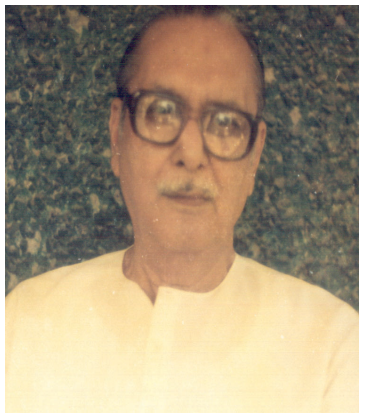
Pioneer inventor of rice processing machines[1]

POSTHUMOUS AWARD FOR OUTSTANDING TECHNOLOGICAL INNOVATIONS



(Late)Shri Bhubaneswar Borthakur was born on June 26, 1918, in Sibsagar district of Assam. His father, late Lakheswar Barthakur, was the first Assamese Director of Agriculture of the then province of Assam in British India. His mother, late Ms. Biraja Bala Barthakur was from the well-known Kataki family of Sibsagar. Barthakur passed his matriculation examination from Jorhat Government High School in 1932, securing fifth position in the board. His academic career was outstanding and he obtained his B.Sc. degree from the prestigious Presidency College of Calcutta and his B.L. degree from Earl Law College, Guwahati.

Due to the sudden death of his father, he could not complete his postgraduation in Mathematics. Being the eldest, Bhubaneshwar had to take on the responsibility of his family. He found himself at a loss, when his father expired, as he had to face entirely new circumstances and challenges.

Though he had the option of joining government service, his independent and innovative spirit made him take up business as his profession and in the process, he became one of the pioneering entrepreneurs of north-east India. His contribution towards the modernization of the rice milling industry in the country will always be recalled with a great sense of pride. Having developed fifteen innovative technologies, seven of which secured Indian patents more than thirty years back, he had set standards of excellence which still remain as a valid point of reference. He passed away in 1999 leaving behind three sons and a daughter and a legacy of innovations, enterprises and a spirit of fortitude, unparalleled not just in the North–Eastern region but even in the rest of the country.

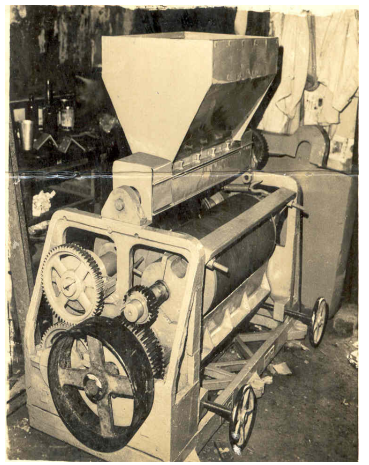
Address
Sushanto Barthakur
Flat B-3, Korunamayee Apt.
M C Road, Uzanbazaar,
Guwahati - 781 001, Assam.

Scouted by
Sri.Kabir R. Bora

Genesis In the mid sixties, Bhubaneshwar concentrated on improving rice-processing machines. He started thinking about the bleak future of his mill as well as the other small and medium sized rice mills during the late fifties because the market was beginning to be controlled by a few big mills. It struck him one day that he could possibly make some headway by improving the milling technique and achieving greater outrun of rice.

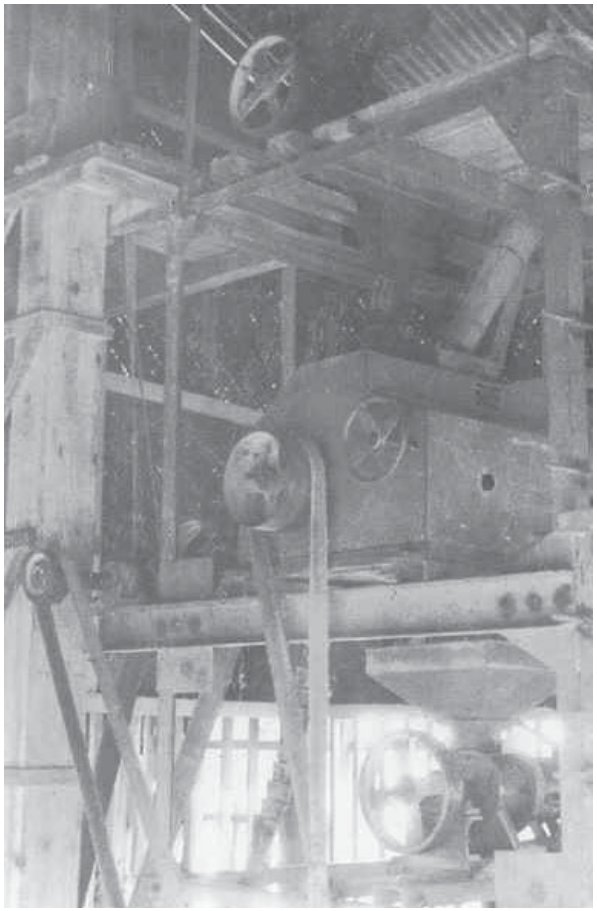
Bhubaneshwar undertook research in the field of improvement of rice milling in 1961 essentially to improve the rice recovery ratio to make it at par with international standards.

He invented a new set of machines and techniques, capable of achieving almost the ideal out run of 75% against the 65% out run that could be obtained by using the conventional sheller and polisher available at that time. This also contributed to solving the difficulties of modernization of the industry. Bhubaneshwar invented an emery-and-rubber roller Sheller as well as a sliding cone polisher for paddy and husked rice. These machines were considered very



important for the construction of a complete unit of rice mill.

Bhubaneshwar claimed that with his new machines, cent percent shelling of paddy was possible and hence, in his unit, the paddy separator was not incorporated. Ordinary millers could thus afford it since paddy separators were very expensive at that time. However, later when the Japanese-made paddy separators became available in the market at a much lower price, Barthakur thought of incorporating these separators into his units.



Innovative works of Bhubaneshwar Barthakur

There are four areas in which he developed innovative technologies in his life long pursuit of greater efficiency in various areas such as: a) agricultural processing, b) wood processing, c) public utilities and d) household utilities.

a) Agricultural processing

(i) The Barthakur Modern Rice Mill

The main innovative components of the Barthakur rice mill are the Sheller and the Polisher. The salient features of these two units are given below.

Emery and rubber roller Sheller

Bhubaneshwar developed a new kind of sheller known as Barthakur sheller. These shellers were used in place of rubber roll shellers since the wear and tear of rubber rolls was high and repairs were expensive in the mid 1960s. The sheller consists of one rubber roll and one emery roll rotating in opposite directions. The rubber roll was made up of a number of 'O' rings or rubber washers stuck together and pressed to form the roll. This could, therefore, be fabricated by any mechanic locally.

The basic principle of this device was to shear away the husk from the grain by allowing grains to pass through the requisite gap between the two horizontal parallel rollers; one of rubber and the other of emery rotating at different speeds in opposite directions. The emery scratch removes the husk and the rubber acts as a cushion and holder.

Advantages

The use of very soft rubber together with the cutting edges of the emery, has resulted in shelling with complete elimination of breakage of grains. The life of the rollers is almost at par with emery disc shellers. It has thus all the advantages of line gap shelling compared to surface gap shelling of the disc shellers. This is achieved without the associated drawback of high wear and tear of the double rubber roller shellers.

Since the rolls could be fabricated locally, the recurring cost on rubber rolls is reduced. Visual inspection and necessary dressing of both the rollers is possible in this machine without dismantling them. The husking efficiency was found to be around 80-85% with very negligible breakage. The capacity of the machine is large compared to its size and cost. The running cost on account of roller replacement and power consumption is very low compared to the different speed double rubber roller sheller.

Sliding cone polisher for paddy and rice (with husk)

The basic principle of the device is to polish the grains through mutual rubbing. The machine may briefly be described as a casing with a sliding arrangement placed horizontally on a base plate. During the operation of the machine, the roller is rotated by a prime mover, and grain for polishing is fed into the gap between the roller and the casing through the adjustable intake aperture. The grain is pushed by the helical screws on the roller into the conical gap**.** Here the properly adjusted blades arrest the peripheral motion of the grains while the straight ridges rotate the grains. The cumulative effect of rotation and arresting of the grains results in mutual rubbing of the grains. The grains are continuously pushed forward towards the discharge end and in the course of this movement, the grains are polished by their mutual rubbing. The conical shape of the annular gap between the casing and the roller with its diminishing cross sectional area imparts the necessary increased pressure on the grains required for their proper polishing. Ultimately, the grains come out through the discharge aperture of the casing.

The Barthakur polisher is a modified version of the Engelberg huller. In the Engelberg huller, the rotor and housing are cylindrical. Bhubaneshwar modified it to be conical with the bigger diameter of the cone towards the inlet.

Advantages

This machine can be used for both paddy polishing and polishing of rice with husk with some modifications. The conical formation of the annular gap between the roller and casing surfaces makes it possible to impart uniform pressure on the grains. For this reason as well as for the fact that abrasiveness of the husk is used for polishing of the rice no breakage occurs in polishing them. As the grains do not change their direction while coming out of the pressure zone of polishing, their shape remains intact. For the same reason, there is no wearing of the grains in the course of their mutual rubbing to effect the necessary polishing. As the arrester blades do not obstruct the discharge outlet, no grains get locked in the polishing operation to be pulverized as in the case of common hullers. Due to the mutual rubbing of grains to near perfection in this machine, no residual paddy is left out after the polishing operation. This results in complete elimination of the use of the paddy separator. By suitable selection of the dimensions of the operating parts of this machine, the yield of rice from raw paddy directly put to this machine, as in the common huller, has been found to be as high as 71 percent. Apart from paddy and rice polishing, wide use for this machine has been found in production of flour of wheat, corn and other cereals. Spice powder can also be conveniently made with this machine. Manufacturing of high grade dust tea is another very important application of this machine.

National lab acquires Bhubaneshwar's technology

Dr. M.S.R.Desikachar, the then Chairman, Discipline of Rice Technology of Central Food Technological Research Institute (CFTRI), Mysore visited his mill in 1970 and and was very impressed with Bhubaneshwar's innovative works. CFTRI, Mysore purchased one sheller and one polisher on Dr Desikachar's recommendation. The object of procuring the machines by CFTRI was primarily to preserve the machine at CFTRI and to show it to their students who could study it and be inspired by the design innovations.

ii) ***Machine for drying parboiled paddy and other grains***

This machine comprises arrangements for drying

parboiled paddy or other grains. The paddy or grains are transported by rotating vanes over a series of steam heated concave trays placed one after another. The evaporated moisture is carried through a hot-air circulating fan. All the bearing and driving mechanisms of the vanes are outside the hot chamber. The direct contact of the grains with the steam pipes allows a high degree of transference of heat to the grains for quick drying. Individual steam control of the heating pipes of each tray makes it possible to maintain the necessary temperature gradient of the trays in the course of the process of drying the grains. It can be operated in all kinds of weather.

iii) *Machine for parboiling of paddy under pressure*

Since the temperature of the water, used for soaking the paddy to be parboiled, should remain sufficiently lower than the boiling point of water, steam pressure cannot be utilized for generating pressure on the soaking water. The required pressure is provided with the help of compressed air or a hydraulic pressure arrangement so that the total steeping period is appreciably reduced. Due to the use of pressure during steeping, a greater amount of water soluble vitamins and other food values, which are subsequently sealed in the grains by the process of parboiling, become permanently fixed in the grains.

iv) *Improved process for the parboiling of paddy*

Water soaking time is reduced and thereby fermentation is eliminated. Besides, in this process, both the soaking and steaming are done in less space.

v) *Other contributions towards agri and food processing*

High frequency stirrer, Soluble tea manufacturing process, Device for separating light materials by oscillation and impact, grading of paddy with conical rollers;Canonical Oil Extractor, Cattle driven power tiller, Belt used thresher, Grain sheller with variable speed rollers of abrasive and elastomer materials, Sheller for de-husking paddy by variable speed abrasive and elastomer rollers with posed grain feeder are just a sample of Bhubaneshwar's range of innovations in this field.

b) Wood processing

Saw mill and timber seasoning plant

During the sixties, Bhubaneshwar added a mechanized wood processing unit to his rice mill and saw mill and replaced the original name "Annapurna Rice & Saw Mill" by "*M/s* Barthakur Industries & Agencies". Various machines like planner, drilling machines and slotting machines were purchased and Bhubaneshwar got some chiselling machines and circular saw machines made locally using his own innovative ideas and thus saved money.

c) Public Utility Equipment

Overhead dumping platform for the reloading of solid materials to carriers

The device provides an arrangement for collecting solid materials such as city garbage, industrial waste etc., by arranging a higher platform with bins so that the collected material could be very conveniently loaded to the carrier in bulk. His other contributions in this field are a Holder for tram, bus and other thin tickets, Controlling system for railway unmanned crossings, Oscillating frame saw and Composing systems for printing press.

d) Household Equipment

Improved safety razor assembly

In this assembly, the corrugated gripping arrangements on the covers hold the slightly upturned edge of the blade on its side away from the shaving edge and this permits movement of the razor blade along the curvature of the covers in between them and thus the necessary projection of the shaving edge outside the razor covers can always be maintained. This feature allows continuous sharpening and thus provides for great economy and shaving comfort. Other examples include improved hand loom equipment, Improved water taps and a Small sewing machine.

The successful entrepreneur

In the late sixties, the then Chief Minister of Assam, Bimala Prasad Chaliha and a team from the Assam Industrial Development Corporation (AIDC) visited Bhubaneshwar's mill and observed the prototypes and demonstration of different rice processing machines invented by him. Highly impressed with the construction and performance of the machines, the Chief Minister, himself being an inventor of certain devices, encouraged Bhubaneshwar to go ahead with the project without any hesitation. Accordingly Bhubaneshwar submitted his project report regarding the rice processing machines in 1969 and subsequently negotiated with the AIDC for jointly manufacturing and marketing his machinery. In the joint venture, the role of Barthakur Industries was to manufacture and supply the machines and the role of AIDC was to offer initial financial support as well as monitor collection of orders and supplies.

Subsequently Bhubaneshwar set up an office in Calcutta in 1969 and started his factory at Howrah. By July 1970, orders for twelve machines were in hand against which eight units were manufactured for supply. Around that time a large number of orders were expected from different parties of Assam and from West Dinajpur. A few months later in 1970, Bhubaneshwar entered into a licensing agreement with M/S Bihar Ispat in Ranchi, in response to a proposal by their family unit M/s Steelsworth Pvt. Ltd. in Guwahati. He then shifted to Ranchi and with his co-operation and guidance, M/s Bihar Ispat continued to manufacture and supply rice milling machines against subsequent orders.

An icon of his time

Bhubaneshwar Barthakur, patriot, philosopher, writer, innovator and entrepreneur, was an icon of his times. Fired by the zeal of patriotism and his concern for the moral and spiritual upliftment of the downtrodden, the publicity shy Barthakur actively associated himself with several service organizations. During the fifties, Barthakur took up cudgels for the introduction of the National Register of Citizens based on birth and death records and also wrote and published a booklet on the subject. He also submitted an elaborate and concrete proposal for utilization of the water resources of Assam through modern technology.

He was the Chairman of the Assam Rice Mill Owners' Association for ten years. In addition, he also held the post of the Director of Assam Agro-industries Development Corporation Limited (State Govt. undertaking). For his untiring efforts for the improvement of the common man and his sympathy for the working classes, he was nominated as a member of the North-east Railway User Consultancy Committee and Shramik Kalyan Parishad by the Government of Assam. A great admirer of the philosophical and scriptural heritage of our motherland, Barthakur served as the President of "Uttar Purva Loka Kalyan Parishad" and Divine LifeSociety for a long period. He had an extensive knowledge of the scriptures. '*Srimad Bhagawat Gita',* the holy book, was the guiding scripture of his life. He was one of the founder members and guiding spirits of the Vivekananda Kendra Institute of Culture, Guwahati.

A voracious reader and a prolific writer as well, Barthakur was the founder and a regular contributor to Vivekananda Journal *"Jagriti"* since its inception. His translations of the "*Tulsidas Dohavali"* and *"Patanjal Yogadarshan"* into Assamese were highly acclaimed by his contemporaries. His frequent writings on the *"Gita", "Sankhya Darshan"* and other scriptural subjects also were appreciated. As his parting gift to the Vivekananda Kendra, he presented the Assamese translation of the "Selections from the complete works of Swami Vivekananda" a few months before his demise. The version of the book in three volumes exemplifies his deep insight into our scriptures and ethics, and his understanding of the life and message of the great patriot saint Swami Vivekananda. He also wrote *"Niti Katha" (Moral* stories) for children, besides a number of articles on Indian philosophy and heritage.