

## Bamboo processing machine (Arulepsa)

### National Third

Mechanical and Electronics



**Imli Toshi Namo**  
Mokokchung, Nagaland

Toshi always had a keen interest in machineries and automobiles, which led him to develop many of his innovations. He has developed a Bamboo processing machinery/lathe for the removal of nodes and outer surface. Using bamboo powder, a by product of this machine, he developed a composite material, which he used in further developing a small electric hydro generator and a low-cost bamboo wall.

### Background

Imli Toshi (28) is a serial innovator originally hailing from Mokokchung in Nagaland. Having remained unemployed after completing BSc (Geology) in 2002, he started trying his hand at innovating new products that may show him and other unemployed youth avenues for employment.

Many of his innovations are the result of his observation and heightened awareness. In 2003 for washing his family car, he needed water from a water fall by the roadside which was located some distance away from road level. He decided to install a pump in the water channel itself to pump



the water to road level. Unlike conventional pumps, this zero head energy pump is placed axially in the direction of flow in river to capture the energy from flowing water. Axial momentum of water is harnessed to drive the centrifugal pump vanes and generate power. This innovative pump was awarded by NIF during the third National Biennial competition. NIF has extended Toshi financial assistance under MVIF and Value Addition, and Research and Development from time to time.

### Genesis of innovation

While more than 50% of the bamboo species and 66% of stock out of about 80.42 million tonnes (GOI, 2001) occurs in North-East India, there were very few technologies to add value to Bamboo, say for furniture. In Nagaland, bamboo based furniture is often made by local carpenters using inadequate hand tools. Lack of dedicated machines at affordable cost has stymied the efforts of the local woodworker. Even removing the hard green covering on the bamboo has remained a challenge for many users.

Having worked extensively with bamboo, Imli Toshi recognized the need to build a user friendly machine that would handle the sequence of tasks. When the design idea first crystallized in his mind, he built a simple prototype. Next, he approached NIF NE Cell for funding and submitted the proposal and drawings.

The prototype named as *Arulepsa* was developed with the help of National Mission on bamboo Application (NMBA) funding and NIF support. It was capable of processing bamboo, remove the outer knots, smoothen the surface, while enabling wood carving and final surface finishing of the job.

While taking trials of his *Arulepsa*, Toshi noticed that there was a lot of bamboo dust/powder produced as waste material. Having an innovative temperament he made a composite material by mixing this powder with locally available resin and made a portable hydro generator combining the design of his earlier zero head water turbine and a Chinese made hydro generator.

### Innovation

The dedicated bamboo processing machine is an integrated unit that can remove knots, do the planing and polishing of the surface and facilitate inner and outer contouring of the job.

Precision control is achieved with a soft touch, four-way joystick linked to a robust electro-mechanical control logic kernel. The machine has overall size of 4x2x12 ft and weighs 75 kg. It is electrically operated using a 1 HP motor running on 230 V AC supply to drive a spindle at the range of 40 to 90 RPM. It has been built with dedicated and independent sub-systems including the two stage planer, the bamboo feeder assembly, the self adjusting gripper assembly and two sets of fixtures for inner and outer contouring (carving).



The Planer assembly is the heart of machine and consists of a two-stage planer unit. The first stage achieves removal of the outer green covering and knots and the second stage makes the surface smooth. Prior art mentions machines for removing the outer green layer and knots of bamboo. Prior art has also disclosed individual machines for multipurpose and cross cutting, parallel splitting and sizing of bamboo.

Universally, complete woodworking on bamboo needs an assortment of machines such as Four Side Planer, Sanding machine, Finger jointing machine, Double End Cutting and Shaping Machine and Stick Sizing machine for making the stick in the desired size. Separate machines have also been used for internal and external knot removal, slicing the bamboo



for making slivers, and making the square bamboo sticks and a tool post accessory fitment for polishing them.

The highlight of Imli Toshi's equipment lies in using a single versatile wood processing platform that facilitates seamless removal of knots, planing, polishing and carving of bamboo. The precision in work is achieved by deploying the dedicated control center and a user friendly four way joystick.

For his hydro generator made out of the composite material, first, he developed a lightweight yet strong composite material using bamboo and resins. The constituents were bonded by pressure and heat. He used this material to design the components of a hydroger. Field trials were done using this hydroger in a small stream. A 20 feet long, 8 inch dia. feed pipe was fitted to the inlet channel of the hydroger. When the water flow hits the impeller, it rotates and the change of flux in the field coil induces the desired current. The arrangement of the magnets and the field coil was configured to produce 1 kW of electricity.

### **Portfolio of innovations**

His product portfolio includes an innovative egg boiler, a hot water filter, and bamboo strip making machine for agarbatti sticks , an incense stick making machine and a weed uprooting device for hilly regions.



One unit of the Bamboo processing machinery/lathe has been purchased by the Nagaland Bamboo Mission. Five units of his bamboo strip making machine for agarbatti sticks were also purchased by the Garo Hills unit of the North East Region Community Resource Management Project. This was facilitated by NIF. Incorporating several iterations and improvements, his novel machines have broken new ground in design, utility, elegance and social relevance.