Think Like an Engineer Journey Pt. 3

Engineering Notes: Elephant Prosthetic

Design Challenge: You've been hired as a biomechanical engineer to create a prosthetic device for a large land animal—an elephant!

- Biomechanical engineers use what they know about biology and mechanical engineering to solve problems related to health and safety.
- A prosthetic device is a technology that is designed to replace the function of a body part. Prosthetic devices have been made by humans for centuries, and now engineers are beginning to create prosthetic devices for animals, too.

Design Thinking Process

- Identify the Problem
- Investigate the Problem
- Brainstorm & Plan
- Build
- Test
- Analyze Results and Improve
- Share Your Solution

IDENTIFY THE PROBLEM.

Goal: Engineer a model prosthetic elephant leg.

CRITERIA:

The model prosthetic elephant leg must:

- Support their weight
- Attach to the model's actual leg at the knee
- Stay together when used
- Be comfortable to wear

INVESTIGATE THE PROBLEM: Chhouk's Prosthetic Leg

In 2007, a young elephant in need of help was discovered in a remote region of northeastern Cambodia. The elephant was alone and having trouble moving around because the bottom portion of his right front leg had been lost. The injury was likely caused by a hunter's snare trap.

Human volunteers cared for the elephant and nursed him back to health. They named him "Chhouk," which means "Lotus Flower," and arranged for him to be transported to a wildlife rescue center where veterinarians and animal specialists could help him.

It soon became clear that Chhouk needed a prosthetic device to keep him healthy and restore his ability to walk. A team of biomechanical engineers created a prosthetic leg that was designed to function just like his original one. They chose materials that were strong enough to support his massive weight and durable enough to last. They also used soft padding and straps to ensure that the device was comfortable to wear and easy to attach.

The design was a success! Upon receiving his new prosthetic device, Chhouk's medical issues and spirit improved rapidly. Even so, the engineers have continued to improve upon their original design, creating several new versions of the device that match Chhouk's growing size and boundless energy!

Article adapted from: Wildlife Alliance, Chhouk, the Elephant with a Prosthetic Foot

Courtesy of the Museum of Science, Boston. Adapted from the Engineering is Elementary, Go Fish: Engineering Prosthetic Tails. ©2014, 2016 Museum of Science.

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BRAINSTORM SOLUTIONS, PLAN AND BUILD A PROTOTYPE.

What's the design plan for your prototype of a prosthetic for an elephant? Write ideas or draw plans for your design here. Use extra paper if you need to!

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TESTING THE PROSTHETIC LEG

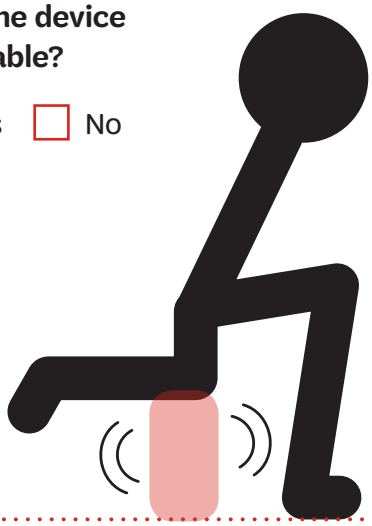
Carefully place your knee onto the top of your model prosthetic elephant leg and secure any attachments you have designed. Hold onto a friend or a steady piece of furniture to prevent yourself from losing your balance. Follow the testing procedures below.

Function

Place your weight on the prosthetic leg.

Does the device feel stable?

☐ Yes ☐ No

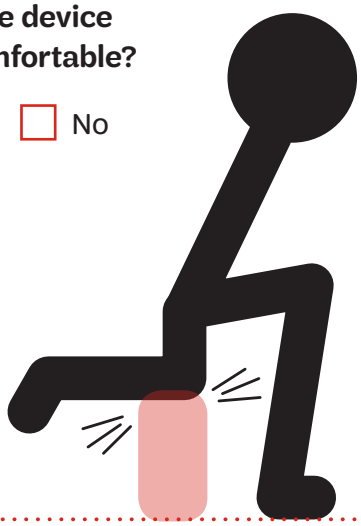


Comfort

Place your weight on the prosthetic leg.

Does the device feel comfortable?

☐ Yes ☐ No

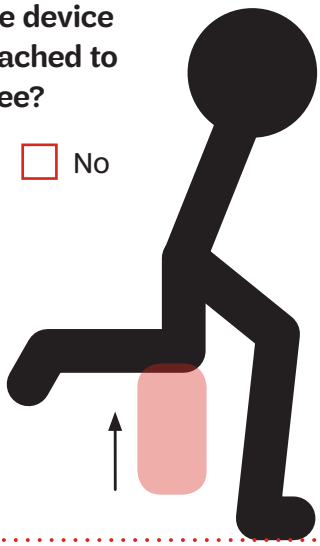


Attachment

Lift your leg off the ground.

Does the device stay attached to your knee?

☐ Yes ☐ No

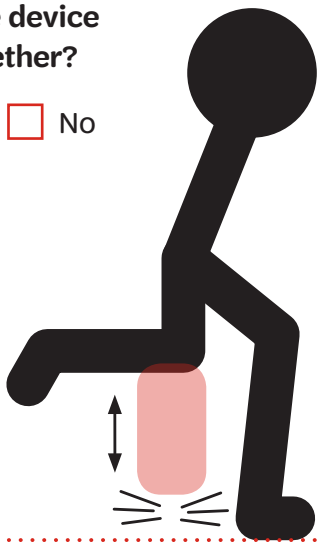


Durability

Walk in place for five steps.

Does the device stay together?

☐ Yes ☐ No



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