

# BiOM Test Fixture #7

## **Operation Manual**

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## BiOM Device

A BiOM is a fully computerized ankle-foot system, which imitates a human's lower limb, propelling the user forward with each step. It is an automated, programmable test fixture for the robotic prosthetic lower limb.

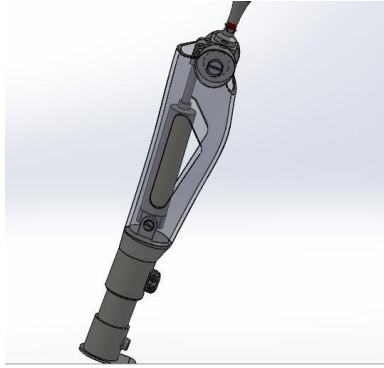


*Figure 1: BiOM prosthetic device which is to be tested*

## Device Inspection

The Quadra is attached with the hydraulic part which is controlled by programmed microcontroller. The rod is fixed with screws with the hydraulic cylinder.

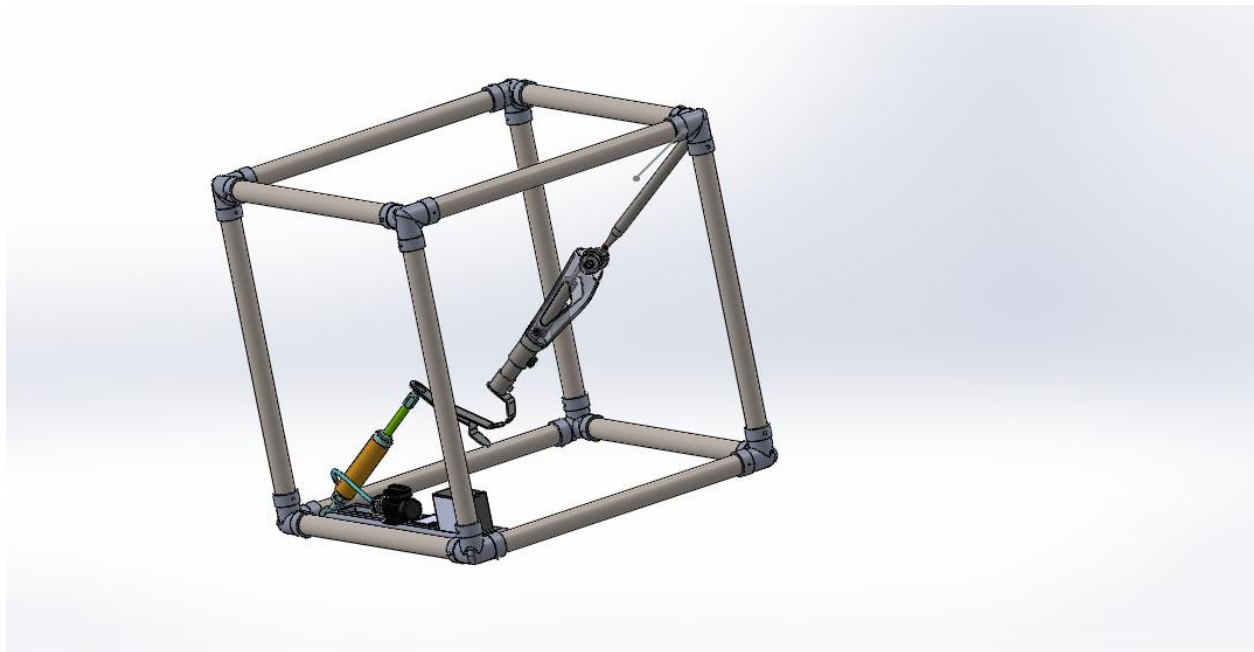
1. The hydraulic cylinder is attached with the ankle support. The ankle support acts as a foot.
2. Before using the BiOM Prosthetic ankle, following instructions should be followed:
  - a) Make sure that all the connections are tight. The ankle support (carbon fiber foot) is firmly attached with hydraulic cylinder.
  - b) Make sure the hydraulic cylinder is working. Check the pressure of the cylinder and make sure there is no leakage of the hydraulic fluid. All connections should be firm.



*Figure 2: BiOM Leg*

## BiOM Test Fixture

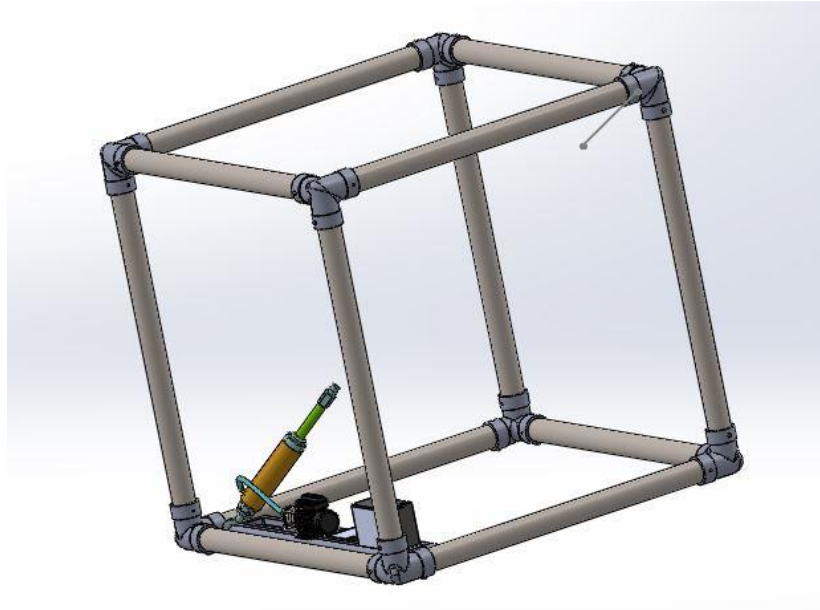
BiOM Test Fixture is the machine designed to test the working of BiOM prosthetic on the application of force due to the weight of the person. The machine uses motor to power hydraulic force actuators that applies force to the ankle. Following are the operational instructions to use the machine:



*Figure 3: complete assembly of machine with device attached*

## Frame Connection

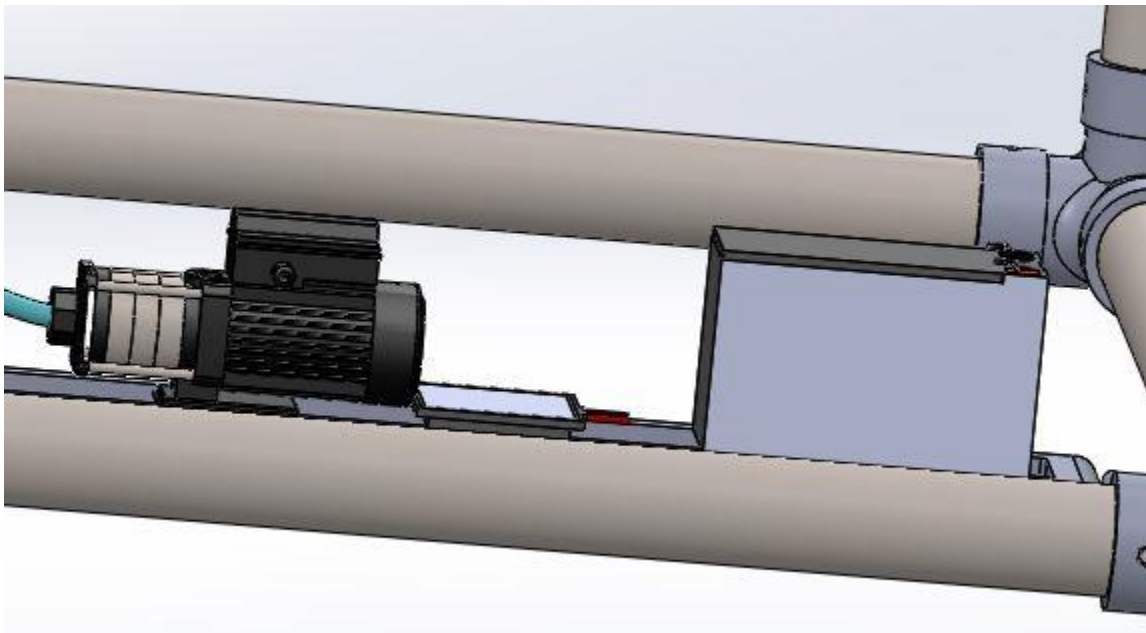
The frame of the machine is wireframe cubic. Check the connections of the rods and make sure the frame is rigid.



*Figure 4: frame of the machine*

#### Battery and Motor Connection

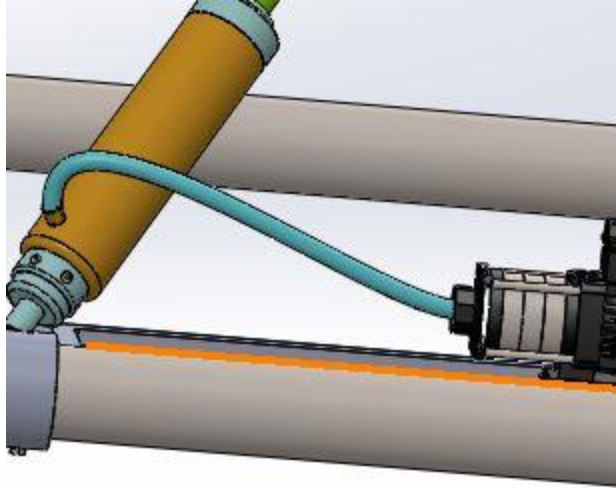
Connect the positive wire from the motor with the positive terminal of battery and negative wire with the negative terminal.



*Figure 5: connection of motor with battery*

#### Actuator Connection

Check the connection of the motor with the actuator. Make sure the pipe is not damaged and is firmly fixed.



*Figure 6: pipe connection of actuator with motor*

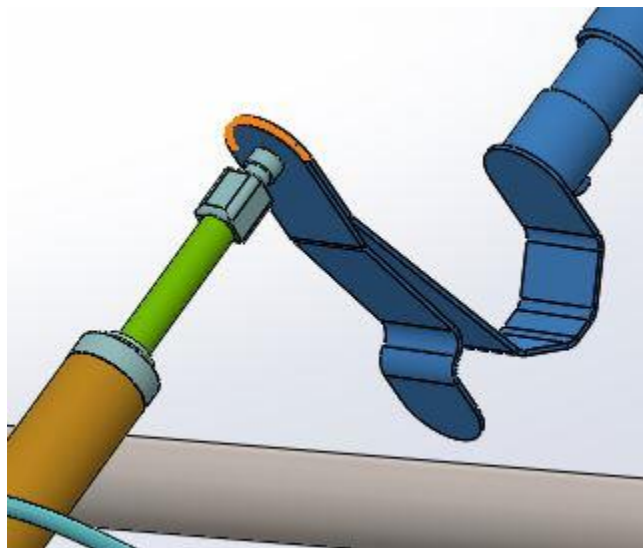
### Inspection of Actuator

The hydraulic force actuator diagonally attached with the frame. Check the cylindrical pressure of the actuator and make sure there is no loose connection.

### Fixing Device with Test Fixture

To fix the device properly with the Test Fixture, take the following measures given below:

- a) There is a screw in the ankle of the BiOM device. Fix the slot onto the force actuator. Make sure the ankle is attached firmly with the force actuator.
- b) Fix the rod, named "quadra" with the other diagonal of the frame. Make sure the connection is fixed and is rigid.



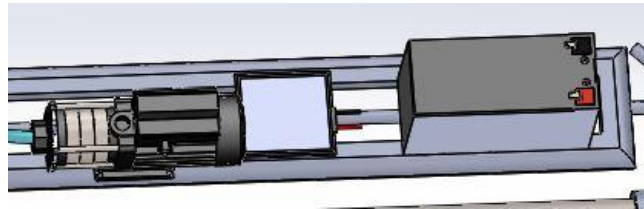
*Figure 7: fixing actuator with device*

## Connection Check

Again check all the connections of the frame, actuator and device. Any loose connection is dangerous for the user.

## Turning on the Machine

Now, turn on the motor from the control panel to apply the pressure on the device. The pressure generates force on the device. Force on the device will bring hydraulics or microcontrollers of the device in action.



*Figure 8: Battery Switch to turn it on and off*

## Measurement

Measure the deflection in the ankle on the application of force using meter rod by measuring both initial and final position.

## Turning off the Machine

After testing is complete, turnoff the motor and remove the device from the frame. Open the connection of motor with the battery.

## Pre-cautionary Measurements

Following are pre-cautionary measurements to use the machine:

- a) Check the wires of the battery and motor. Don't operate the machine with wet hands. Don't touch the wires. Doing so, is dangerous and injurious.
- b) Don't wear loose clothes while operating the machine.
- c) Wear close shoes while operating machine.
- d) Keep a safe distance from the machine during operation. Failure of any part may hurt you.