

Case Study : Motorcycle Driven Ploughing Machine

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Cotton seed and groundnut plantation

Empathy Study



- In Gujrat, small and marginalized farmer are dependent upon cash crops like cotton
- Depending upon monsoon, ploughing can be either single or deep depending upon the moisture of soil
- Increasing frequency of drought, decreased supply of fodder, restrictive usage of bullocks, high maintenance cost of draft animals added to it.
- tractors were found uneconomical for later stage (when the soil has considerably softened) for ploughing and inter-culturing, weeding due to high weight and fuel consumption

Ideation

- Inspired by a local mode of transport, the three-wheel taxi “chhakdo” , innovators had developed an innovative multipurpose farming machine which can do all the operations which can be carried out by a pair of bullock.
- Using the self fabricated chassis, drive and power of an Enfield Bullet motorcycle in front the innovator team has retrofitted an attachment with two wheels at the rear with a tool bar to fit various farm implements.



Chhakdo, a frugal innovation which has become inspiration for ploughing innovation

Ideation

- The rear wheel of the motorcycle has been removed and an innovative assembled unit has been attached. It can also be designed and attached to locally available Chhakdo rickshaw or assembled vehicle having minimum 6.5 HP engine
- This meets various needs such as ploughing, weeding and sowing seeds and spraying. It can improve productivity and reduce operating costs for farmers, who currently use bullockdriven plough and cannot afford the tractors or power tillers.

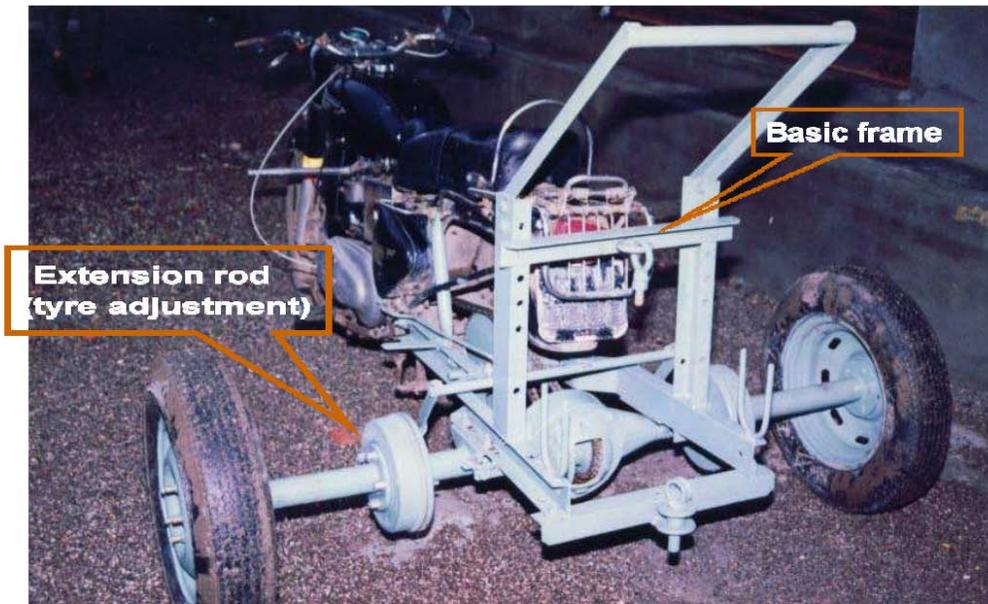


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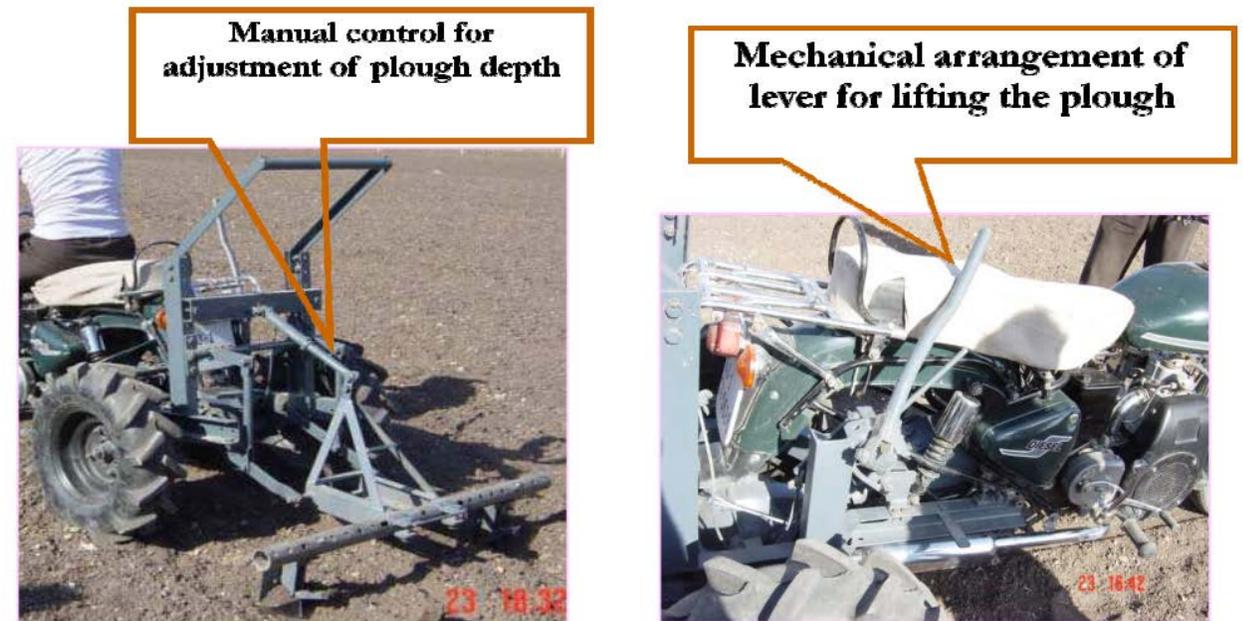
- The device was developed by an Indian artisan cum farmer and has already proved its utility.
- Ideal for a wide range of agricultural operations like field preparation, Sowing, Inter-culturing , Spraying etc
- It is simple, easily repaired and requires low maintenance, in contrast to tractors
- No continuous variable cost, in contrast to bullocks
- Comparable price to bullocks
- Attachable to “ENFIELD” and some other motorcycles.

Prototyping

P1 – First prototype by Innovator (1994)



P2 - 2nd Model by the innovator with added features (2000)



Prototyping



Final Product patented in India and US

Crude Prototype	Improved Version
Speed reduction by chain drive and no reverse speed arrangement	A new gear-box with reverse gear option is incorporated and minimized the power loss due to direct shaft attached to gears
No reverse gear facility	A new gear-box with reverse gear option incorporated

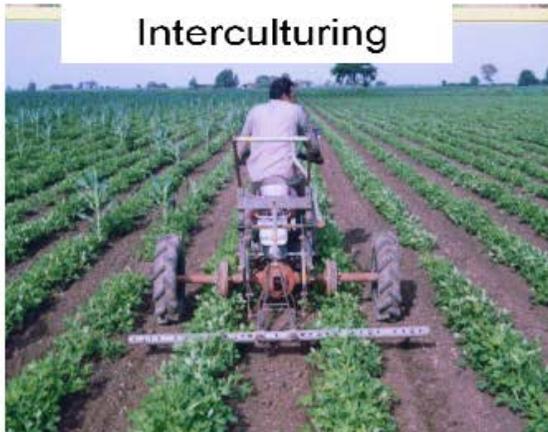


From crude motion transfer to use of gear box

Design Specification : Comparative Benchmarking

Parameters	A pair of Bullock	Motorcycle plough (Santi)	EICHER tractor (eicher 242 di)
Technical Features			
Power (HP)	A Pair is equal to 2 HP	6.5	24
Gear Systems	No	1 - 2 - 3 & reverse	Sliding mesh gear 8 forward 2 reverse
Max. Traveling Speed	3 kmph	45 kmph	35 kmph
Availability of PTO	No	No	Yes
Availability of Hydraulics	No	Mechanical Lift	Double Cylinder 1000 kg capacity
Fuel consumption (Average)	Cost of fodder is Rs. 200 per day	0.5 lit / hr	2 lit/hr

Applications



Thank You