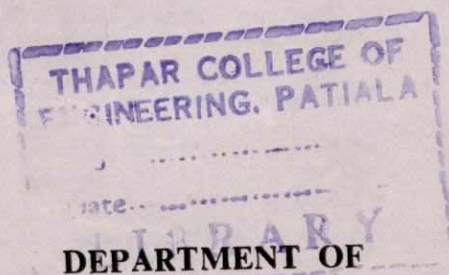


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**INDUSTRIAL TRAINING REPORT
FOR WORK TERM-I**

**CARRIED OUT AT
THE PATIALA CO-OP. SUGAR MILL LTD.,
RAKHRA**

**PREPARED BY
JASWINDER SINGH
(Roll No. 151/85)**



**MECHANICAL AND INDUSTRIAL ENGINEERING
THAPAR INSTITUTE OF ENGINEERING
AND TECHNOLOGY
(DEEMED TO BE UNIVERSITY)
PATIALA—147001**

1988

To

Mr. S.K.Satsangi,
Head,
Placement and Coordination,
Thapar Institute of Engineering & Technology,
Patiala-147001.

Dear Sir,

This report entitled "Industrial Training Report for work Term-I" was prepared as my work report for various departments of The Patiala Co-op. Sugar Mills Ltd., Rakhra.

This report has been prepared and written by me and has not received any previous academic credit at this or any other institution.

I would like to thank, Mr. A.K.Sharma (Chief Engineer) for their assistance in preparing this document.

Last, but not least I will remain debted to my Institution which has given me an opportunity to work with industry.

Yours sincerely,

Jhan
(JASWINDER SINGH)
Roll No.151/85

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My sincere thanks to Mr. Harkamaljeet Singh, Deputy Chief Engineer, Mr. Amrik Singh, Deputy Chief Chemist for their encouraging advice and hospitality.

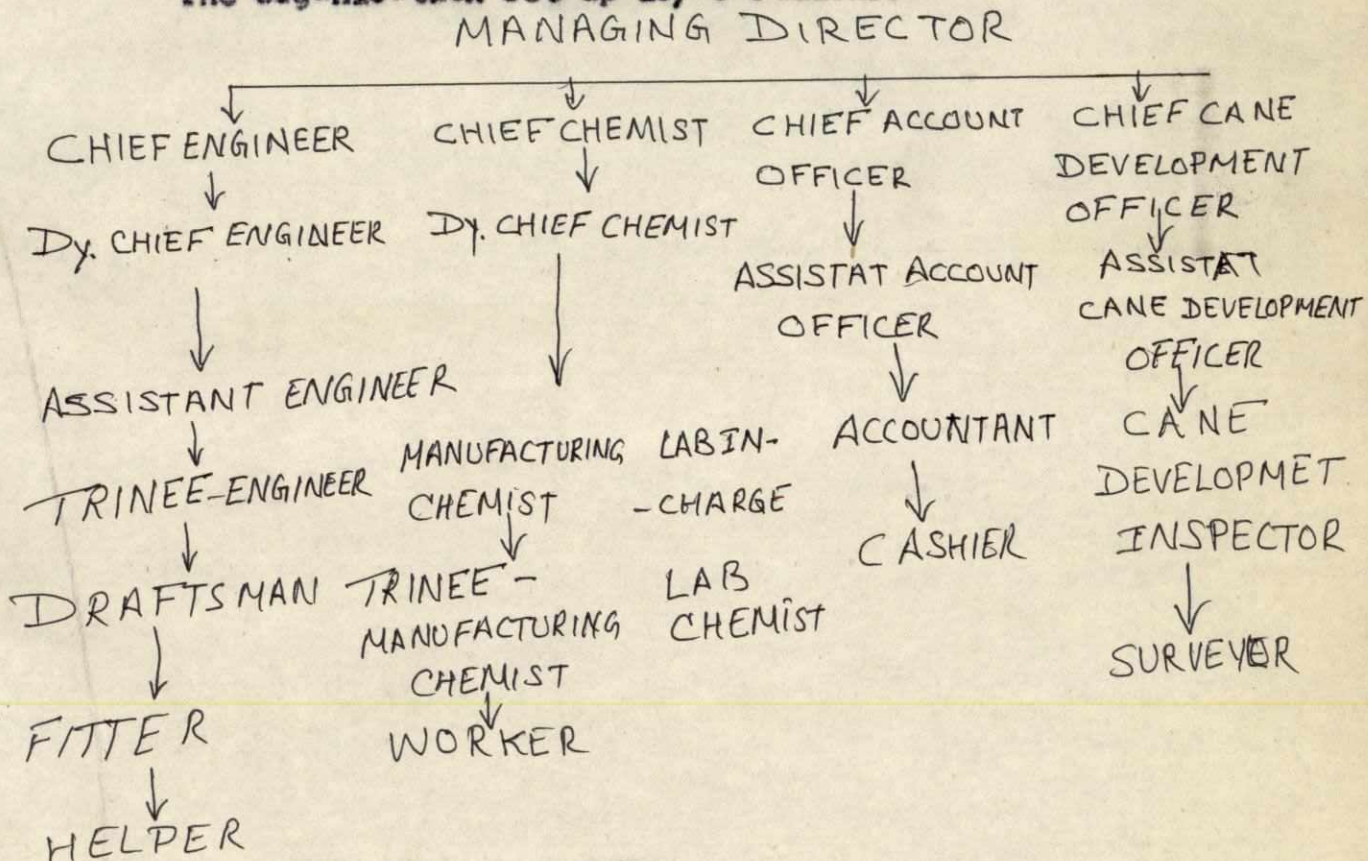
My special thanks to Mr. S.C.Kanwar, Electrical Engineer, Mr. D.C.Shrivatave, Mechanical Engineer, Mr. I.P.S.Bhatia, Manufacturing Chemist for providing technical and other help in all matters concerned with my Work Term-I.

I also have a hearty thanks to all trainee engineers and trainee manufacturing chemists for giving me a good company during the factory hours and off the factory hours.

Jas
JASWINDER SINGH

ORGANISATION SET UP

This factory is the unit of State Corporation. Its head office located in Chandigarh. The factory management is divided into four main sections. General Section, Engineering Section, Manufacturing Section, Cane Section. Head of these sections have the powers to control the staff working under them. The Managing Director is the supreme authority over all the sections. The organisation set up is/as follows:-



INTRODUCTION

The Patiala Co-op Sugar Mills Ltd., Rakhra is near the Village Rakhra on Patiala-Nabha Road. It is 15 km. away from Patiala towards Nabha. One Railway Station at a distance of 4 km. is there. It was inaugurated by Chief Minister, Mr. Surjit Singh Barnala.

The factory installed for a capacity of 1250 tones crushing, of cane per day i.e. it can make minimum 1250 qtls of sugar per day. The estimate cost of the project is Rs. 12 crores. There is one medical dispensary for first aids. Factory has a area of 62 acres and the area for employee's colony is 49660m².

The area of operation for the factory is 16 km., which is allotted to the sugar factory by the Cane Commissioner through a reservation order.

The Cane Development is done by the Inspectors, Supervisors and other staff by going to their areas and see the difficulties of the farmers, and tell them about the new varieties of cane procedure for their cultivation, utilisation and fertilizers, irrigation times and other method by which they may go in position to get more yield.

The cane is supplied at the mill gate by carts and trollies, the cane is transported to the factory from out centres, is by means of trucks.

BOND

SAVING

INTRODUCTION THROUGH VARIOUS HOUSES.

BOND

SAVING

Factory is divided into different houses, which are as follows:

- 1. Mill House
- 2. Boiler House
- 3. Power House
- 4. Clarification House
- 5. Boiling House
- 6. Dries House.

1. Mill House.

The sugar contents of cane is dissolved in juice contained in millions of plant cells each one of which must be ruptured for the juice to be expressed. This process in recent development is done in practice by a set of revolving cane knives and levellers which cut the cane into fine pieces followed by pressing and squeezing by multiple mills.

It consists of following items.

- i) Kicker.
- ii) Leveler Knives
- iii) Cutter Knives
- iv) Cane Carrier
- v) Mills.
- vi) Strainer
- vii)

1) Kicker:-

The Kicker comprises of a set of Knives which level the layer of whole cane into uniform thickness to feed the cutter. Knives in order to eliminate their choking and promote smooth performance.

ii) Leveller Knives:-

The leveller comprises of a set of Knives which cut the whole cane into small pieces and even out the layer of cut cane. They are worked with high clearance normally about 4" to 10" from the carrier slats and in consequence leave a large portion of uncut cane. The pitch between the two adjacent knife blades in case of levellers very often is kept three inches apart.

iii) Cutter Knives.

The cane cutter comprises knives of similar design as those of levellers from operational point of view. They completely cut the cane into fine pieces and they work well with a small clearance of about 1" or 1½" from the carrier slats. The pitch between the two sets of knives in the case of a cutter is very often kept two inches apart.

iv) Cane Carrier

The cane carrier is constructed of mild steel framing with two endless chains of the roller type.

usually of about six inch pitch carrying overlapping steel slats to prevent chips of cane falling through. The carrier is driven by an independent electric motor, and its maximum speed is usually about ten percent more than the peripheral speed of the mill, which it feeds.

The carrier is divided into three portions:

- a) The horizontal portion.
- b) The inclined portion.
- c) The head, where the cane arrives above the mills.

The slope of the carrier is important and it should not exceed 16-18°, otherwise the cane would have the tendency to slip and the conveyor would move forward without picking it up.

†) Mills

There is four 3 roller mills. These roller are toproller, feed roller and discharge roller. The different grooving is done in these roller. In the recent practice, a wider angle of 55-60° is generally employed on the top rollers and 52-58° on the discharge rollers. The depth is generally taken 0.8 of the pitch. Messchaert grove are made in the feed rollers. These grooves are deep circumferential grooves spaced about 4" apart. The width of the messchaert grooves is generally 1/2" - 3/16". The depth of these grooves should not be deeper than 1 1/4", which would otherwise make the roller weak.

7.

vi) Strainer:

The juice extracted by the mills is passed through a metal strainer to remove suspended impurities . The operation is carried out near the mill as placed over the mills, so that the strained substance consisting of cush-cush, is readily returned to the intermediate carrier for subsequent extraction of the juice.

BOILER HOUSE

To run the steam turbine, steam required at specific temperature and pressure (340°C and 21 Kg/cm^2). For continue supply of the steam, factory has two boilers of capacity 20 tonne per hour each. These boilers are water bend tube boilers and fuel used in these boilers is Bagasse which is a by-product of the sugar cane. Boiler house supplies steam to the mill house, to run the mill turbine. Steam is also supplied to the boiling house for boiling of the juice.

BAGASSE ELEVATOR:

Bagasse leaving the last mill should be elevated for distribution it to the boiler furnances. It is picked up by a bagasse elevator, which drops it into a horizontal conveyer, this distributes it along the length of the boiler station to the furnances. The conveyers are of scraper type. They are generally driven at a speed equal to two or three times the peripheral speed of the last mill.

Capacity = 40 tone/hr.

Angle of slope = 45°

Speed of carrier = 12-35 m/min.

BOILERS:

There are two high pressure water bend tube boiler of texnaco make.

Capacity
pressure
Rated steam/ & Temp.

20 Tone/hr.
= 21 Kg/cm^2 & $340-350^{\circ}\text{C}$

Hydrolic Test pressure

=31.5 Kg/cm²

Heating surface area

=687 m² (7500ft²)

HORSE SHOE FURNANCE:

The bagasse falls directly from the feed chute into the furnace which takes the form of a tank in the shape of a horseshoe, and forms a conical heap. By means of tuyeres placed all around the horseshoe, and more numerous near the bottom, air, which may be cold but is preferably preheated, which burns away and collapses on itself. The ashes accumulate at the bottom of the furnace.

POWER PLANT:

The Electrical power required for 24 hours in the sugar mill of capacity 1250 TCD is about 1400 KW. It cannot be taken from P.S.E.B. because supply may be irregular and it will be very costly. So a thermal power plant installed in the sugar mills. It consist of a steam power turbine, Alternator and Diesel Generating sets. The steam turbine can produce 1500 KW electrical power. The steam turbine run with the steam produced ^{by} high pressure, texmaco made, water bend tube boilers. First the steam energy is converted into mechanical energy with steam turbine then this mechanical energy is converted into an electrical energy with the help of an alnerator.

Factory has two Diesel Generating sets. These are run when the load of the factory, during running season ^{is} gets increased and P.S.E.B. supply is also not available.

SPECIFICATIONS OF THE TURBINE.

No. of power Turbine	= 1 (one)
Capacity 1500 KW	1500 KW
Make Triveni	Triveni
Type	Multistage impulse Turbine.
Stage	Three stage.
Steam inlet pressure	18 to 21 Kg/cm ²
Steam out let pressure	0.95 Kg/cm ²

SPECIFICATIONS OF THE AN ALTERNATOR

No of Alternators	One
Capacity	1800 KVA
Voltage	440
Current	2470

SPECIFICATIONS OF THE DIESEL GENERATING SET.

No	Two
Make	Kirloskar
Name	AC Generator.
Specific Capacity	160 KW/ 222 hp.current

4. CLARIFICATION HOUSE:

The cane juice comes from mills contains many soluble and insoluble impurities. It is turbid and viscous in nature, and is not fit to be worked up for white sugar without suitable chemical treatment of it. After chemical treatment and clarification the clear juice is taken for manufacturing white sugar. It consists of following items.

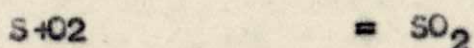
- i) Juice heater.
- ii) Juice Sulphiter.
- iii) Sulphur Furnance.
- iv) Line Slacker
- v) Clarifier.
- vi) Vacuum filter.
- vii) Filter press.

i) Juice heater:

There are two designs of juice heaters, the horizontal and verticle one. The verticle juice heaters are preferred because they occupy less space and provide better facilities for cleaning.

Juice heaters are usually provided with exhaust steam from turbines at 5 to 10 lb/in², and also in certain cases with vapour drawn from the multieffect evaporator, in which cases a larger heating surface must necessarily be provided. If the heaters is to work on vapour from the multieffect evaporator, the general practice is to make a incondensable

The reaction taking place at a temp of 363°C is as under:-



Furnance is composed of trays in the form of drawers in suitable guides. On the lower tray, by which the combustion air enters, is placed the quicklime. The air then passes to the upper plate, on which is spread the sulphur. Baffles deflect the air and force it to pass in contact with the quicklime and the sulphur. In the absence of these baffles the output of the furnance would fall by half.

At the outlet of the sulphur compartment, the gas, which now contains 12-16% of SO_2 , rises to the aspirator of the sulphitation apparatus, by way of a sublimation chamber and a jacketed water cooled flue. The water which has served to cool this flue then passes over the furnance which it cools in turn. The tray area for a sulphur furnance is provided for the capacity of 4-5 lb sulphur/Sq.ft./hr. Compressed air used is estimated to 100 cu.ft (assumed at 0°C and 760 mm pressure).

iv) Rotary Lime Slacker:

It is a revolving drum with interior baffle-plates serves to intimately mix quicklime and water. The drum is carried on flanged rollers and is revolved by means of an encircling sprocket and chain.

Fresh lime is charged in the rotary slacker through the inlethead and just sufficient quantity of hot water is added to the charged lime as needed for the smooth carry forward of the slacker contents to the discharge side. The milk of lime is discharged at the other end. The unslacked pieces of lime stones or grit are lifted by a mechanism and discharged outside.

Lime Storage Tank:-

The lime storage tank is a cylindrical tank in which the vertical axis is provided with a rake of hanging chains which revolve round and round and while rubbing against the bottom of the tank prevent any lime accumulating there.

Clarifiers:-

The 'Rapidorr' actually consists of two separate clarifiers one above the other, each consisting of an upper compartment and a lower compartment in which the mud accumulates. These two compartments are connected by a wide sleeve of diameter equal to one-third that of the tank. The muds which settle in the upper compartment thus descend through it into the lower compartment and collect there in a sump of same dimensions as the sleeve connecting the two compartments, and with a conical bottom, from which they are extracted by a diaphragm pump. The four compartment are fed by the central hollow shaft which opens by a large notch into each of the two sleeves, thus feeding at a position between the two

compartments in each case. This central hollow shaft, rotating very slowly, carries scrapers of sheet metal which slowly brush the bottom of each compartment.

The clarified juice is withdrawn from the upper region of each of the four compartments by pipe leading from the top corner of the compartment and arranged so that the juice overflows the end of the pipe into the juice box.

The muds withdraw by gravity as for the juice. The pipes are arranged in this way but, as the muds are often very thick, the method preferred is to move them by means of a diaphragm pump of short and adjustable stroke. From the mud box, the muds normally go by gravity to the filtration process.

Vii) Vacuum Filter:-

The filter is composed of a hollow drum rotating about a horizontal axis and partly submerged in the liquid to be filtered. The periphery of the drum serves as filtering surface, it is divided into 24 independent sections, each occupying 15° on the circumference and extending along the full length of the drum. Each of these sections is connected insidiously to a vacuum system by a small metal pipe terminating in a distributing valve situated at one end of the drum and carrying three different sectors.

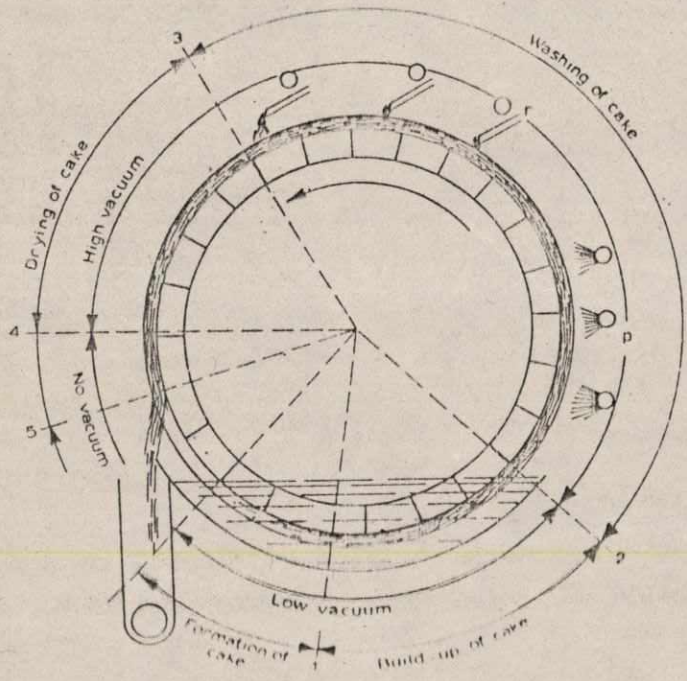


Fig. 32.6. Diagrammatic operation of a continuous rotary vacuum filter.



- (a) One without connection to the vacuum, but connected to atmosphere.
- (b) The second communicating with a chamber where a low vacuum of the order 10-15 in. of mercury is maintained.
- (c) The third connecting to a chamber where a high vacuum is maintained of the order of 15-20 inch. of mercury.

The exterior surface of the drum consists of a sheet of copper or stainless steel with very fine perforations, covering the 24 sections.

(vii) Filter Press:-

A filter press consists of a series of plates separated by frames of thickness, separated and movable, which slide on two supporting bars and can be held firmly against each other by means of a screw device.

When pressure has been applied and the filter is 'close up' the openings a and b, situated in the lugs of the plates and frames, form a continuous passage. The juice to be filtered enters by the passages a. Between each plate and the adjacent frame is interposed a filter cloth. The juice passes into the frame, transverses the cloth and leaves by the passage c, after leaving

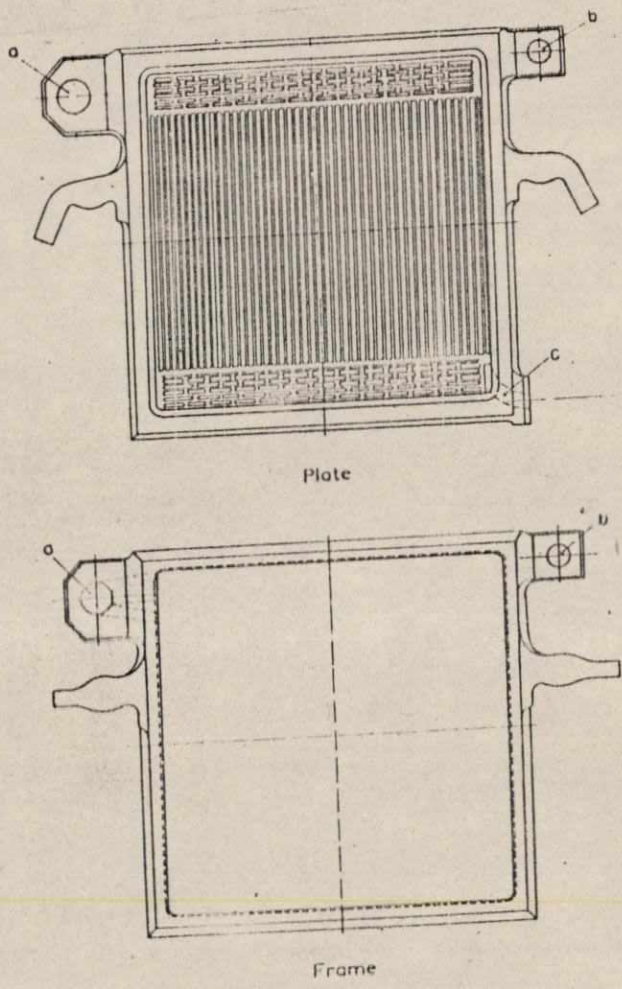


Fig. 32.2. Plate and frame of filter press.

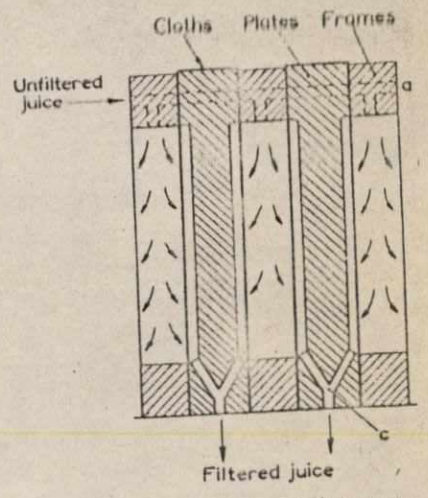


Fig. 32.3. Operation of filter press.

behind on the cloth, in the interior of the frame, the suspended matter which it contained. The solid mass formed by this suspended matter, when all the available space has been filled, is called the filter cake.

Boiling House:-

The concentration of the clarified juice is effected in two stages both regard to saving of steam and to efficiency in working. In the first stage clarified juice of about 15 brix is concentrated to syrup of about 60 brix, this is done in multieffect evaporator and is a contineous process, and this operation is called evaporation. In second stage the thick syrup is further concentrated almost to a solid mass or masseculite of 93 to 100 brix and this is done in vacuum pan and is an intemittent process. This operation is called boiling to grains.

It consists of following items.

- i) Evaporators:-
- ii) Syrup sulphiter:-
- iii) Vacuum Pans
- iv) Crystallizer
- v) Centrifugal machines

1) Evaporators:-

The standarder multieffect evaporator consists of a verticle cylinder, built on to the tubular calandrice excress which the heat exchange takes place. The calandria consists of no. of brass tubes.

The cylindrical body terminates at the top in a 'save-all', the object of which is to separate the liquid droplets which may be entrained with the vapour from the juice. The body of evaporator is made of steel plates.

Evaporator has three important principles.

First Principle:-

It states that in a multiple effect evaporator, each pound of steam supplied to the first body will evaporate one pound of water in each body in series. With 'N' effects one pound of steam evaporates n pounds of water.

Second Principle:-

The second principle deals with the practice of vapour bleeding. It states that if a weight of vapour 'W' is bled from effect 'M' of 'N' effects and used in place of steam for a given duty the saving in steam is equal to.

$$\frac{M}{N} \times W$$

For example, if bleeding is done from the first body of the quadruple set, the saving is $\frac{1}{4}$ th the weight of the vapour used.

Third Principle:-

In any apparatus in which steam or vapour is condensed, it is necessary to withdraw continuously the noncondensable gas which is unavoidably left in the heating surface compartment.

ii) Syrup Sulphiter:-

The sulphitation syrups are bleached by the action of sulphur dioxide in the syrup sulphiting tank. There is a one tank of height 300 cm dia 100 cm, having syrup inlet dia 1 cm, and retention time 18 minutes, working capacity 5.18 cu.mt., dia of SO₂ gas pipe 4". The total capacity of the vessel is 11.02 cu.mt.

iii) Vacuum Pans:-

The conception of the vacuum pans is entirely analogous to that of an evaporator body, However, two modes of heating are employed.

- (a) Coils
- (b) Calandria.

In colandria pans, the tubes are shorter and of large diameter than in evaporators. In the pan massequite rises past the heating surface through the tubes of the calandria. There must obviously an equal descending mass corresponding to this ascending massequite. With the liquid and mobile material in the multieffects, this poses no problem. With thick and viscous massequite, the manner in which this circulation is planned and successfully effected forms the most important characteristic of a vacuum pan.

iv) Crystallizer:-

The ordinary crystallizer is a simple steel vessel, of U-shaped cross-section, fitted with an agitator permitting it to maintain the mass in slow and contineous motion.

It has two functions,:-

- 1) It acts as a storage tank for the massequite discharged from the vacuum pan.

ii) It accerterate the growth of crystal that are already formed in the vacuum pans by slowly stirring and cooling of the massecuite.

There are three types of crystalizers.

- i) Air colled crystalizers
- ii) water colled crystalizers
- iii) Vacuum crystalizers.

The air colled and water colled crystalizers are of open type. These both crystalizers are generally of U-shaped design and the vacuum crystalizers are roundin shape.

V) Centifugal machine:-

A centifugal machine is essentially a vertical cylindrical perforated metal drum or basket rigidly attached to the lower end of the spindle by a hub and arm piece. The vertical spindle is suspended from an overhead support resting in a conical-rubber buffer and rotates in heavy base or roller bearing which permits the basket and the spindle to revolve within certain limits and when unevenly loaded allows it to be self balanced, thus reducing vibration and power requirement to a minimum. The basket and the spindle revolve at very high speed by suitable means within a stationary outer casing called the 'curb' which serves to catch the molasses and diverts it to the gutter

leading to a tank from which it is pumped either back to the process for further exhaustion or outside the factory as final molasses.

6) Driver house:-

The sugar leaving the centrifugals is hot at 60-70°C and moist at 0.5-1.5% moisture, and as such it cannot be bagged for sale.

Drying of sugar is done in centrifugals by means of superheated steam, and colling is done in hopper conveyors.

It consists of following items:-

- i) Grass hopper conveyor
- ii) Sugar elevator
- iii) Sugar grader

Grass hopper conveyor

It consists of a suspended trough made of galvanized sheet iron, supported on flexible inclined ^{iron} blades. The eccentric imparts a shaking motion to the trough with the help of a connecting rod. The connecting rod is made of wood with metallic crankpin head reciprocating at about 300-330 rpm.

Sugar Elevator:-

The sugar elevator is used for lifting the sugar to higher level. It consists of a number of buckets attached

to an endless detachable chain. In this generally two chains are preferred so that the buckets can be bolted between the chain links at the places where the buckets are attached. The drive is always given at the top end of the elevator. The casing of elevator is made of sheet iron.

SUGAR GRADER

The sugar so obtained consists of a mixture of heterogeneous crystals and needs to be well-sieved and graded before it is marketed. The sieving is done through sifters which is of Magnetic or vibrating type. Magnetic or vibrating type shifter.

This gives more efficient grading even when large quantities are being dealt with. The vibrating movement reduces choking of screens and works for a longer period without cleaning. Screens of various mesh size are fixed in frames and arranged one over the other in order to facilitate grading of sugars. The frames are vibrated at a very high speed by means of an eccentric having a small throw 0.5-1.0 inch and are belt driven by a motor. The mechanism is placed under the dust-tight casing leaving the upper part of the box free for access to the screen. Maximum vibrations take place at the upper end of the screen where the material is thickest.

QUALITY
BOND

FLOW PROCESS OF JUICE FOR MAKING
SUGAR.

QUALITY
BOND

FLOW PROCESS OF JUICE FOR MAKING SUGAR

Juice is extracted from the cane by cutting it with knives of leveller, cutter and then passing it through the mills. This raw juice after weightment is taken into vapour line juice heater, where its temperature is ^{raised} from 35° to 45° to raise the temperature of raw juice to 70°C, it is taken into raw juice heater. Then the juice is sulphited in the juice sulphiter, where it is mixed with SO₂ gas and milk of lime. In juice sulphiter P^H of the juice is maintained to 7.0, after this, juice is again heated, in sulphited juice heater, to a temperature of 105°C. Then this sulphited juice is taken into the clarifier where mud settled down at the bottom. This mud is filtered in the vacuum filter or some times in the filter presses. The filtrate is taken into the raw juice receiving tank and mud cakes are sold to the farmers for irrigation purposes.

Clear juice of P^H 6.9 to 7.2, which is in the upper portion of the Dorr, is again taken into clear juice heater, where its temperature is raised to 105°C and this clear juice is taken into first quad. body, where boiling of it is done by the exhaust steam at a pressure of 5 to 6 lb/in² and temperature of 120°C is used. The boiling of juice is done in four successive bodies. Three of them are worked under vacuum and the vapours, those come from first body, are used for boiling of the juice. From the last body concentrated of bris 55 to 60° is taken into syrup sulphiter. It is mixed with

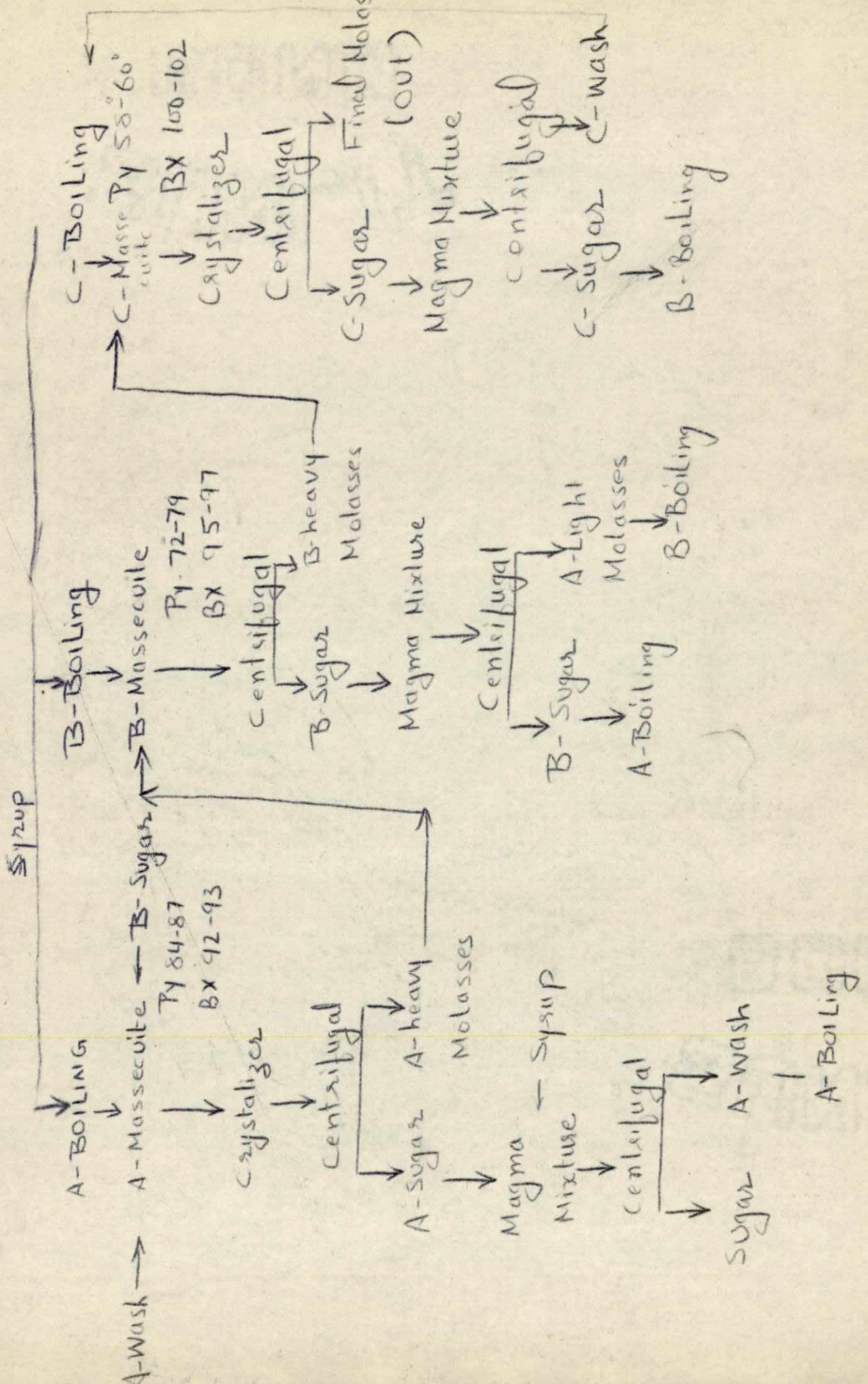
SO₂ gas in syrup sulphitation tank where its P^H value reduced to 5.4-5.6. The sulphited syrup is then pumped to storage tanks. This syrup is taken into crystal form by boiling it in vacuum pan which is a single effect. The crystallized form of syrup is known as massecuite. It is known as A-massecuite, because boiling of syrup is done in Pan A.

A-massecuite of purity 72-74% is taken into air cooled crystallizers. Then it is taken into centrifugal machines. In the centrifugal machine the sugar crystals are separated out from the molasses. Here the separated molasses is known as A-heavy molasses and remaining portion of the massecuite in the centrifugal machines is known as magma. This magma is taken into magma mixture where it is mixed with syrup and then it is taken into semisolid state. This magma is pumped to second batch type centrifugal machine which separates molasses, known as A-light molasses of purity 80-85% and remaining portion in the machine is the final product i.e. sugar. It is then taken into the grass hopper so that it can be cooled. This cooled sugar is taken into grader through the sugar elevator where after grading it is bagged.

B-massecuite of purity 72-74% is made by boiling the double cured C-sugar seed and A-heavy molasses in the vacuum pan-B. The massecuite is taken into the crystallizers. Then it is taken into the continuous centrifugal machine.

From this B-heavy molasses is taken into the molasses tank and magma is taken into the magma mixture where it is mixed with syrup and again pumped to continuous centrifugal. It gives B-light molasses and double cured B-sugar which is taken into melter and then taken into the pan A for boiling.

C-masseccuite is made by boiling B-heavy molasses, some times A heavy molasses, and C-wash. The masseccuite is taken into the water cooled crystallizers and then to the continuous centrifugal machine, which separates the final molasses and single cured C-sugar. Final molasses is taken into the molasses storage tank after weightment and C-sugar is taken into the magma mixture where it is mixed with water or C-wash. It is then pumped to continuous centrifugal machine where C-sugar and C-wash are pumped formed. C-sugar is taken into the melter from where it can be taken into the pan^A or Pan B for boiling. And C wash is taken into the pan^C boiling.



PROJECT

LESS DISCHARGE OF EFFULENT AND TO REDUCE
ELECTRICAL CONSERVATION OF POWER CONSUMPTION

Object:

Less discharge of effluent and to reduce electrical conservation of power consumption.

Introduction:

In the factory they have overhead cold water tanks, from these water tanks they take water for factory purposes and also for colony purposes. In the factory much more water is recirculated so that the wastage of water can be reduced and with that effluent of water can be decreased. In spite of this there are lot of places from where there is continuous wastage of water. From some places we can recirculate the water by making some alternate but from some places we couldn't stop the wastage of water. The reason for this is that the water is not pure and so we cannot recirculate it. This waste water passes through the drainage line. Then this waste water is purified by the effluent treatment plant then this purified water is used for the irrigation purposes.

Present Method:

In the factory there are eight condensate pumps. Because of high temperature of the condensate water, the gland packing becomes hotter due to this the bush of the pump can melt so this can damage the pump. To reduce the temperature of the gland packing or to cool the gland packing we use cold water. After cooling the gland water goes into the drain as an effluent.

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Proposed and implimented method:

This wastage of water can be prevented by making a common header, ~~so~~ so that waste water can be put in this header. With this the waste water can be recirculated and the problem of excess effluent water can be reduced. Also if there will be a common header for waste water then we can open the valve of pipe fully to keep the outlet water cooled which we are not doing at present.

At present we open the valve merely to cool the gland and get the out let water hot because the water goes into the drains. As specified above if the valve will be opened fully then there will become self cooling of water. Then this water we can take in the cold service water tank, from where we can use it again for its recirculation.

Calculations:

Water used for gland cooling at the rate of 1 litre/
15 sec.

Wastage of water from one condensate pump
= 240 litre/hr.

Wastage of water from eight condensate pumps
= 240 x 8 = 1920 litre/hr.

Water pump capacity = 35000 gallon/hr.
to pump the water
from ground.

= 159110 litre/hr.

Hrs save for water pump = $\frac{\text{Wastage water}}{\text{Pump capacity}}$

$$= \frac{1920}{159110} = 0.0120671$$

Power of the motor which is used for the pump. = 30 KW

Power saved per day = $0.0120671 \times 30 \times 24 = 8.69$ Kwhr

Cost of 1 Kwhr = Rs. 1.

Saving Rs. 8.69/day

Water Treatment Plant:

Capacity of water treatment plant = $50 \text{ m}^3/\text{day}$

= 50,000 litre/day

Power of the motor used in water treatment plant = 25 KW

Wastage of water = 1920 litre/hr. = 46080 litre/day

Total day saved for water treatment plant = $\frac{46080}{50000} = 0.9216$

Power consumed per day = $25 \times 24 = 600$ Kwhr.

Power saved per day = $0.9216 \times 600 = 552.96$ Kwhr.

Cost of each Kwhr = Rs. 1.

Saving from water treatment plant = Rs. 552.96/day

Total saving per day = Rs. (552.96 + 8.69)

$$= \text{Rs. } 561.85$$

To adopt the method of recirculation we required:

1. Pipe of diameter 4" and length 100 mts.
 - Rate of pipe Rs. 170/meter
 Therefore cost of pipe is Rs. 17,000
2. Pipe fitting cost Rs. 3000.

PROJECT

**Time study of centrifugal machine for
Single curing & to compare its Economic
with double curing -**

OBJECT:

Time study of centrifugal machines for single curing instead of double curing.

DOUBLE CURING:

Two sets of centrifugal machines are required in double curing of the massecuite. In the first set of machines called the 'foreworkers' - the massecuite is spun dry without washing. This massecuite is discharge into mixture called the magma mixture where the purged sugar is mixed with syrup, thus forming a magma of higher purity. The magma sugar is again cured in the second set of centrifugals called the 'afterworkers'. After that the final product sugar can be obtained.

SINGLE CURING:

In single curing only a single set of centrifugal machine will be used. First in this, massecuite will be spun dry without the 'steaming'. In single curing massecuite will not be discharged into the ^{mixture.} ~~mixer~~. But at the same speed of the basket i.e. at 960 rpm, massecuite will be spun with the washing and steaming and the gate of gutter for molasses will change its position in the A-Light molasses tank. And thus the final product i.e. sugar can be obtained only from single set of centrifugal machine.


**TIME REQUIRED FOR EACH OPERATION IN PRESENT
METHOD OF DOUBLE CURING**

<u>OPERATION</u>	<u>TIMER</u>	<u>RPM</u>	<u>TIME IN SEC.</u>
3	Z ₁	480(acc ⁿ)	20
5	Z ₂	960(acc ⁿ)	90
7	Z ₃	480(ret.)	20
8	Z ₄	200(ret)	20
6	Z ₅	Syrup Separation	25
3	Z ₆	Chute Operation	10
3	Z ₇	Water Wash	15
4	Z ₁₀	Water Wash Duration	15
1	Z ₁₁	Water Spray (Basket Wash)	15
2	Z ₁₂	Charging duration	10
9	Z ₁₃	Breaking duration	10
3	Z ₁₄	Chute Wash	5

Total Cycle Time for double curing = 175 Sec.

**TIME REQUIRED FOR EACH OPERATION IN
SINGLE CURING**

<u>OPERATION</u>	<u>TIMER</u>	<u>RPM</u>	<u>TIME IN SEC.</u>
3	Z ₁	480(acc ⁿ)	20
5	Z ₂	960(acc ⁿ)	120
8	Z ₃	480(ret)	20
9	Z ₄	200(ret)	20
6	Z ₅	Syrup Separation	25
3	Z ₆	Chute operation	10
3	Z ₇	water wash	15
4	Z ₁₀	water wash duration	15
1	Z ₁₁	water spray	15
5	Z ₈	water wash	15
7	Z ₉	water wash duration	15
2	Z ₁₂	Charging duration	10
10	Z ₁₃	Breaking duration	10
3	Z ₁₄	Chute wash	5

 basket moving at 960 rpm.

water washing of massecuite = 15 Sec.

The gutter gate will open after 15 Sec. for A-light molasses tank. The gutter gate will open for the period of 25 Sec.

After 55 Secs. The gutter gate for A-Light molasses tank will open.

Water washing of massecuite in the basket = 60 Sec.

Curing time for massecuite = 50 Secs.

Total time required for moving the basket at 960 rpm = 120 Secs.

Total cycle time for single curing = 275 Secs.

CALCULATIONS:

Magma mixture motor:

Power 5.5 kw

Magma Pump Motor:

Power 11 kw

Batch type centrifugal machine:

Power 75 HP

Crushing of cane per day = 1600 tone

'A' massecuite formed per day = $1600 \times \frac{25}{100}$

= 400 tone

'A' massecuite formed in one hr when working time for centrifugal machine is taken 22 hrs = $\frac{400}{22} = 18$ tone

Cycle time for batch type centrifugal machine = 215 Sec.

No. of charges per hr = $\frac{3600}{215} = 17$

No. of charges per hr can be taken as = 15

Masseccuite cured by one centrifugal machine per hr = $15 \times 5 = 75$ qtls.

No. of machines required for curing of 180 qtls of masseccuite = $\frac{180}{75} = 2.4 = 2.5$

No. of machine required when double curing process adopted = 4 Nos.

No. of machines required when single curing process adopted = 2.5 Nos.

Actual No. of machines saved = $4 - 2.5 = 1.5$

Power of each centrifugal machine = 75 HP

Total power saved with 1.5 machines = $75 \times 1.5 = 112.5$ HP

Total power saved with single curing =

Power saved in Kw/hr per day = 129

REQUIREMENTS IN SINGLE CURING INSTEAD OF DOUBLE CURING:

In single curing, the procedure of operations remains the same. But in this certain additional time relays and solenoid valves are required. These are as follow:-

- Solenoid valve for water spray
- Time relay for water spray duration
- Solenoid valve for syrup separation.
- Time relay for syrup separation.

With the single curing crushing rate of the cane can be increased and hence capacity of the mill can be increased. Also with the single curing the number of machines used for curing the massecuite will decrease, so with this much more power saving will be there.

The only disadvantage of the single curing is that the sugar obtained by single curing ~~is~~^{will} not as white as in double curing.

PROJECT

ELECTRICAL ENERGY CONSERVATION IN THE
EXISTING SYSTEM OF THE INJECTION PUMPS

OBJECT

Electrical Energy conservation in the existing system of the injection pumps.

INTRODUCTION

The factory having five Nos injection pumps for creating 26" vacuum in vacuum pans and evaporators. The water is being injected through injection pumps in the individual multizet condensers. And then multizet condenser creating the vacuum in the vacuum pans due to the pressure differences by sucking the vapours of the vacuum pans and ultimately creating the 26" vacuum in the pans. The water goes out from the multizet condenser is having pressure of 8970 Kg/m².

The water of discharge 194.44 l/sec. and pressure of going waste and in the channel through the tail pipe of the injection pumps. But this water having pressure and discharge 194.44 l/s sec can be utilize by providing a water turbine in between the outlet of the multizet condensers and discharge point of the tail pipe of the condenser.

CALCULATIONS:

- Discharge of water through tail pipe = 194.44 l/s.
- Vacuum in Vacuum fan = 26" of Hg.
- Head of water = 22 m

ATMOSPHERIC PRESSURE

1 cm of Hg

= 10.1325 cm of Hg
= 1.0332 Kgf/cm²

1" of Hg

= 0.01359 Kgf/cm

26" of Hg

= 345.2 Kgf/m²

1 m

= 8970 Kgf/m²

= 39.37 inch

= 3.28'

Amount of head required to neutralize

Vacuum of 26" of Hg

= 8.97m

= 29.4'

Available head of water

= 22 m

Net head of water

= 22 - 8.97

= 13.03m

If we install a water turbine 2 m below the ground level because our channel is 2 m below the ground level then the head of water will become 15m.

Now head is

= 15m

Discharge

= 194.44 l/s

= 194.44 x 10⁻³ m³/s.

Power generated by one water turbine =

= 9810 x 15 x 194.44 x 10⁻³

= 28611.85 watts

= 28.6 KW.

Power generated by five water turbines

= 28.6 x 5

= 143 KW

Power generated by water turbines per day = 143 x 24 = 3432 Kwhr.

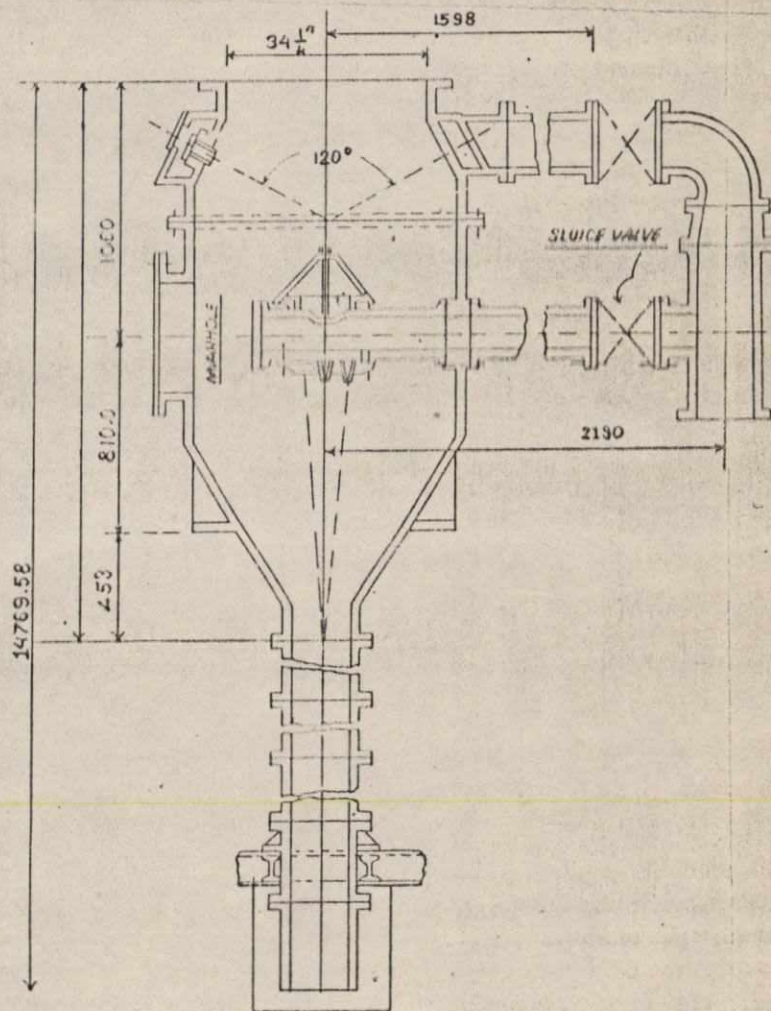


Fig. 62. Multi-jet type condenser.

PROJECT

STEAM ECONOMY BY AN ECONOMISER.

OBJECT: STEAM ECONOMY BY AN ECONOMISER

Chief Engineer give me a project on economiser to find out all the relating informations about it because they want to install it in the factory.

In the Sugar factory, the boiler feed water is generally taken at a temperature of about 194⁰F. The saturation temperature at which the water should be fed into the boiler to be transformed into steam varies, according to the pressure used, between 327⁰F(85 p.s.i.) and 457⁰F(440 p.s.i.). There is thus a large margin of temperature to be made up in the boiler. This margin means that a substantial proportion of the total heat has to be supplied to the water before evaporation proper commences.

The combustion gases leave the boiler at a temperature which is relatively high, and generally above the saturation temperature. This sensible heat content of the gases would be lost in the stack. Hence the idea of utilising their sensible heat content to raise the temperature of the feed water, and so decrease the quantity of heat to be supplied to the steam in the boiler.

The economiser is a heat exchanger placed in the path of flue gases leaving the boiler, and through which the feed water is circulated between the food pump and the boiler. It is generally takes the form of tubes, in most cases with fins, through which the water circulates in series.

Calculations:

To find out the temperature of the flue gases going out through Chimney after passing through the economiser.

T_o - Temperature of gases coming out of the boiler and entering the economiser = $300^{\circ}C = 572^{\circ}F$

t_o - Temperature of water entering the economiser = $96^{\circ}C = 205^{\circ}F$

t - temperature of water leaving the economiser = $130^{\circ}C = 266^{\circ}F$

T - Temperature of the flue gases leaving the economiser

$$T = T_o - \frac{t - t_o}{r}$$

Where $r = \alpha PC/pc$

α - Coefficient 1 between 0.92-0.96

P = Wt. of gas passing through the economiser in Ib/hr.

C = Specific heat of gases

p = Weight of water to be heated in Ib/hr.

c = Specific heat of water = 1

Specific heat of gas $C = 0.27 + 0.00003T$

Where $T = 572^{\circ}F$ = Temperature of gases where super heater is placed in $^{\circ}F$.

$$C = 0.27 + 0.00003 \times 572 = .3$$

To find out the weight of gas passing through the economiser.

$$\text{Weight of gas } P_g = 5.76 (1-W) m + 1$$

$$\text{Excess air } 40\% \quad (m = 1.4)$$

$$\text{Moisture in bagasse } 50\% \quad (W = 0.5)$$

$$P_g = 5.76 (1-0.5) 1.4 + 1 = 5.032 \text{ Ib/hr}$$

Total weight of bagasse to be burnt

$$B = 20 \times 2240 / 2.5 = 17920 \text{ Ib/hr.}$$

2.5 is taken on the bases that 1 Ib of bagasse can produced 2.5 Ib of steam and 20 is the capacity of the water.

$$\begin{aligned} \text{Total weight } P &= P_g \times B = 5.032 \times 17920 \\ &= 90173.44 \text{ Ib/hr.} \end{aligned}$$

$$r = \alpha PC/pc = 0.95 \times 90173.44 \times 0.3 / 20 \times 2240$$

Temperature of flue gases leaving the economiser

$$T = T_o - \frac{t - t_o}{r} = 572 - \frac{266 - 205}{.3} = 465.73^\circ F = 240.9^\circ C$$

To = Temperature of gases leaving the economiser and entering the air heater = $465.73^\circ F$

t_o - Temperature of ambient air = $20^{\circ}\text{C} = 68^{\circ}\text{F}$

t - Temperature of Hot air required = 356°F

T - Temperature of flue gases coming out of the air heater and going through Chimney.

$$T - T_o = \frac{t - t_o}{r}$$

For air and flue gases r is equal to 1.3

i.e. When flue gas temperature drop by 1° ambient air temp rises by 1.3° , so temperature of flue gases coming out of the air heater

$$\begin{aligned} T - T_o &= \frac{t - t_o}{r} = \frac{465.73 - 356 - 68}{1.3} \\ &= 244.2^{\circ}\text{F} = 118^{\circ}\text{C} \end{aligned}$$

Capacity of boiler 20 Ton/hr.

working pressure 300 P.S.I.

Super heated steam temperature = $340^{\circ}\text{C} = 644^{\circ}\text{F}$

Moisture in bagasse 50% ($W = 0.5$)

Sugar in bagasse 3% ($S = 0.03$)

Excess air 40% ($m = 1.4$)

Gas temperature leaving the boiler and entering the economiser $t = 300^{\circ}\text{C} = 572^{\circ}\text{F}$

Sensible heat lost in flue gases in BTU/lb of bagasse

$$q = ((1-w) (1.4m - 0.13) + 0.5) (t - 32)$$

$$\text{Where } q = ((1 - 0.5) ((1.4 \times 1.4) - 0.13) + 0.5) (5.72 - 32)$$

$$= 764.1 \text{ BTU/lb}$$

Heat transferred to the steam per lb of bagasse burnt
in BTU.

$$M_V = (7650 - 2160S - 8330W - q) \times \alpha \beta \eta$$

Coefficient of heat loss

$$\text{Unburnt } \alpha \quad 0.975$$

$$\text{Radiation } \beta \quad 0.975$$

$$\text{Incomplete- combustion } \eta \quad 0.97$$

$$M_V = \text{Combustion} \\ (7650 - 2160 \times 0.03 - 8730 \times 0.5 - 764.1)$$

$$\times 0.975 \times 0.975 \times 0.97 = 2264.79 \text{ BTU/lb}$$

$$= 5227.1353 \text{ Kj/Kg (Since 1 BTU/lb = 2.308 Kj/Kg.)}$$

Case I

When feed water temperature is 96°C

Total heat in steam at 300 P.S.I pressure and
 684°F temperature.

$$\text{(From steam table)} = 3153.934 \text{ Kj/Kg.}$$

Total heat in feed water at 96°C = 402.176 Kj/Kg.

Heat to be supplied for per Kg of water(3153.934-402.176) = 2751.758 Kj/Kg.

Weight of steam produced per kg of bagasse burnt = 5227.1353/2751.758

= 1.89956

Total weight of bagasse to be burnt B = 20/1.89956 = 10.52 Kg/hr.

Case II:

When feed water temperature is 130°C.

Total heat in steam at pressure 300 P.S.I and temperature

340°C = 3153.934 Kj/kg.
(From steam table)

Total heat in feed water = 546.31 Kj/Kg.
at 130°C

Heat to be supplied per Kg of water = 2607.624 Kj/Kg.
(3153.934 - 546.31)

Weight of steam produced per Kg of bagasse burnt = 5227.1353/2607.624

= 2.0046

Weight of bagasse to be burnt = 20/2.0046 = 9.977 Kg/hr.

Result:

Total weight of bagasse to be burnt

When feed water temperature is 96°C = 10.529 Kg/hr.

Total weight of bagasse to be burnt
when feed water temperature 130°C = 9.977 Kg/hr.

Saving in bagasse = $(10.529 - 9.977)$ = 0.552 Kg/hr.

= 5.52 Qtls/hr.

Cost of each Qtl of bagasse = Rs.20/-

Total saving = Rs.110.40 per hr. = Rs.2649.60 per day.

PROJECT

Steam economy in Sugar Industry

OBJECT:

Shifting of Vapour line juice heater from last effect evaporator to 3rd effect vapour line for more steam economy and more capacity of evaporator set.

Introduction:

The system of heating the raw juice firstly in the vapour line juice heater installed in the last evaporator vapour line, where we get a marginal temprature of rise of 10-11°C. It is in practice in our factory we heat the raw juice to about 70°C with the second body vapours. We can heat the raw juice to 70°C with 3rd evaporator vapours in the vapour line juice heater installed in 3rd body vapour line.

3rd body evaporator vapour line juice heater:

It is very essential to adopt most effective and xamimum steam economy measures as there used to be acute shortage of steam and extra fuel consumption with the vapour line juice heater in the last body evoporator vapour line. We are getting raw juice temprature raised from 35°C to 46°C.

If the vapour line juice heater is shifted from last effect to third effect vapour line we can get law juice temprature raised to 70°C, if the entering temprature of raw juice to the juice heater is 35°C. The raw juice enters the 3rd body vapour line juice heater at 35°C and leaves at 70°C. Valve is not to be fully opened but it should be

opened partially so that the temperature of raw juice can be raised to 70°C only. The heating surfaces of the 3rd and 4th body evaporators are equal. So the 4th body evaporator will not suffer for want of vapours (even after maximum vapours being consumed by raw juice) because as we go on drawing more vapours from 3rd effect (Calendria to body vacuum) will increase and boiling boost up. The evaporation of the previous bodies will also increased accordingly.

In this way the whole evaporator set efficiency will improve, leading to higher capacity of the station.

The raw juice is heated to 70°C in a single 3rd body vapour line juice heater instead of heating in two juice heaters in series, which reduces load on the pump. the raw juice heating to 70°C in the 3rd body vapour line juice heater has been self controlled.

When the 3rd body vapour line juice heater is in line the evaporation in the evaporator used to be most effective enabling to crush 300 M.T. per day more than normal crushing.

Case I:

When vapour line juice heater is in the last effect evaporator vapour line.

Inlet temperature of raw juice = 35°C (95°F)

Outlet temperature of raw juice = 46°C/114.8°F

Rise in temperature = 11°C (19.8°F)

Rate of crush = 1250/24 = 52.83 TCh

Raw juice % cane = 90%

Quantity of raw juice = 90/100x52 = 46.68Ton/hr

= 47T/hr.

Specific heat of juice = 0.9

(From R.B.L. Mathur's book 'A Hand book of sugar Cane')

At 26" Hg temperature is 125°F (page 200)

From Hugot book (Page 962)

At 125°F latent heat is 1018 BTU/lb

Vapours utilizing by raw juice = ms /L

$$= \frac{47 \times 2260 \times 0.9 \times 19.8}{1018}$$

= 1842.92 lb/hr.

= 0.82 Ton/hr.

Steam economy by using last effect vapours

$$= 0.82 \times 4/4 = 0.82 \text{ Ton/hr.}$$

Steam economy % cane = 0.82/52 x 100 = 1.58%

Case II:

3rd body vapour line juice heater Guardupple effect:

We used 3rd body vapours (At 15" vacuum

From RBL Mathur Book (p.200)

At vacuum 17" of Hg temperature is 173°F

At vacuum 26" of Hg temperature is 125°F

At vacuum 9" of Hg temperature is -48°F

At vacuum 2" of Hg temperature is -10.67°F

So at vacuum 15" of Hg temp is 173 - (-10.67)

$$= 183.67^{\circ}\text{f}$$

Inlet temperature of raw juice = 35°C

Outlet temperature of raw juice = 70°C

Difference in temp 35°C = 63°F

Latent heat of vapours from III body at 84.26°F

$$= 987.4 \text{ BTU/lb Sq.inch.}$$

(From Hugot book p 962)

Specific heat of juice = 0.9

Vapour utilizing by raw juice = ms /L

$$= 47 \times 2240 \times 0.9 \times 63 / 987.4 = 6045.55 \text{ lb/hr.}$$

Steam economy by using 3rd body vapours of guardupple

$$\text{effect evaporator} = 6045.55 \times 3/4 \times 1/2240 = 2.024 \text{ Ton/hr.}$$

$$\text{Steam economy \% cane.} = 2.024 \times 100 / 52 = 3.92\%$$

Steam economy by using 3rd body vapours instead of
4th body vapours of quardupple effect evaporator

$$= 2.024 - 0.82 = 1.22 \text{ Ton/hr.}$$

Since

One pound of bogasse can produced 2.5 pounds of steam.

Steam economy = 1.22 Ton/hr.

1 Tone of bogasse can produced 2.5 tons of steam

1 ton of steam can be produced by 0.4 ton of bagasse

1.22 ton of steam can be produced by 0.488 Ton/hr of
bagasse

Bagasse Economy = 0.488 Ton/hr = 11.712 Ton/day

Rate of one Ctl. of bagasse Rs.20/-

Profit from Bagasse = $11.712 \times 200 = \text{Rs.}2342.4$ per day.

Results:

Particulars	3rd body VLJH of quardupple effect	Last body VIJH
Inlet temp.	35° c	35° c
outlet temp.	70° c	46° c
Steam economy	2.024 Ton/Hr.	0.82 Ton/hr.

Advantages:

1. Steam economy can be achieved to the extent of 2.34 per cent cane by raw juice heating alone.
2. Raw juice temperature to the required level of 70°C will be attained in single 3rd body of Vapour line juice heater.
3. The evaporator set efficiency will improve enabling to crush 300 ton/day more than normal crushing with 3rd body Vapour line juice heater.
4. A steady and self controlled heating of raw juice to 70°C will assumed at all levels of crushing and exhaust steam pressure.
5. Vapour load on the condenser ~~can~~ reduced more than the conventional last body vapour line juice heater as maximum vapours will condensed in 3rd body Vapour line juice heater.
6. 3rd body vapours will less corrosive than the last body more acidic vapours.

Conclusions:

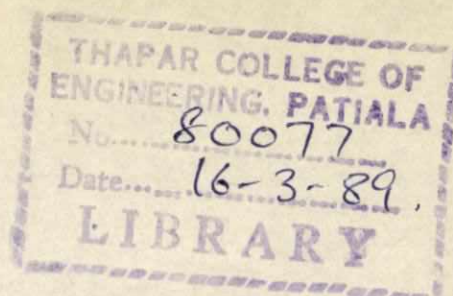
As stated earlier the raw juice heating with second body evaporator in conventional juice heater to 55-60°C is not effective and economical. Even though the temperature (Raw juice temperature to second body vapour temperature)

is more, a temperature of 60°c is hardly attained by the juice
It shows that the temperature of the second body will try to
enter in 3rd body calandria instead of passing to a distant
conventional juice heater as there vapour suffer pressure
losses in travelling through length line (second body
evaporator to conventional juice heater station) and bends.

Whereas the 3rd body Vapour line juice heater will be
in closed system of evaporators. It will be very easy to
heat raw juice to 70°c with less temperature vapours of
3rd body than 2nd body vapours.

PROJECT

CODIFICATION OF THE STORE ITEMS



OBJECT

Codification: of the store items.

The words 'stock' and 'stores' are used somewhat loosely, but fortunately such a lack of discrimination is not of serious consequence. 'Stores' generally relates to goods on hand in the form of materials awaiting conversion by some process or other to another form, whilst 'stock' implies converted stores of manufactured goods generally.

CLASSIFICATION:

Stocks and stores may be of several kinds. They may be classified according to size, nature and purpose. Identical stores may again be for different objectives. No matter to which category they belong they have to be classified, if a suitable system of control is thought necessary for their proper accounting.

STANDARDIZATION:

Standardization of plants and machineries, spares and parts is very important in any scheme of Inventory Control. It leads directly to lower holding without any reduction in the stock-over. Efforts should be made to reduce the number of items comprising a class or a group. For example, there may be a large number of engines of different makes and models. An attempt may be made to establish equivalents as to size, capacity, make and models so that a smaller range could be

held in stock not only of the machines but also of the spares and parts. Provisioning of spares and parts for maintenance is also a major problem. If they have to be imported from foreign sources of supplies, their Lead Time is also inordinately long. Therefore, large stocks of imported spares and parts have to be kept in stock. However, standardization here is also equally necessary.

PLACING INDENTS:

It is placing indents either on Purchase or Stores Section that practical difficulties are encountered for want of proper specifications and universally accepted nomenclature. For example, if any indenting section wants to place an indent for standard length 15.5 mm. Taper Shank I.T.I. make Drill, it has to write the complete specification and in case it forget to state T/S or S/S/^{it}would lead to unnecessary correspondence in procuring or supplying the material, as the Purchase or Stores Section, as the case may be, will naturally ask for further classification. If the indenting section only writes 15.5 mm drill then the procuring or supplying section will be in a soup to know whether the drill is required for steel drilling. To avoid the confusions, it is suggested to codify stores. Further if it is decided to switch over to mechanical system of accounting of stores, codification becomes a must. Without codifying the materials, evaluation of transactions is not possible. To quote an example, if 100 numbers of 10 mm.

nuts are issued, then first thing that has to be done is to convert the numbers into kilograms and then it is also necessary to feed the computer with the value which may not be very accurate; but with codification it is possible to feed the code number, quantity multiplied by the unit cost and this will straightway give the most accurate value.

SPECIFICATION:

In practice, materials are specified from sources such as common trade names, manufacturers' specifications, trade specifications, and so on. Normally specifications are expressed through common symbols, codes descriptions, dimensions, quality or compositions, performance, methods of analysis etc. In any case, specification must be clear, concise and definitive, reflecting the characteristic of the item as far as possible. Standardization once introduced and codification once followed, will avoid constant repetition of long descriptive titles and is expected to provide quick and correct means of identification and control over purchase and issue of stores.

WRONG POSTINGS:

Bearing in mind that 90% of the discrepancies in the Stores are due to wrong postings, the reason being different names being given to one item, codification becomes further necessary, especially where the system of issuing and accounting is decentralised.

CODIFICATION:

All stocks and stores are denoted by their common or proper names and this is the most readily understandable

method of describing them. But difficulty arises when the same article is known by different names and slightly different nomenclature may lead to wrong issue. Codification avoids these variations, though it is not without its drawbacks. For sorting prior to posting in Stores Account also to Cost Account, it becomes a practical necessity. Code markings are, therefore, of greater help to decipher the stores in more intelligible terms.

There are different systems of codification for rationalised storekeeping. But the best is that which gives, along with standard form, also the history and sizes of materials. Codification should also avoid calling the article by its function or its used name. It should give an objective name which should be versatile in nature. The system is more commendable for adoption where large number of items having large variety are piled up in Stores. Some are as follows:-

1. Arbitrary system,
2. Pneumonic system,
3. Decimal system,

While codifying the store items, I adopt Decimal System of codification.

DECIMAL SYSTEM:

Decimal system may be said to be universal in its working. It is simple and easy to codify stores under this system. To follow this system one has to categorize stores

in classes, groups, sub-groups, types and last three digits can be left for sizes or sub-types.

Decimal system works from 0 to 9 figures and on 7 digits. The class can have several groups and types and last 3 number for sizes. To quote an example, if it is wanted to codify 15.5 mm. 3 fluted standard length drill Taper Shank, first thing that has to be seen is the class and group. And when this is known, it is easy to locate its sub-group and type. If it is desired to codify 15.5 mm. drill, the procedure will be:

5501155

first '5' for(class)

Second '5' for drilling(group)

Third '0' for Drills(sub-groups)

Fourth '1' is for taper shank(type)

and last three figures 155 depict the size of the drill 15.5 mm. In other words, there can be given a complete history of the drill along with its size, etc., if the same is codified under decimal system and this is the reason why this system is very popular.

As may be seen, this system works on dividing the entire stores in classes, groups, sub-groups, types, sub-types or sizes and no section exceeds figure 0 to 9. Consequently, it is known as decimal system.

PROJECT

Tabular form of the spares of the
Prime movers.

OBJECT:

Tabular form of the spares of the prime movers:

Chief Engineer suggested me to prepare a record of all prime movers in a tabular form. Because some records of the prime mover ^{do not} they/have and some records which/ they have are not specific and centralized.

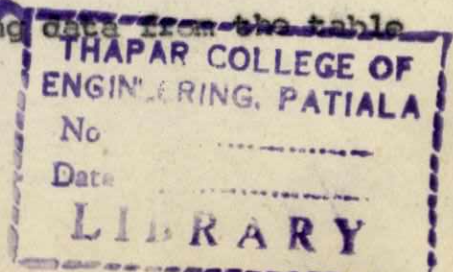
I made record of all primer movers with the help of engineers and by going personally to each primemover.

At present, during running season for example if an oil seal of any reduction gear leaked. First they take out the oil seal from the reduction Gear, than after reading the oil seal number from it they collect it from the store.

But if this table will be available in each house then during dismentling of reduction gear, oil seal can be collected from the store by reading the oil seal number from the table, so with this maintainance time will decrease.

This table will become very helpful for the engineers in giving their requirement for off season. At present the Engineers see the different files for different primemovers i.e. for motors he will see different files and in the same way for pumps and reduction gear he will see different files. But if this table will be available there they can write all the concerning data from this table without going through different files.

In the same way it will also become very helpful for the management if they want to purchase any primemover same as existng one. Because they can see all concerning ~~data from the table~~ without going through different files.



FUMP

S.No./make	Head	Discharge	R.P.M.	Capacity	Bearing No.	Oil seal No.

THAPAR COLLEGE OF
 ENGINEERING, PATIALA
 No. 80077
 Date 16-3-89

MOTOR

REDUCTION GEAR

S.No.	Description	Frame No.	H.P.	R.P.M.	Bearing No.	Make	Type	Ratio	Bearing No.	Oil seal No.
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BROWN
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