



Pottery Wheel Testing Report

SELCO Foundation



Background & Context

Pottery is one of the oldest traditional livelihoods in India, but still thrives as both an art form and a means to create functional items. The craft has been practiced and passed on over generations with the form constantly evolving. It has been a massive employment generator in both rural and urban India for decades but is slowly diminishing. While various platforms, including government centres, potters' markets and online pottery boutiques have contributed to its continued viability as a livelihood, this trend is steadily declining in rural areas because of increasing costs. Unable to meet their basic needs from the income generated by pottery, potters are opting out of the art. While motorized wheels exist, irregular electricity or complete absence of electricity prevents them from opting to the solution.

As pottery is considered a laborious craft, right from sourcing the clay, firing the article to creating one- plagued by uncertainties in finding clay, wood for firing kiln, and the labour for spinning the wheel, which is making potters choose alternative professions. There is extreme drudgery involved in driving the pottery wheel that amounts to less productivity due to fatigue. The current methods include a driving wheel using stick or by hands or by motorized wheel. However, most villages do not have dependable grid supply to use a motorized potter wheel and due to this, a conventional motorized potter wheel is not a feasible solution.

SELCO Foundation started developing an efficient motorized solution for the wheel to provide a solution for rural artisans where in to reduce the physical effort of spinning the wheel and increasing productivity, and income generated- including savings from hiring labour.



The Solution

A modified high efficient, high quality and safe potter's wheel with a speed controller for easy operation has been designed. As many of the workplaces are in geographies with no access or unreliable electricity, the product is powered by a solar system with an optional light.

The wheel has also been designed with a more efficient PMDC (Permanent Magnet DC) motor to reduce the overall cost on solar powering the wheel. This simple solution allows for a transformational change in the way potters have been operating traditionally. Reduction in drudgery can also lead to an increased chance for next generation to carry forward the skill.

LAB TESTING

Post intensive market research, a few wheels were tested for efficiency in the lab. The testing process involved taking into account a set of parameters which were as follows:

- efficiency of the wheel
- ability to take load of working with the clay
- safety of use
- ergonomic design of the wheel

The lab testing was conducted in a studio in a school so as to not affect the livelihood of a potter during technical testing of the Wheel. Post lab testing, this wheel was piloted in rural regions of Karnataka and tribal areas of Kalahandi district in Orissa.

The solar energy solution was designed for 4.5 hours back up as most of the artisans prefer to work long hours and take breaks based on their convenience.

COMPARATIVE CASES



(A) Delhi Wheel - Dharma Industries



(B) Bangalore Wheel - Sri Janani Engineering



(C) Box Pottery Wheel: Robomatrix Automation & Solutions Pvt Ltd

Observations	Delhi wheel (A)	Bangalore AC wheel (B)	Box Pottery Wheel - Ghaziabad (E)
Procured / not procured	Procured	Procured	Procured
Motor and wheel	0.25hp, 24V PMDC motor and 20 inch wheel	0.16hp, 24V PMDC motor, 12 inch wheel	0.5hp, 24V DC, 17 inch wheel
Cost	Rs. 18,000 (wheel+speed controller+charge controller)	Rs. 40,000 (wheel+speed controller+charge controller)	Rs.23,500 (wheel+speed controller+charge controller)
Solar system	Rs. 1,10,000 approximate	Rs. 80,000/- approximate	Rs. 1,10,000 approximate
Solar specs	First design (rough):250Wp, 24V - 3 panels 50A Charge Controller 150Ah - 2 batteries 4.5 hours back up New design	Solar system was not designed as this was a studio pottery wheel and not fit for field testing	First design (rough):250Wp, 24V - 3 panels 50A Charge Controller 150Ah - 2 batteries 4.5 hours back up New design
Manufacturer	Dharma Industries	Sri Janani Engineering	Robomatrix Automation & Solutions Pvt Ltd
Load being taken	18-20kg can reach 25kg with pottery being done in small articles from top	11kg maximum	20-25 kgs
Safety	Concealed and safe	Concealed and safe	Concealed and safe
Overall Feedback	Load: Works well and can take a required load of 20kg Safety: Unsafe for children to be around and also women with long hair as the bigger pulley is the potter wheel base itself and hair / hand can get stuck between the wheel and the belt. Design: Can be better designed in order to take higher load	Load: Maximum load taken is 11kg. Safety: Very safe in all means Design: Good and it uses a 24V DC supply	Load: Safety: Very Safe Design: Good
Steps taken	1. AC motor replaced with 0.25hp PMDC motor 2. Speed controller (24V 50A) designed for the motor and manufactured by Emsys 3. Wheel tested and it takes a load of 18-20kg. 4. The pulley and belt concealed to increase safety. (refer picture) 5. 10 Wheels ordered - 5 in Orissa and 5 in Karnataka. 6. 3 were installed in Orissa and 2 in Karnataka.	Charge controller with 40A rating manufactured by Emsys	Procured and tested, there were a few mechanical issues which needed to be checked by the vendor
Selected for Pilot?	Selected for Pilot Implementation	Not selected	Few technical issues need to be resolved
Reason for selection/not selection	Suitable for variety of articles that potter create	Not suitable for variety of articles. As the wheel size is small, the potter can create only smaller articles	Was not suitable for the field

Field Testing and Evaluation

Post the final iteration in the lab testing phase, the wheels were deployed across two states - Karnataka and Orissa with different typologies of potters. The wheel was tested in 6 sites across Karnataka and 4 in Orissa.

These were based on socio-geographic factors ranging from terrain, weather, energy access, income levels, types of raw materials used, infrastructure, market linkages etc. (Please refer to the appendix for detailed typologies.)

Demography:

The sites had a mix of individual potters and community potters - The community potters were restricted only to Orissa where there were villages with just traditional potters. In these sites, a few potters were sharing two wheels each in a community model. Some of them had to hire labourers to help them with the extremely laborious process.

Energy issues:

Almost all sites suffered from erratic power cuts with daily power cuts ranging from 3-5 hours. During certain times of the year, especially the monsoons, the power cuts would come in during their working hours which would affect their productivity and a subsequent loss of business. With the rest, they would work through the night when the power supply would be present to make up for lost hours of labour.

Type of wheels used:

Four of the testing sites had potters using AC wheels who would suffer due to power cuts and shoddy systems with lack of servicing. The rest were using manual hand powered wheels which involved immense drudgery and labour cost as labour had to be hired. Some families would have women helping the potters with the pre-process.



SPECIFICATIONS OF THE WHEEL AND THE SOLAR SYSTEM

Wheel: 20 inch

Motor: PMDC 24V, 0.25hp

Variable speed controller: 24V

Solar system:

Panel- 24V 150Wp * 3

Battery- 12V 100Ah * 2 / 150Ah * 2

The sites had a mix of batteries tested with 100 Ah and 150Ah

Back up/Operation time: 7 hours

Cost- wheel = Rs20,000, solar = Rs.

1,10,000

TEST RESULTS

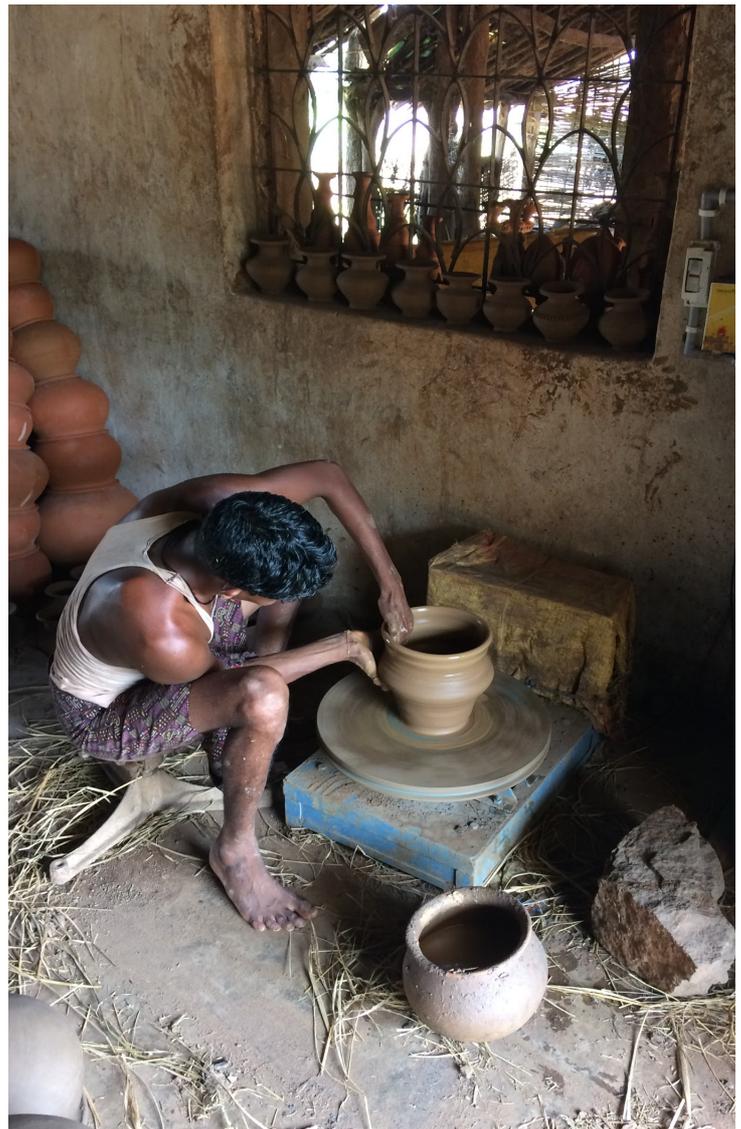
The pottery wheels in all the locations were working satisfactorily. The potters were able to create all varieties of pots from small earthen lamps to large water storage pots of all shapes and sizes.

DESIGN TECHNICAL ISSUES AND FEEDBACK

- Functionally, the solar system was very functional.
- More capacity was observed in one of the features with the hand operated model used a small rod to avoid water from going into the speed controller
- Speed controller issues were observed in one of the sites which were resolved
- Motor issues were observed which were also fixed
- There was a misconception with some potters that larger pots could not be made on the DC machine. These were debunked over time.
- The users were all very satisfied with the product and provided overall positive feedback.

POST TESTING IMPACT OBSERVED

- Reduction in drudgery was felt by the potters while working long hours, which also helped increase their number of productive hours, if needed.
- Confidence was built in continuing with the pottery business. Some potters had plans to expand their business, having the energy to think of new designs and interact with the customers or vendors more.
- Other potters in the village had started to approach these potters for buying such wheels to enhance their work and productivity as well- indicating the market and acceptability of the technology.



Next Steps

Business cases observed and the need for building them

A lot of these potters have been practicing pottery since many years as a family business. They also have addressed the problem of skilled potters leaving the profession because of the uncertainty in the business. They expressed the need to expand their business and to bring some of these skilled potters back into this profession through business expansion activities. Post the testing of the technology, the field pilots will be conducted across various geographies and typologies to get a deeper understanding of the capital investment, operational activities and the costs associated with the potter types, current market linkages, current financial

linkages and business aspirations, will need to be taken account as well. Thus, next steps could include:

- To introduce new technologies as per their process requirements like blunger, pug mill, and efficient kiln
- Through this, effective utilization of the new labour in the new processes
- An infrastructure for display of demo products
- Build market linkages – product development, training of potters, supply chain linkages, etc





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