

“Design and Development of Turmeric Polishing Machine Energized by Human Power Flywheel Motor.”-A past review

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Abstract— In the present investigation, in the recent past human powered flywheel motor concept has been used for chaff cutter, bricks making, wood turning, cloth washing. The machine uses bicycle technology, with speed increasing gearing and a flywheel, which drive the process unit through a spiral jaw clutch and torque increasing gearing. Pedal power is used transmit this power to run the machine by the operator. Power can be transmitted through crank chain to free wheel to the working unit. This human powered flywheel motor concept (HPFM) provide new era in the human powered agriculture processing, harvesting, post harvested operations equipments. Considering social, cultural and environmental factor as well as in many rural operations utilizing unskilled worker and in Vidharbha rejoin there is more problem of electricity so this kind of HPFM concept is helpful in driving various rural machines. The machine is economically viable, can be adopted for human powered process units which could have intermitted operation without affecting the end product.

Key words-Human power machine, turmeric polishing.

I. INTRODUCTION

India has leading business in agriculture. India has more capacity to produce turmeric in an agriculture field and also India is larger exporter of it. Turmeric polishing is a post processing operation carried out on turmeric rhizome like cleaning, curing, dryings, polishing, and grinding. Dried turmeric is polishing to remove the outer dirty skin, root and soil particles and soil particles and transformed into relatively smooth, bright and yellow rhizomes. A mechanical polisher be developed (S.M.Moghe,K.S.Zakiuddin) at Nagpur university Maharastra, India. It is operated by 1hp motor. This polishing machine can be operated manually. Traditionally polishing is carried out by hand polishing in

which labors who have to rub turmeric finger on hard surface, after filling drum with turmeric finger is rotated , abrasion of the surface against the mesh in drum affect the polishing. Machine is responsible of produce greater quality of turmeric. It also avoids wastages of turmeric.

II. LITERATURE REVIEW

[1] V.A. Parthasara. This pamphlet with India is a leading producer and exporter of turmeric in the world India has produced 837200 tonnes of turmeric from an area of 18600 ha. In session 2006-2007. This paper said about climate and soil, varieties, cultivation, plant protection, harvesting process which include curling, boiling, drying, polishing. Dried turmeric has a poor appearance and a rough dull outer surface with the scale and root bits. They said the yield of polished turmeric from raw material varies from 15-25 percent.

[2]Anne Plotto, during 1995-2000 explained the term polishing with the help of post management aspect, polishing of dried fingers is useful to remove scales and rootlets from the rhizomes for this purpose rotating drum lined with a metallic mesh which abrades the rhizomes surface. It gives on attractive color. This paper also provides information about turmeric production in India.

III. LITERATURE RELETATED TO TURMERIC POLISHING

[3]David Gardon Wilson, This paper deals with the understanding of Pedal power. Fig.1 shows human powered output pedaling. If we want pedaling in the range of 50 to 70 revolution per min in such a case we should engaged people to deliver power continue for an hour or more. Figure1 shows how optimum pedaling rate verses desired power rate.

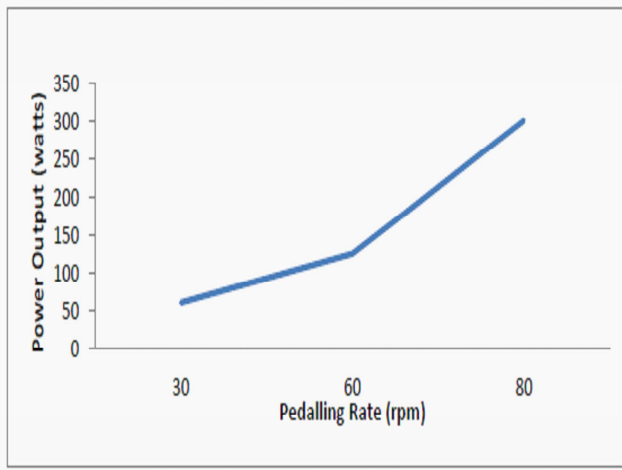


Fig. 1. Human Powered Flywheel Motor Concept

[4] K.S.Zakiuddin, Stated the importance of Human Power from the earliest time to the present and its necessity to different machine with future scope. They categorized human powered Machine with its different examples according to its type. Provided information about Dynapods. Finally this paper explains the Human Powered Flywheel Motor concept with line diagram which contain Bicycle, Chain, Gear pair, Flywheel. Recently this concept they used in Chaff Cutter [4].

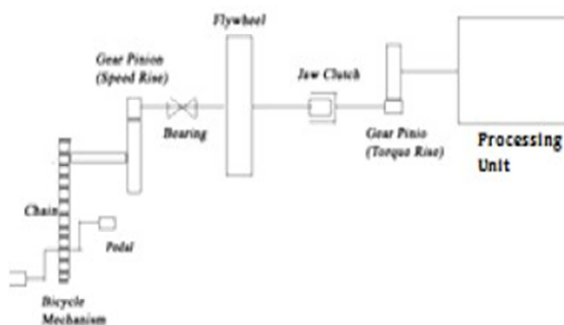


Fig. 2. Human Powered Flywheel Motor Concept

[5]J.P.Modak. In this paper, A human powered bricks making machine has been designed and development. The machine uses the human flywheel motor as an energy source and they said that this concept can be adopted for human powered process unit needing more than 2 KW short term power and which could have intermittent operation without affecting the end product. Essentially machine consist of three sub system i.e. 1.Energy Unit, 2. Appropriate transmission, 3. Process Unit. from schematic arrangement of the machine and specification of major part of machine. They have used gear pair for torque amplification and other one for speed increasing and connected with spiral jaw clutch.

IV. NEED OF THE HUMAN POWERED FOR TURMERIC POLISHING PROCESS

Polishing of harvested turmeric is a bigger problem for the turmeric producers in an India. The customer is in need of high quality polished turmeric for making turmeric powered. There are many machines available in the markets but all these machines are motor operated and considering social, cultural and environmental factor as well as in Vidharbha region ,Maharashtra, India there is a more problem of electricity.

The objective to design and development of turmeric polishing machine developing countries of third world like India are facing problems of Power storage due to rapid industrialization, non availability of power in rural areas and unemployment amongs semi-skilled workers. The given machine is selected for design and development.

Most of farm operation for turmeric is carried out manually by conventional methods which are slow, tedious and labor intensive. There is a mechanization gap in field of farm level primary processing activates of turmeric after harvesting.

V. REQUIREMENT OF TURMERIC POLISHING PROCESS

This machine can wash turmeric rhizomes mechanically .It is portable, electrical power operated and rotary drum type turmeric polishing machine At optimum rotational for speed at optimum time can polish 50-60 kg of turmeric rhizomes the optimum performance parameter for polishing below 45 rpm for 20-30 min, at which desired yellow color can be obtain surface forms more smooth. There is also improved by polishing because the surface microbial load is reduced to half, polishing can increase microbiological quality of turmeric rhizomes



Fig. 3. Turmeric Polishing Machine

Machine specifications-

1. Electric operated (1 hp)
2. Operating speed up to 40-50 rpm, for 15-20 min.
3. Capacity 50 kg

VI. PROPOSED MODEL OF TURMERIC POLISHING MACHINE ENERGIZED BY HFM

From the literature search made produces data for proposed model of turmeric polishing machine consist of three sub system 1. Energy unit. 2. Transmission 3. Process Unit. Fig Line diagram of turmeric polishing machine energized with HFM. This model consist of bicycle mechanism for energy unit which will consist big sprocket1, and small sprocket2, speed increasing gear pair G1P1, Flywheel which store this input energy. After storing the maximum possible energy in the flywheel, this available energy transmit towards processing unit with the help of spiral jaw clutch C1,befor transmitting the flywheel will decelerate depending actual resisting torque offered by the process unit, this torque amplification before engagement of clutch done by gear pair G2P2.

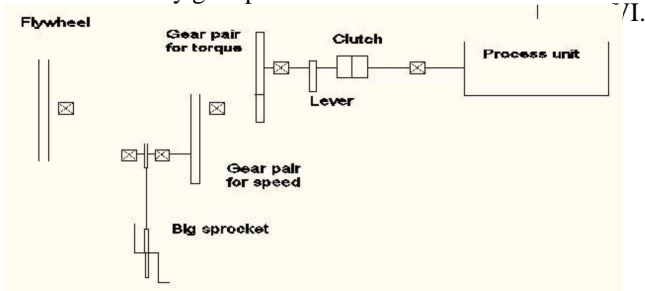


Fig. 4. Conceptual Model for Turmeric Polishing Machine Energized by HPFM

According to proposed model of turmeric polishing machine following table shows bill of material on designed calculation.

TABLE 1. BILL OF MATERIAL

Component s	Dimensions (mm)	Materi als	Qty
Base Frame	L H W= 735*50*430	MS	1
Drum Frame	L H W=100*500*25	MS	1
Drum	Dia.= 600 mm, length = 800mm	GI	1
Spur Gear	PCD=117, total width=25.50, no of teeth=39	CI	1
	PCD=156, total width=34, no of teeth=39	CI	1
	PCD=246, total width=25.50, no of teeth=83	CI	1
Pinion	PCD=60, total width=25.50, no of teeth=20	CI	1
	PCD=80, total width=34, no of	CI	1

	teeth=20		
Bearings	Bore Dia 25 mm	MS	8
	Bore Dia 35 mm	MS	2
Shaft	Dia = 25mm length = 430mm	MS	3
	Dia = 35mm length = 430mm	MS	1
	Dia = 25mm length = 940mm	MS	1
Flywheel	Dia = 1200 mm, Weight = 100Kg	CI	1
Clutch	Length of one half = 100mm, Dia= 65mm	CI	1

VII. DESIGNED MODEL OF TURMERIC POLISHING MACHINE ENERGIZED BY HPFM

As per the designed and analytical calculations made following CAD model is developed by using different commands of Pro E software

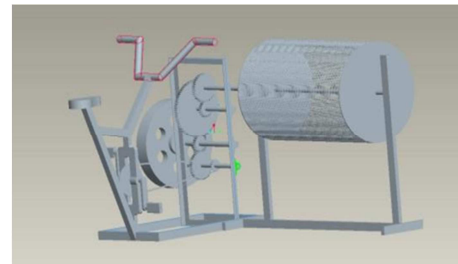


Fig.5. 3D View of Machine

Based on the above study of human powered motor concept and its different applications, turmeric polishing process, polishing machines following conclusion can be drawn.

1. Above research work and the proposed model can provide benefit in the turmeric polishing.
2. Model will provide to design and development such that will be simple to build and labor required to operate this machine is only one and less skilled labor can operate this model.
3. Some development in existing machine and process unit with the proposed model which is based on past work carried on human powered will efficient as possible so that polishing capacity should be equal or more than existing machine.

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