

Pendulum Impact Test



Mean Percent Force Reduction	
Polyurethane Foam	40.3954 %
Polyimide Foam	28.3345 %
Open-Cell Polyurethane Foam	20.8708%
Organic Latex Shredded Foam	27.7816 %
Gel Shredded Memory Foam	28.8874 %

Slip Test Comparison



Results:

- The padding on the shoulder and neck is made of shredded gel memory foam, polyurethane foam, all wrapped in ultra-weather resistant nylon fabric sheet.
- Reduce shoulder pad displacement by 45.4% after impact compared to a t-shirt undershirt.
- Secure fit football undershirt protects the neck from impact and decreases the motion of shoulder pads.



Shredded Gel Memory Foam

Polyurethane Foam