Grenze International Journal of Engineering and Technology, Special issue

Automated Jaggery Making Machine

K.Jawahar[1], M.Balaji[2], B.K.Nareshkumar[3], B.Dinakaran[4] and B.Dineshkumar[5]
[1]Assistant Professor, Electrical and Electronics Engineering, , Kongunadu College of Engineering and Technology, Trichy
kjawaharme@gmail.com
[2-5]Electrical and Electronics Engineering, Kongunadu College of Engineering and Technology, Trichy
nareshkumar9788@gmail.com, balajiyuvan9710@gmail.com

***Abstract*—Specially dedicated machineries are used for crushing out sugar from its raw materials. Since large machineries only used for the sugar making process which are bulky and are not easy to carry. An 'Automated Jaggery Making Machine' is compact in size and are much easier to carry. This system is automated by the Programmable Logic Controller. Through this device, raw material (sugarcane) can be crushed by the crusher, then induction based boiling process is been done and cooling process is carried out. This machine could replace the large sized machineries in the industries which costs so high. It gives more contributions towards agriculture to help the farmers in the sugar making process with minimum amount. It is more economical and easy to implement. This machine helps in both agricultural fields and small scale industries.**

I. INTRODUCTION

The sugar industry within the world is an important one in so far as it generally encompasses several linkages to the economical and domestic markets in which it operates. The industry is a strategic sector for employment creation throughout the region and it form an important part of agriculture and development policy and the region although there is a progressive more towards these firms. The world sugar market has in the past been highly distorted & EU markets for several least developed countries consider this paper is for important development.

An important feature of global sugar industry is that 70% of world's sugar production is consumed within the country of the origin and the rest is traded. Regional competition can serves a competitive discipline to the large firms in those small economies where markets are concentrated. Their relationship with governments, their control over investments patterns and their market power can affect the pricing and supply of sugar.

So the regional people can face various difficulties in fixing the sugar value. The importance of competition authorities' developmental policy makers to consider and share knowledge about firm behavior at a regional level, which is primary purpose of this study. Recent literature establishes the important link between growth and development and removing constraints to access economic activities and improve the market power.

In addition to that it creates a great effect on people causing diabetes, heart attack, weight gain, cellular aging etc. These are the various problems faced by using the white sugar. In our project "Automated jaggery making machine" the above problems are easily eliminated. The above machine makes the process very simple and making it a compact and reliable product.

These solutions reduce maintenance costs, improve availability and provide very less time for obtaining sugar. In addition to that, it provides a best solution for obtaining sugar naturally without any chemical processes.

Grenze ID: 01.GIJET.5.1.42

A. Stages of Jaggerymaking

Sugarcane cutting and transportation are the two steps before extracting juice from sugarcane. The steps in Jaggery making are as follows: -

Extraction of juice fromsugarcane

By using cane crusher which driven by oil engine or electric motors. About 1.5 or 2 tons ofsugarcane is required to make a single pan of Jaggery. A pan of Jaggery requirement dependsupon the quality of cane and its sucrosecontent.

Boiling of juice

Extracted juice from the sugarcane is taken for boiling, juice is boiled inopen pans. These pans are made up of iron sheets and are of 230 to 280 cms of diameter and about 50 cm deep. Generally, the baggasse is used asafuel.

Purification of juice

The juice which is heated and boiled releases out many impurities that needs to beremoved. Thus purification of juice is the main deciding factor for colour, texture, test anddurability of Jaggery.

Concentration of juice

Next step after purification of juice is concentration of juice which is boiled at thestriking point of temperature that normally ranges between 11.80^{o}c to 12.30 ^{o}c.

II. Proposed Method

In ancient days sugar making process is done with huge process and for making sugar, so many artificial Products are used and it causes health problems to human such as Obesity, Diabetes, Heart Diseases ,etc and also in sugar making process in industry it take too much of time for crushing, heating, cooling, etc and so many products are wasted. In a research the Scientist identified that the brain uses more energy than other organ in body and glucose is its source of fuel. In the brain excess sugar impairs both our cognitive skills and our self-control. It has drug like effects in the reward center of the brain even though it gives energy to our body it cause many side effects.

III. Design of Machine

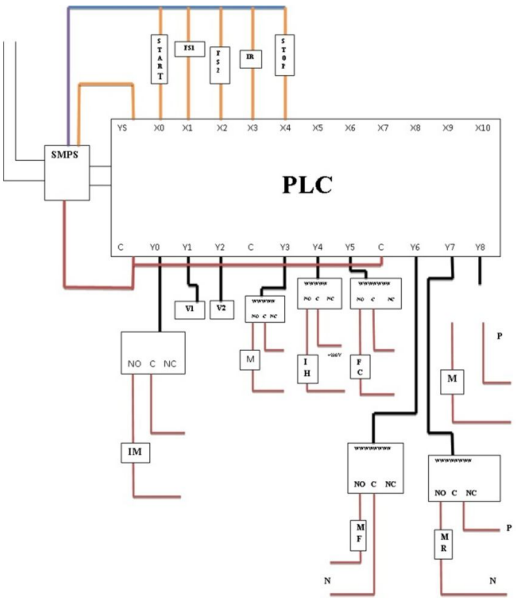

Fig. 3.1 PLC pinr diagram

STL instruction is used for designing the syntax of a sequential function chart (SFC), making the program designing similar to drawing a flow chart and allowing a more explicit and readable program. From the figure in the left hand side below, we can see very clearly the sequence to be designed, and we can convert the sequence into the step ladder diagram in the right hand side.

A. Actions of Step Ladder:

Step ladder is composed of many steps and every step controls an action in the sequence. The step ladder has to:

a) Drive the output coil

b) Designate the transition condition

c) Designate which step will take over the control from the current step

B. Timing Diagram of Step Ladder:

When the status contact Sn = On, the circuit will be activated. When Sn = Off, the circuit will be inactivated. The actions will delay for 1 scan time.

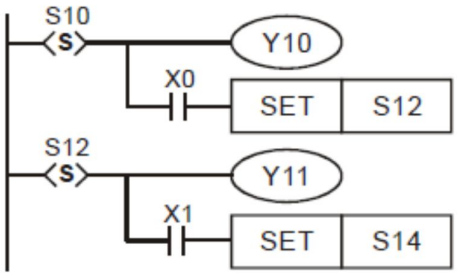

Fig. 3.2 Timing Diagram

C. Repeated Use of Output Coil:

a) You can use output coils of the same No. in different steps.

b) See the diagram in the right. There can be the same output device (Y0) among different statuses. Y0 will be On when S10 or S20 is On. Such as right diagram, there is the same output device Y0 in the different state. No matter S10 or S20 is On, Y0 will be On.

c) Y0 will be Off when S10 is transferring to S20. After S20 is On, Y0 will output again. Therefore in this case, Y0 will be On when S10 or S20 is On.

d) Normally in a ladder diagram, avoid repeated use of an output coil. The No. of output coil used by a step should also avoid being used when the step ladder diagram returns to a general ladder diagram.

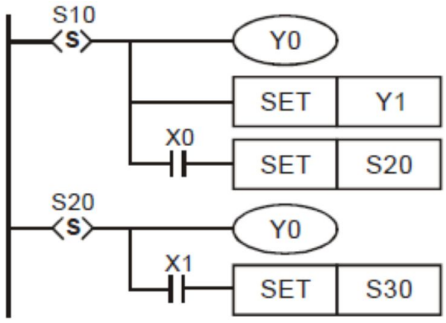

Fig. 3.3 Uses of output coil

D. Repeated Use of Timer:

The timers in EH2/SV series MPU are the same as general output points and can be repeatedly used in different steps.This is one of the features of the step ladder diagram. However, in a general ladder diagram, it is better not be repeatedly use the output coil. Also avoid using the No. of the output coil used by a step after the step ladder diagram returns to a general ladder diagram.

E. Transfer of Step

SET Sn and OUT Sn instructions are used to enable (or transfer to) another step. When the control power is shifted to another step, the status of the previous step S and the action of the output point will be cleared. Due to that there can be many step control sequences (i.e. the step ladder diagram starting with S0 ~ S9) co-existing in the program.

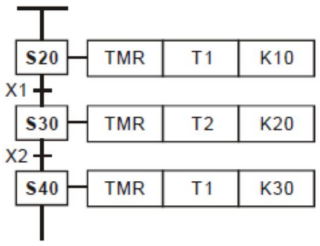

Fig. 3.4 Uses of Timer

The transfer of a step can take place in the same step sequence, or be transferred to different step sequence. Therefore, there are some slight differences regarding how to use SET Sn and OUT Sn.

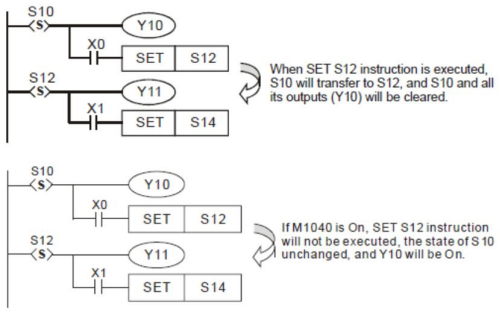

Fig. 3.5 Transformation of step

F. Cautions for Driving Output Point

After the step point and once LD or LDI instructions are written into the second line, the bus will not be able to connect directly to the output coil, and errors will occur in the compilation of the ladder diagram.

You have to correct the diagram into the diagram in the right hand side for a correct compilation.

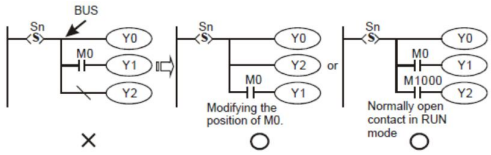

Fig. 3.6 Cautions for Driving Output Point

IV. Final Setup of Machine

Fig. 4.1 Final setup

V. Results & Conclusion

In this project an accessory is provided to conventional sugarcane feeding system. automatic sugarcane feeding system results in increasing production rate of jaggery. This process not requires labour to feed manually instead it can be automatically feed. This process works faster as compare to manual feeding. As the process is fast it saves time and money.

References

[1] Agarwal, M.L. (1976), "A research of work done on gur manufacture and storage', Westzone of the country under All India Co-Ordinated Research Project on Sugarcane, Sugar Technologists Association, India, 41st Anniversary Convocation, pp.67-71

[2] Design of Machine Elements by .B.Bhandari

[3] Design of Hydraulic Circuit by using Fluid SIM

[4] Catalogue of Polyhydron Pvt.Ltd.

[5] Chapman, F.L. and I.G. James. 1998. Investigations into a Differential Charging System for Harvesting. Proceedings of Austranlian Society of Sugar Cane Technologists.20: 43-46.

[6] Khurm, R.S. and Gupta, J.K. (2008), Machine design Update Edition, Euresia Publishing House (PVT) RAM Nager, New Delhi.