

# 03 Universal Fit Transtibial Prosthetic for Bionic Monofin

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## Need

~150,000 lower limb amputations per year in the US (28.2% transtibial)

There are prostheses that allow amputees to swim, but none exist for monofin

**Objective:** To create a **universal fit** prosthetic device that allows **transtibial amputees** to **safely monofin** using the Amphi Anhinga.

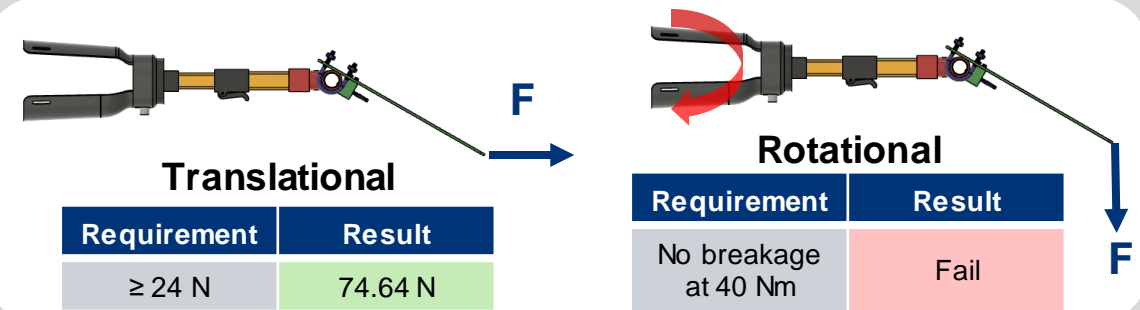


Amphi Anhinga (Bionic Monofin)

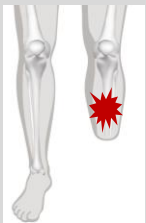
## Verification Testing

### Translational and Rotational Movement Tests

Verifies that prosthetic is not pulled off during monofinning



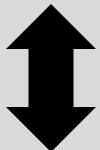
## Design Inputs



Residual Limb Pressure Sensitivity



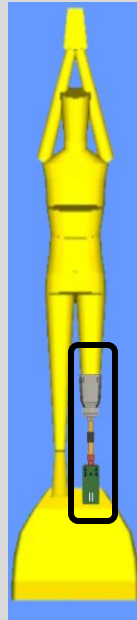
Withstand swimming forces



Adjustable for varying residual limbs

## Solution

### Intended Use



Prosthetic can be used bilaterally and attaches the residual limb to the monofin



- Residual Limb Attachment
- Shank
- Ankle & Foot

### Adjustability Tests

Verifies that the prosthetic encompass various amputation sizes

Test	Value	Results
Limb Circumference	31.1 – 46.7 cm	28 – 42.8 cm
Shank Height	$\geq 34.1$ cm	29.2 – 37.3 cm
Ankle Angle	$\geq 40^\circ$ in extension	42°
Foot Length	16.1 – 22.5 cm	16.0 – 22.5 cm

## Conclusion

**Impact:** Very first universal fit prosthetic that provides amputees accessibility to monofinning at the same cost as non-amputees

**Future:** Modify residual limb cuffs for better fit and work with veterans to test the prosthetic