

# Introduction to the “Quad” TLUD Micro-Gasifier Stove

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## Background:

Micro-gasifier cookstoves are consistently shown to have many highly desirable features. The most common micro-gasifiers use the Top-Lit UpDraft technology, commonly called TLUD (tee-lud). All of TLUD technology is in the public domain, and there are various designs. Enhancements could come from a wide variety of sources as these stoves are used by many people with different needs, including multi-pot and plancha stoves, fruit dryers, and room heaters.

The TLUD stoves have been progressively improved in recent years. In 2005 Paul Anderson (aka “Dr TLUD”) won a cookstove-emissions contest and called his design “Champion.” In 2008 production began in Chennai, India, on the Servals Champion TLUD. In 2010 the BEIA project of CREEC in Uganda used basic features of the Champion stoves to create the “Mwoto” TLUD that can be made by tinsmiths. In 2012, during several stove camps, the Quad design evolved directly from the Mwoto because of the need to fabricate these stoves faster and with less cost. The Quad (version 3) TLUD gasifier stove is now in production in Uganda by Awamu Biomass Energy Ltd.



Champion – 2005



Champion – 2008 to Present

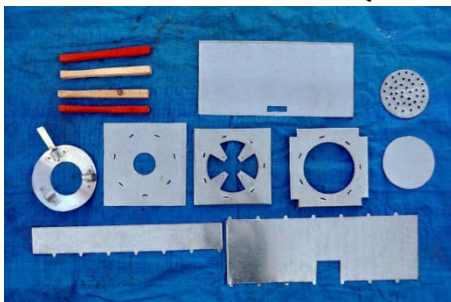


Mwoto – 2010 to Present



Quad – 2012 to Present

## Characteristics of the Quad TLUD:



The Quad TLUD has features for easier production (using tabs and slots, and zero rivets), easier shipping (as flat-pack pieces), local assembly, and greater stability and coolness of four wooden handles that serve also as legs. Without question, there will be further improvements as the number of users increases and they provide feedback. For example, households using the Quad TLUD stoves in various refugee camps could make suggestions that outsiders might fail to foresee. Jigs, tools and methods for making flat-pack pieces are being prepared in the USA for availability to stove projects worldwide.

**Material:** Sheet metal and 4 wooden handles/legs

**Cost:** Mwoto and Quad TLUDs sell for approximately US\$15 in Uganda, and should eventually cost less, especially if purchased in bulk as flat-pack pieces to be assembled by a local project.

**Dimensions:** Currently one size, but size can be easily changed: Height: 19” (48 cm), Square footprint 12 x 12” (300 x 300 mm); Fuel cylinder height 14 ” (36 cm) with diameters from 5 to 7” (12 to 18 cm).

**Test results** of Quad and closely related TLUD stoves such as Mwoto and Champion:

**CO & PM Emissions:** Consistently the lowest for any of the natural draft stoves that burn solid biomass.

**Thermal efficiency:** Range from 35% to 41% currently. Expected to go even higher.

**Fuel consumption:** 1050 to 1600 grams for a standard WBT of cold start plus simmer (respectably low).

**Fuel types:** TLUDs can utilize a wide variety of low-value chunky dry biomass fuels (e.g. corncobs, tree seed pods, nut shells), including briquette pieces that can be locally produced from unused biomass. “Stick-wood” is not a common TLUD fuel, but can be used vertically as “wood segments.” Vertical segments also with papyrus reeds, bamboo, etc.

**Options:** The Quad can be made as a TChar variation for ease of using the created charcoal as fuel in a charcoal stove or as biochar that is added to the soil.

For further information, contact Dr. Paul Anderson at: Email: [psanders@ilstu.edu](mailto:psanders@ilstu.edu) and visit [www.drTLUD.com](http://www.drTLUD.com) for future updates about TLUD gasifier technology.