Traditional Waterwheel Technologies and Examples

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Photos and Figures offered by Prof. Dr. Hiroshi IKEMORI & Hiroshi MIZUNO
Importance of Waterwheel

Environmentally Friendly Technology

Waterwheel has two types, one is to harness water currency and the other is to pump water with manpower

- Wooden Waterwheel is easy to build and re-build by environmentally friendly process

- Uses river water without affecting environment

- Easy to build by acquiring proper knowledge

- Waterwheel produces power in a place where it is needed

- Waterwheel can be built with locally available materials, local tools and local constructors
The Historical Processes of Waterwheel as power in Japan

<table>
<thead>
<tr>
<th>Roles of Waterwheel</th>
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<tbody>
<tr>
<td>- Rice field Irrigations, rice polishing and flour milling (flour and buckwheat)</td>
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<td>- Oil squeezing (rapeseed oil and cotton oil)</td>
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<td>- Brewing, mining sites and production of cannons</td>
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<td>- Cotton-spinning in the Meiji era</td>
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The most popular era: Period of the end of Edo era to the beginning of Showa era (about 100 years)
Large-scale waterwheels

Overshot wheel for polishing rices. 14m in dia. Built in 1992

Back pitch wheel for polishing rices & flour mill. 18m in dia. Built in 1993
Waterwheels for Rice Polishing (18 diamm)  
(Built in 1993 and in operation now)

Back·pitch waterwheel for polishing rice & flour mill  
18m in diameter

Water is taken from a lake in a mountain  
and is sent through siphons
Building 14 m Diam. Overshot Waterwheels for Rice Polishing
(Built in 1992 and in operation now)

Overshot waterwheel for polishing rices
14m in diameter.

Constructors
Reconstruction of ninety-year waterwheel for an incense factory and waterwheel is rebuilt in indoor space

5.5 m in diameter
The width of 1 m
Rebuild in about 22 years

Milling devices is over there
The number of mallets

The weight of a mallet

Strokes (average)

The number of pounding

Power of mallets

Output

= 3.53PS + conveyor power (1PS?)

+ other factors such as the loss of transmitting devices
Polishing rice waterwheel with 7 m in diameter

- Grinding buckwheat with stone mills
- Taking river water from a dam in upstream and rotating

Rotation: 8 RPM
Waterwheels for polishing rice with mallets
Polishing rice waterwheel in Thailand

Built with locally available materials

Reduces children’s heavy burdens of polishing rice
Capable of one-kilo polishing rice, the equivalent of one day consumption, in 30 minutes
Pedaling wheel
(Pumping waterwheel)

Rotate waterwheel by weight
Pedaling the waterwheel by a person’s weight

Capable of pumping 200 liters of water per minute
Water Pumping wheel in apple farmlands in Mongolia
Movable by oneself

Watering seedbed
Japanese Tread(Scoop)-wheel for irrigation in Mongolia

Diameter 1.8m, Weight 30kg, Discharge \( \bullet m^3/h \) (\( \bullet \) rpm)

Tread-wheel

Apple orchard

Water channel

Light & Portable

P.L. Fraenkel: Water lifting devices
Asakura Three Consecutive Waterwheel
(Mr. Nose is in center, and Mr. Anegawa is in the right)

Water supply to rice fields

Mr. Anegawa
Pumping waterwheel with 12m in diameter in Cambodia and Technical Interchange with local staff (Sponsored by AIM)

Taking river water and rise it to the upper pipe, then water soil and seedbeds
Waterwheel repair with simple tools

- Elaborated production with a hatchet

- Keeps good balance on an unstable foothold

- Build a waterwheel uniting with tools
Aiming to learn the importance of waterwheel, our predecessors' wisdoms and the usage of clean energy through the processes of building waterwheel. Aiming to cultivate an environmentally friendly mind in the processes of gaining experience in building a waterwheel and using it.

Build washing-and-peeling taros waterwheel which was popular in farming areas in Japan. This kind of waterwheel is a symbol of clean rivers.
Small-scale and light waterwheels: Japanese style that can peel taros.
Peeled taros by waterwheels built by students of Nishinippon Institute of Technology
Waterwheel electricity in a non-electric village in Laos

Rotated 70 per minute under condition of 1cm depth and non-friction

Condition
- Water velocity: 3.5m/s
- Canal with an inclination of 1m
- Connect with a battery with 12V and 200A

Result
- Produced more than 13.5V under condition of 30RPMw
- Charged successfully into battery

Can be expected to produce large amount of electricity with the 5 – 10cm Depth of water
Hand-made waterwheel and generator

-Belt is used to accelerate rotation. Minimization of accelerator and generator is possible

- Waterwheel is built with locally available materials and simple tools

- Can be used as alternative motor
Thank you for your kind attention.