
MECHANISM OF WATER DISTRIBUTION ON LEMON FARM LAND

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Abstract

Pump is mechanical device to increase the pressure energy of a fluid. Generally pumps are used to lift the water from low level to high level. These are of two types, namely reciprocating pumps and centrifugal pumps. On centrifugal pumps the centrifugal force or variation of pressure due to rotation is responsible for their operation or working.

The program of community services as implementation of sciences and technology intended to introduced and give skill training about water supply units to the community at Desa Sempa jaya ,Kabupaten Deli-Karo. In this area the people have a problem about availability of water for agriculture, when mountain Sinabung gets eruption the leave of plantation are covered with dust and damaged to citrus plants, in dry season orange plants lack of water even though the success of the harvest is very dependent on water.

The program was carried out by designing, fabricating and erecting the unit of water supply, consist of deepwell pump, piping system, valve, tee, bent, tower tank and panel control.

The result of this community services showed that the capacity of pumps are 6 liter/menit, head are 50-70 meter, power 2 HP, speed 1500 rpm. capacity of tower tank 5400 liter, the pump may supply the water to tower tank until full about 2 hours, and the farmer may use the water from the tower tank by gravitation about 3 days.

Keywords : deepwell pumps, piping, tower tank, valve, elbow, tee.

1. INTRODUCTION

Analyse the situation

Farmer groups are the vanguard for increasing agricultural productivity so it needs to be maintained and developed, Farmer groups may strengthen the bargaining position to other institution such as institution of agriculture and institution of marketing (Mulyadi, 2001). Integration method should be carried out also more efficient if managed by groups. Next Farmer groups have to developed as the basis for counseling development for other farming communities. Desa Sempa Jaya (lihat gambar

1.1) is one village at kabupaten Karo, the distance about 75 km from Medan city, has a fairly extensive agriculture area with a population of 2500 people. This village has moderate climate with minimum temperature about 20-28 °C. Average annual rainfall are 1.936,3 mm, in general the most rainfall in September, October, November and Desember (BPS Sumatera Utara, 2015). apart from these months there is a dry season which threatens the availability of water for farmers until the orange plants lack of water, the plants become stunted until they failed to harvest. Karo soil topography is hilly and the water source is in steep slopes far from the farmers land, so far the

Figure 1.1 : The science and technology applied to the farming community.

Pump Engine :

3.0 m/det. (TR.Bangga.2009).

These are called centrifugal pumps because the centrifugal force or variation of pressure due to rotation is responsible for their operation or working, and height d of the water has some parameters such as, capacities, and speed, the empiric results shows above parameters will affect pump performances. Where head $(h) = \mu^2/2g$ (TR.Bangga 2009). and μ velocity of slip at radii (r) pompa.

Component parts :

1. Impeller : The function of impeller is to force the water into a rotating motion and shroud around the impeller is to direct the water through the impeller.
2. Casing : is provide for housing the impeller and supporting the bearing provided for the shaft carrying the impeller..
3. Suction Pipe: It is a pipe, whose upper end is connected with the pump on suction side and lower end is submerged in the source of water, the velocity of water in the suction pipe should be between 1.5 sd

4. Delivery pipa : Lower end of this pipe is connected to the outlet of the pump and takes the water upto the required head and then delivers it ,the velocity of water in the delivery is kept equal or slightly higher than velocity in suction pipe. (TR.Bangga.2009).

Net Positive Suction Head (NPSH) :

The term NPSH is very common in the pump industry. It is defined as the gauge reading in meters of water taken on the suction side of the pump at the center line minus gauge vapour pressure in meters of water at the pumping temperature plus velocity head at that points.

Static Lift $(h) = (h_s + h_d)$, and

Suction head of a pump $= h_s + h_{fs} + V_2^2/2g$.

The program of community services mono year used deep well pump with power 2 HP speed 5600rpm (figure1.2.) .

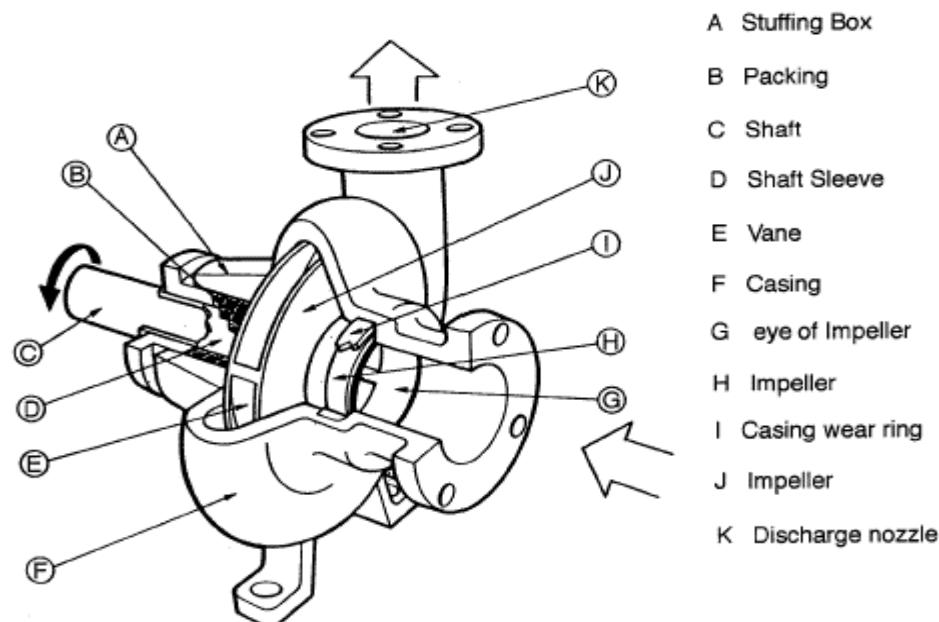
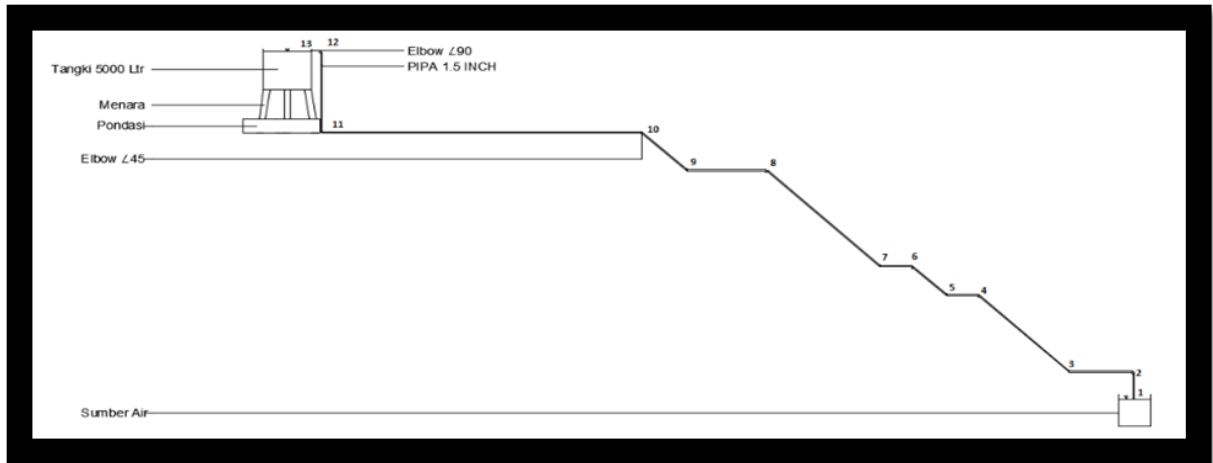


Figure 1.2: Design and pump engine parts.



Mechanization water distribution, piping system, fabrication of tower tank, serves to increase water from the source of water which is located in the valley of the lemon garden and 70 degree land slope. Submersible pump put into the source of the water works and lift water through pipes and valves to tower tank located at uppest. The components of this system as follow:

to water lemon plants

7. electrical Instalations of submersible pump.

2. Problem Solving Method

Base on the above matters,a solution is made to overcome the problems faced by partners through the literature study,machine manufacturing,surveys,tower tank,piping system, training and maintenance. In general solution may describes as follow :

a. Procurement of Equipment

Procurement of equipment such as submersible pump and piping may help the farmers to solve their problems about lack of water on the lemon plants.

b. Workshop and tutorial

c. Demonstration

The extension activities is very important to do as part of transferring technology to partner

including operation of the engine and how to maintenance the units.

d. Tutorial and Practice

20 farmers at Sempa Jaya village are participated in tutorial and practice held by LPPM USU, three times class about two hours for five weeks. Every one has to be active to follow the rule of waorkshop about theoretical and practical. Every one may talk about their

experiences about pump, piping, tower tank, and how to predict the fault of the engine. The farmers are given the complete unit of engine for provide water, next the engine can water the land of lemon garden. Participating this workshop the farmers get more understand and has skill to operate and maintenance the engine, finally the farmers will get better harvest.

3. RESULT AND DISCUSSION

1. Evaluation of Activities

The training and workshop program for operation and maintenance pump engine for farmers at Sempa Jaya village will carry out continuously, which will be held every two months at farmers land.

The outcomes, shows at table 1.1 as follow:

Table 1.1 Outcomes.

No	Problems	Results	Outcomes
1	Don't understand slightly about technology.	Participants can understand about technology.	Participants has more confident about technology.
2	Less of technical knowledge	Participants can understand about the basic of pumping system.	Participants has more confident working on technology.
3	Short training of pumping system and maintenance.	Participants can understand of basic of pump and maintenance.	Participants able to maintain the pumps.
4	Short training of tower tank system and maintenance.	Participants can understand of tower tank and its maintenance.	Participants able to fill, maintain and wash the tower tank..

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5	Mindset	Participants able to change their mindset that water the lemon plant has a standard.	Participants water the lemon plant standardly.
6	Work alone without group	Participants able to change the method of working by group.	Participants able to work by group.
7	Skill trigger dicipline	Participants able be discipline on maintain the engine	Participants able be discipline on maintain and operation the engine.

2. Supporting Factors

On community services partners agreed to help physically and thingking for develop the their business of lemon plants.

3. Obstacle Factors

1. Less knowledge of technology.
2. Less of skill about technology..
3. Short course of maintenance of pump system.
4. Mindset.
5. Work alone not in group.
6. Skill trigger the discipline

4. CONCLUSION AND RECOMMENDATION

Conclusion

After participating the workshop three times, so many mindset change of the farmers. They get more knowledges about technology in general especially pump technology and its parts, so the confidence, skill for mechanic daily produce excellence in the water distribution by using mechanism way until harvest is not depend on the nature, which is rainy season and dry season, finally, the farmers may live independently, discipline and harvest maximum. Besides that the farmers also happy to join the workshop, they may improve the knowledge of pump technology, standard for watering the lemon plant, how to operate the pump and its maintenance.

Recommendation

Good and systematically Maintenance and operation management for water distribution able to operate the pump optimal, the suggestion for the group of may perform as follows:

1. Operates the pump according to manual guide book.
2. The rotating parts should be lubricated regularly.
3. Tower tank should be cleaned regularly by drain the water every three months, and supply the raw water again.

4. Pipes line has to control regularly, if there is a leakage fix it as soon possible.

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