The Heelless Shoe- Centre of mass

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Principle

The center of mass of an object is the point where all its mass in concentrated. The object is in static equilibrium about this point with no net torque. (Physics lab, 2010)

As long as the point lies above the area of support of the object then it does not overturn (topple over).

For an irregular object the "plumb line" method is used to determine the objects centre of mass. The objects and a weighted string are suspended at various points on the object and a point where the line passes at every suspension is established as the centre of mass (Seeing and touching structural concepts, 2010)

Applications

Using the plumb line method one can establish the centre of mass of an average high heeled shoe as shown below. The white dot shows the approximated centre of mass**.**
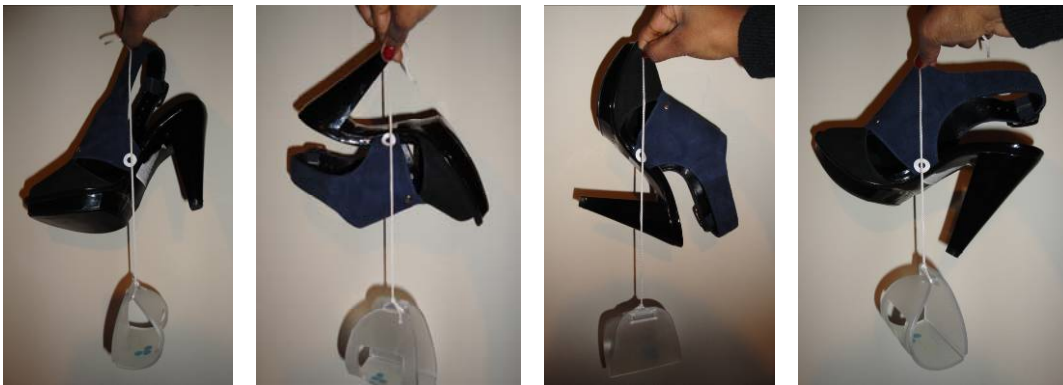
As seen the centre of mass lies outside the front base support area of the shoes. The shoe is therefore unstable and would topple over without the heel.

Base support when the shoe has a heel extends front the front to the back of the shoe

The heel maintains stability by extending the base of support ensuring the centre of mass lies above the support.

What happens to a heelless shoe?

http://Commetrics.com

http:// live.drjays.com

When there is no heel the centre of mass lies outside the base of support. To counter this and maintain equilibrium of the shoe there are two options:

- Move the centre of mass so that it lies above the base support. This can be does by adding mass toward the front of the shoe shifting the centre of mass forward.
- Increase the base of support so that the line of the centre of mass lies within the supported area.

Both these options are introduced in the heelless shoe to make it very stable despite the intentionally missing heel.

Arch support to increase comfort when walking by distributing the person's weight over a larger area.

Increased support area

http://Secondcitystyle.com

Weighted platform thus the centre of mass lies within the platform and above the supported area ensuring stability

References

Physics lab. 2010. *Center of mass,.* [Online] (Updated 26 May 2009)
Available at: http://dev.physicslab.org/Default.aspx [Accessed 21 /02 /2010].

Seeing and touching structural concepts. 2010 *Centre of mass of a piece of cardboard of arbitrary shape,.* [Online] (Updated 18 July 2008)
Available at: http://www.mace.manchester.ac.uk/project/teaching/civil/structuralconcepts/x [Accessed 21 /02 /2010].