

## Burr Mills (Grinders)

CTI volunteers have spent a decade refining their design for an adjustable burr-type mill, often called a grinder. We now have three models in production, all functionally similar, but optimized for manufacture in three locations.

All three are:

- Used for peanuts, grains, corn, coffee, breadfruit
- Powered by hand crank, bicycle, or electric motor
- More reliable than similarly priced grinders Several hundred in use (various versions)
- All three use nearly identical burrs, bearings, and augers and consequently have similar performance.

### Ewing III

- Manufactured in Kampala, Uganda,
- Has a sheet metal body, and requires less sophisticated manufacturing steps.

### Omega VI

- Manufactured in Zimbabwe and has a robust, cast aluminum body.

### Omega VI

- The Omega VI is very similar to the Omega IV, is manufactured in the USA, and has a few changes for convenience and stability.
- A box has been designed for shipping and then mounting the Omega VI grinder.



Ewing



Omega

This document, an Operators Manual, and other Burr Mill info are available to download from the website on the **"What We Do > Burr Mills** page

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- <http://www.compatibletechnology.org/whatwedo/devices> > Burr Mills.

### Pedal Powered Grinder

Persons in rural or remote areas of the world that use grinding technologies often lack financial resources to be able to afford to use electric motors, gas or diesel engines. Often electric power is undependable and/or unavailable. Manual hand crank machines or traditional methods of grinding are the options available to them. Depending on the application, pedal powered grinding may sometimes be appropriate.

The photo(s) illustrate(s) the use of a converted exercise bike attached to an Omega VI grinder for use in grinding peanut butter. The flywheel is set in motion by pedalling which in turn rotates the upper sprocket attached to the auger of the grinder. The rotary momentum of the flywheel tends to impart a smooth positive grinding action while the operator pedals to keep the flywheel moving at an appropriate rate. This application is not recommended for corn.



Road bicycles have been converted in a similar way.

### Assembly Instructions Available

This document, assembly instructions for the Pedal Powered Device, and other Burr Mill info are available to download from the website on the "**what We Do > Burr Mills**" page

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## Burr Mills (Grinders)

### The Evolution of a Food Grinder Design

#### ***The Need:***

CTI volunteers have been working for about ten years to develop a food grinder that fits the niche between expensive, motorized, commercial grinders on the one hand and cheap hand grinders on the other. The initial applications were to grind corn, but grinding peanuts, small grains, and dried breadfruit slices have now become more important. Our projects need reliable grinders that can be human powered by crank or bicycle but can also be powered by a small motor when electricity is available. A grinder that can be manufactured in developing countries is very desirable.

#### ***Early Approaches:***

Initially, there were attempts to “beef up” commercial grinders. We designed long lasting burrs and added bearings to allow motor operation. These developments were not entirely successful for a variety of reasons. The Corona and Porchert grinders were small and not sufficiently robust. The Bell grinders had burrs that were too large to be effectively powered by hand or bicycle.

#### ***Omega I and II.***

In the early 1990’s CTI volunteers designed the Omega I and Omega II. These units had larger burrs than the Corona and smaller than the Bell. Gradual improvements were made in the “throat”, burrs, and augers. Many of these grinders are in use in Africa and Central America. The grinder is robust, but the design is complex, with a machined thrust bearing.

#### ***Omega III.***

With help from a FICAH grant (now Food for All), CTI volunteers began to improve the design for making peanut butter. The thrust bearing assembly was replaced by self-aligning ball bearings mounted on threaded rods. The fineness of the grind could now be adjusted with a pair of wing nuts on the rods. This resulted in the Omega III, a much simpler design to manufacture and to clean.

#### ***Omega IV and V.***

The next design, Omega IV, has a major appearance change. It uses a cast aluminum body that incorporates the mounting, hopper, and throat. The burrs, auger, and thrust mechanisms are essentially the same as the predecessor. The cast body dramatically simplifies the manufacturing. The Omega IV has been a very popular design, with hundreds in use in Africa and Central America. The Omega V is a minor change to the IV, using a stainless steel throat liner to minimize wear when grinding high silica product such as rice hulls.

#### ***Ewing II.***

While the Omega series of grinders has been popular, the cost is still high for poor farmers. In an effort to reduce manufacturing cost, volunteers designed the Alpha I and Ewing II with help from some of our international partners. These grinders use essentially the same shaft, augers, and burrs as the Omegas, but have a body



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made of standard pipe and sheet metal. The burrs are adjusted by turning a standard coupling with a thrust bearing on a threaded pipe. Dozens of Ewing II grinders have been sold for projects all over the world.

### ***Ewing III.***

African machine shops had a difficult time manufacturing the Ewing II. Some of the components, while commonly available in the US, are not available in some African countries. There were also problems performing some of the machining operations. In response to this need, CTI volunteers and our African partners have designed the Ewing III. It's performance and many of its components are nearly identical to its predecessors, but it is manufacturable in Uganda and is expected to be less costly than the Ewing II.

### ***Components and Accessories.***

Grinder body changes are most visible, but there have been concurrent improvements in grinder components such as burrs, augers, cranks, and bearings. Volunteers are also developing accessories that can be mounted on the basic grinder to perform related food processing tasks. Our hope is to develop a family of inexpensive, yet robust, food processing tools that are appropriate for poor families in developing countries.

### ***Omega VI.***

By late 2002, CTI had nearly exhausted its supplies of grinders for sale to small and startup projects. More seriously, the patterns for casting the Omega IV and V grinder bodies had been given to our partners in Africa. CTI decided to improve the design based on user comments, and to invest in new patterns. The first batch of 60 Omega VI grinders was completed in April 2003. These grinders are similar to the Omega IV and V design, but have the front bearing moved to provide more stability to the auger and burrs. The burr gap of the Omega VI is also easier to adjust and there are fewer parts in the design. Several new burr and auger helix designs are available on the Omega VI.