User’s Guide

For the Buckling Load Calculator

Basic Information

The software is written in Tkinter python3. In order to use the program, please preinstall the python3 and remember to download the file “Load1.png” with the software in the device used. The software needs all the files downloaded in the same location. Apart from that, there are some limitations in this calculator that are listed below:

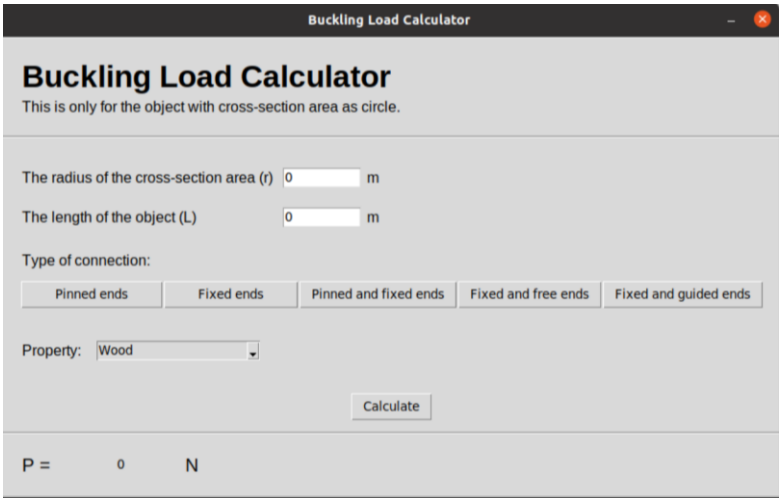
1. The calculator could only be able to use on an object with a cross-section area as circle.
2. The connection types should be within options:
    a. Pinned ends
    b. Fixed ends
    c. Pined and fixed ends
    d. Fixed and free ends
    e. Fixed and guided ends
3. The property of the object should be either brick or wood.

Introduction

The software would need users to provide the below data:

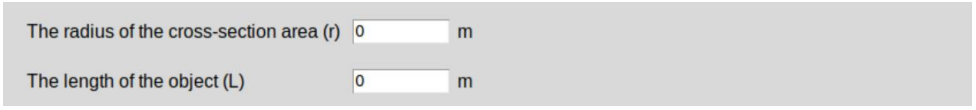
1. The radius of the cross-area.
2. The length of the object.
3. The connection type of the object.
4. The property of the object.

The below picture is how the software looks like:



First, for the radius and length, the data should be entered in the respectively enter boxes. Radius is to calculate the I, and the length is to calculate the real length.

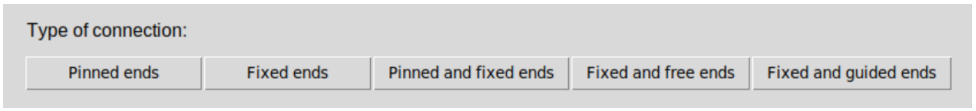
$$I = \frac{\pi \cdot r^4}{4} \qquad \textit{Eq.1}$$



Then, the next section is the button. There are five buttons, and each button represents one connection type shown by the text on them. This is to calculate the real length.

$$\text{Real length} = K \cdot L \qquad \textit{Eq.2}$$

Where K_pinned_ends = 1
K_fixed_ends = 0.5
K_pinned_fixed_ends = 0.699
K_fixed_free = 2
K_fixed_guided = 1

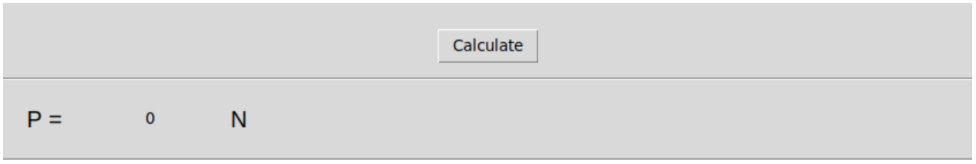


Following is a dropdown menu with two options. This is to set the young's module. One is wood ($E = 1.43$), the other is brick ($E = 14$).

In the end, click the button "calculate" and all data will be fill in the function below.

$$P = \pi^2 \cdot \frac{EI}{(KL)^2} \qquad \textit{Eq.3}$$

Then, the result will be shown beneath the button.

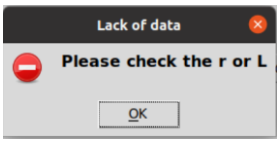


Step by Step

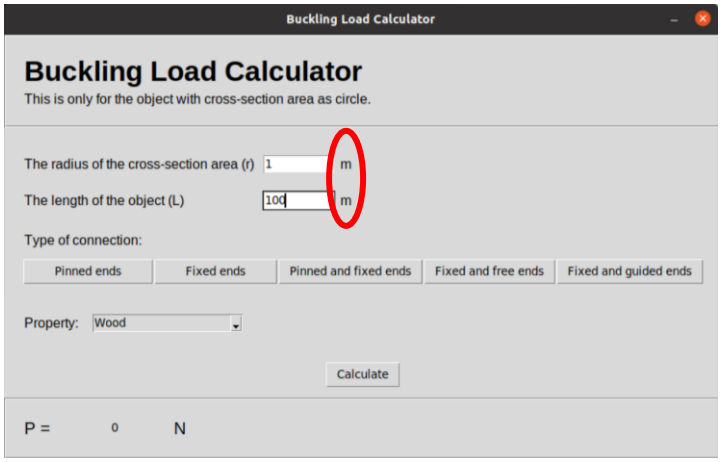
The software will be demonstrated by the example mentioned:

- $r = 1\ m$
- $L = 100\ m$
- Connection typed: Pinned ends
- Property: wood

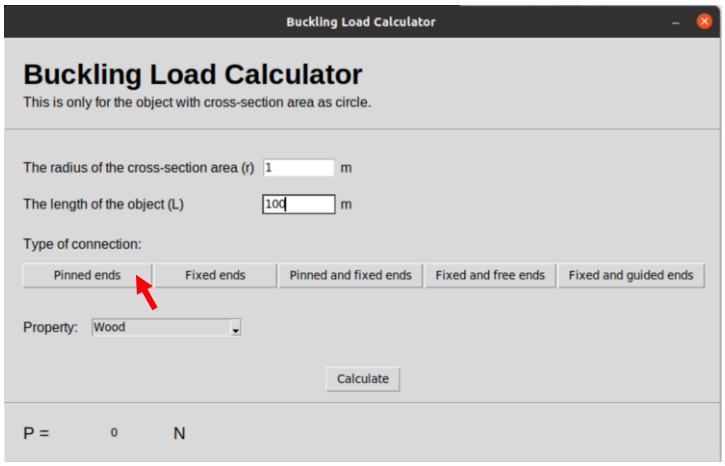
Notice, if an error message jumps out, please check the data entered.



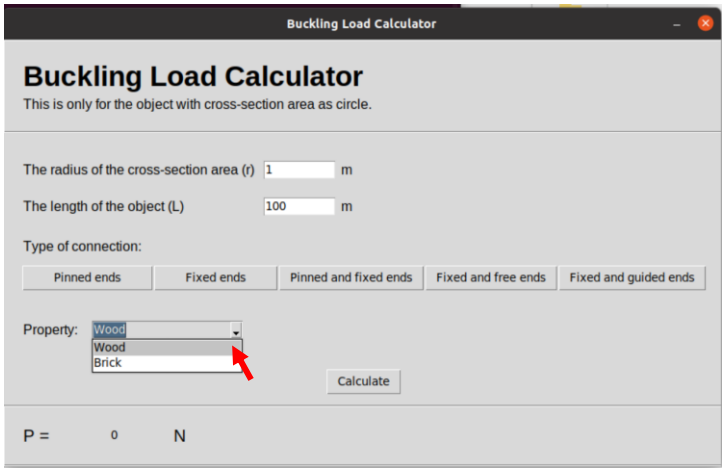
Step 1. Enter the r and L in relatively text boxes. Notice the unit is meter.



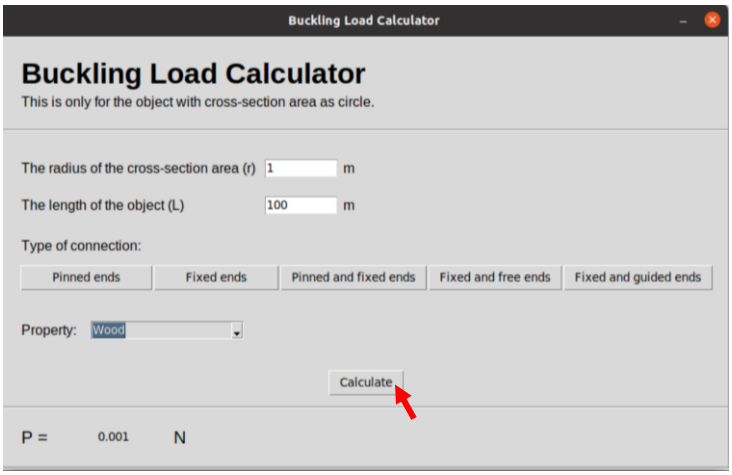
Step 2. Click the corresponding type button.



Step 3. Chose the property.



Step 4. Click the button ‘Calculate’.



Step 5. Got the result in the text box at the end.