

# Bionic Arm Challenge

## Semester 1 Exam

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# Requirements

- Stay within a \$26,000 budget when choosing the components to build the best arm possible.
- Bionic arm can only fail no more than 2 tests.

# 1st Trial

## Design Plan:

<b>Component</b>	<b>Design</b>	<b>Cost</b>
<b>Actuator</b>	<b>Air Muscle</b>	<b>\$10,000</b>
<b>End Effector</b>	<b>Electric Hand</b>	<b>\$6,500</b>
<b>Material</b>	<b>Carbon Fiber</b>	<b>\$5,000</b>

**Total Production Cost \$21,500**

# Parts Chosen

TryEngineering.org Bionic Arm Design Challenge 1.0 - Internet Explorer

http://74.220.206.127/extranet/game/design/design.html

TRYENGINEERING.ORG

BUDGET \$26,000 SPENT \$21,500 ON-HAND \$4,500

BIONIC ARM DESIGN CHALLENGE

DESIGN STUDIO

01 LEARN 02 ANALYZE 03 DESIGN 04 TEST

**NEXT STEP: BUILDING YOUR ARM**

**YOUR ARM WILL BE CONSTRUCTED USING THE COMPONENTS YOU SELECTED....**

ACTUATORS

AIR MUSCLES

END EFFECTOR

ELECTRIC HAND

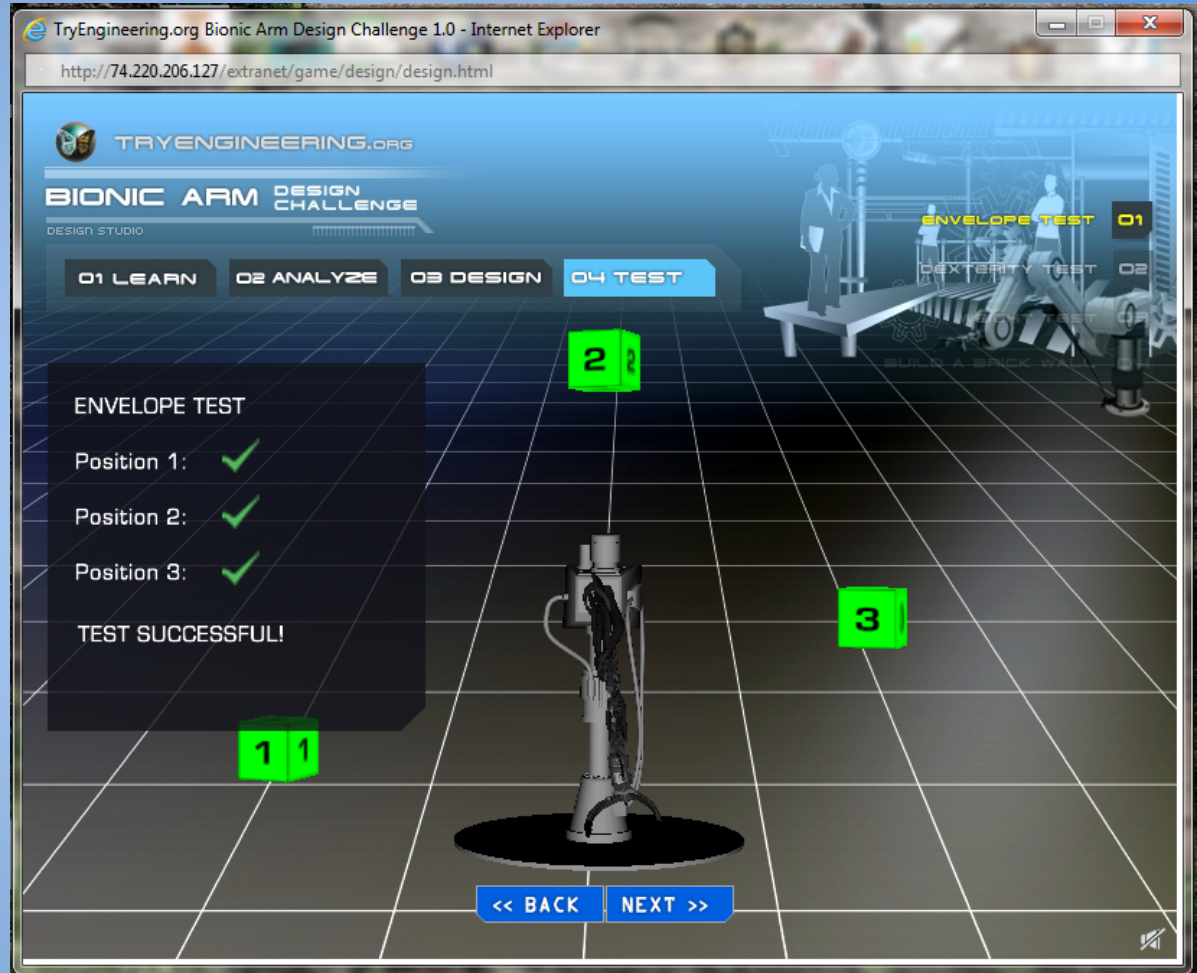
MATERIALS

CARBON FIBER

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# Envelope Test

- Determines the arm's range of motions



# Dexterity Test

- Determines the arm's ability (use of strength and agility) to grab a brick and place it correctly in the wall



# Weight Test

- Determines the arm's strength

The screenshot shows a web browser window with the URL <http://74.220.206.127/extranet/game/design/design.html>. The page title is "TryEngineering.org Bionic Arm Design Challenge 1.0 - Internet Explorer". The main content area features the "BIONIC ARM DESIGN CHALLENGE" logo and a "DESIGN STUDIO" interface. A navigation bar at the top contains four buttons: "01 LEARN", "02 ANALYZE", "03 DESIGN", and "04 TEST", with "04 TEST" being the active button. A central 3D model of a bionic arm is shown in a virtual environment. In the foreground, there are three large, stylized letters: a green "W", a green "A", and a red "A". A dark grey panel on the left side of the screen displays the following text: "WEIGHT TEST", "2 Kg Brick: ✓", "5 Kg Brick: ✓", "10 Kg Brick: ✗", and "TEST FAILED". At the bottom of the screen, there are two blue buttons: "<< BACK" and "NEXT >>".

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BIONIC ARM DESIGN CHALLENGE

DESIGN STUDIO

01 LEARN 02 ANALYZE 03 DESIGN 04 TEST

WEIGHT TEST

2 Kg Brick: ✓

5 Kg Brick: ✓

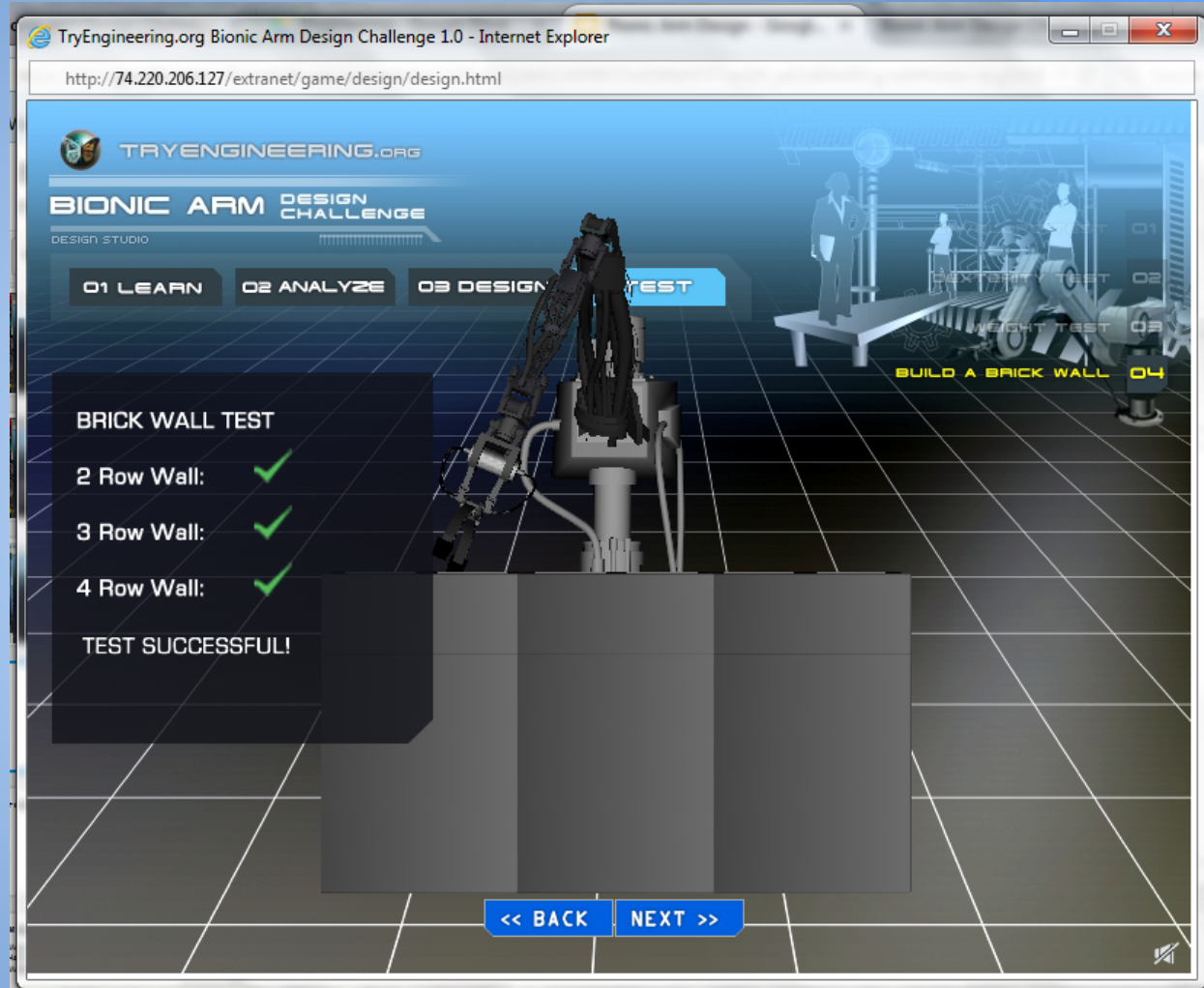
10 Kg Brick: ✗

TEST FAILED

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# Brick Wall Test

- Tests arm doing a “real-life task”





# Test Results

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http://74.220.206.127/extranet/game/design/design.html

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**BIONIC ARM DESIGN CHALLENGE**

DESIGN STUDIO

O1 LEARN O2 ANALYZE O3 DESIGN **O4 TEST**

## TESTING RESULTS

ENVELOPE TEST	DEXTERITY TEST	WEIGHT TEST	BRICK WALL
REACH POSITION 1 ✓	REACH BRICK ✓	LIFT 2KG BRICK ✓	2 ROW WALL ✓
REACH POSITION 2 ✓	LIFT BRICK ✓	LIFT 5KG BRICK ✓	3 ROW WALL ✓
REACH POSITION 3 ✓	PLACE BRICK ✓	LIFT 10KG BRICK ✗	4 ROW WALL ✓
<b>PASSED</b>	<b>PASSED</b>	<b>FAILED</b>	<b>PASSED</b>

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