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Design of Plate Cutting Machine For Cane Cutter (Saccharum Oficinarum) Use Asetilin Gas

M,C, Tri Atmodjo[#1] , Tumpal O.R[#2] , Sigit D.Puspito[#3]

[#1]BPPT Researcher and Lecturer of Malahayati University
[#2]Lecturer of Malahayati University and Under Master Course in Sriwijaya University
[#3]Graduated student from Malahayati University.
atmojo_b2tp@yahoo.com

Abstract— **Till now process in cuting of plate which is thickness more than 3 mm still do manually by hand, without machine. By process of amputation of plate have weakness that is result of plate cutting less natty and require to be grinded, size measure is less accurate and is inefficient of time.**
Utilize low quality of hence require to be conducted by scheme and making plate clippers use machine, having higher quality which needed semiautomatic plate cutting machine. Plate cutting machine use gas of asetilin semiautomaticly water down process cutting of plate, accurate size measure, quickening cutting process and result needn't be grinded and also in its scheme require fund about Rp. 2.011.000,-.
Design method used is reference study and field study. Reference study that is, by studying and taking literatures and considerations related to problem of scheme of goodness in the form of book, magazine of bulletin, and others.
While field study that is, checking directly at workshops of welding and do design of plate cutting machine use gas of asetilin semiautomaticly.
From result of scheme of machine can cut thick plate 5-15 mm, with unlimited length. Pursuant to amount of used activator, system activator of transmission enchain rol use motor of DC with energy 20,4Watt 24volt 0,85A 22 rpm. Weight of machine 20 kg with long dimension 495mm, wide 330mm, high 400mm. Spacer of horizontal nosel and vertical by using fastener of thread bolt. Functioning Electronic network to arrange speed that, movement for cutting there is 6 backward movement and speed. The Speed of machine is 0,04m / s.

Key Words : **Cane cutter, Cutting Machine, Saccharum oficinarum,Asetilin gas**

I. INTRODUCTION

Crosscut Process with oxygen have used many by industry of Enginering in Indonesia like cane cutter production , shipping industry, industrial of construction , industrial of machine, treatment of wate and etcetera.

Cutting metal with fire of Oksi-Asetilin will dissociate some of its mains metal by reaction of chemistry, that is reaction between metal with Oxygen gas.

Quality or result of cutiing the plate depend on its process , and for getting of good plate cutting and as according to size measure which expecting to need the existence of the way of cutting accurate. Cutting plate use gas of asetilin manually will get problems which often arise in the other hand its amputation process require sufficient time. Utilize to overcome the problems require to be performed by scheme of machine cutter of semiautomatic plate which have the quality of superordinate.

1.2 Objective of design

1. To make perfect cane cuter by excellence of plate cutter.
2. Changing manual processing become semi automatically
3. Facilitating Enginering indutri-industri like workshop of welding,
4. industrial of shipping, and construction industry
5. Cope to float construction machine
6. Improving the quality of plate which cuting by cuting machine.

II. MATERIALS AND METHOD

2.1 Time and Place Scheme

This Scheme [is] executed on 01 August 2008, to 30 Oktrober 2008, [in] workshop of Las / [LIMITED PARTNER, CV] bubut of WAKIDI DIESEL Jln. Metro- Km wates. 5 Countryside of Purwodadi, District Of Trimurjo Float Middlely

2.2 Appliance and Materials

Equipments weared in scheme of machine cutter of plate use gas of asetilin semiautomaticly

2.3 Diagram Emit a stream of Scheme

Diagram Scheme can be seen [by] [at] picture 9

Picture 9. Diagram emit a stream of scheme

2.4 Method Scheme

Method Scheme the used [is] 1. Study Bibliography that is by studying and taking considerations of literatures related to problem of scheme, good in the form of book, media a period of/to, magazine of bulletin, and others 2. Field study

Accurate directly amputation of plate manually or [do] not use machine

2.5 Method Data Collecting

To collect expected data, writer collect data with a few the way of, that is

1. Method Observation

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That is passing perception with record-keeping systematically to problem of influencing to be designed [by] machine, where this [is] data very having an effect on for the scheme of machine

2. Literature method

That is searching data of library books:

2.6 Source of Data

The datas able to assist design obtained from some source, that is other data obtained from library and also other literature

III. RESULT AND DISCUSSION

Semiautomatic Cutting Machine Plate

Specification of the following Machine :

a) the Name of : Plate Cutting machine with
b) gas of asetilin semiautomaticly
c) Source Of Power : Motor of DC 20,4 Watt 0,85A 24volt,
d) 22 rpm.
e) Weight of Machine : 20 kg
f) Speed of conductor wheel : 0,04 m / s
g) high of Machine : 400 mm
h) wide of Machine : 330 mm
i) Length of Machine : 495 mm

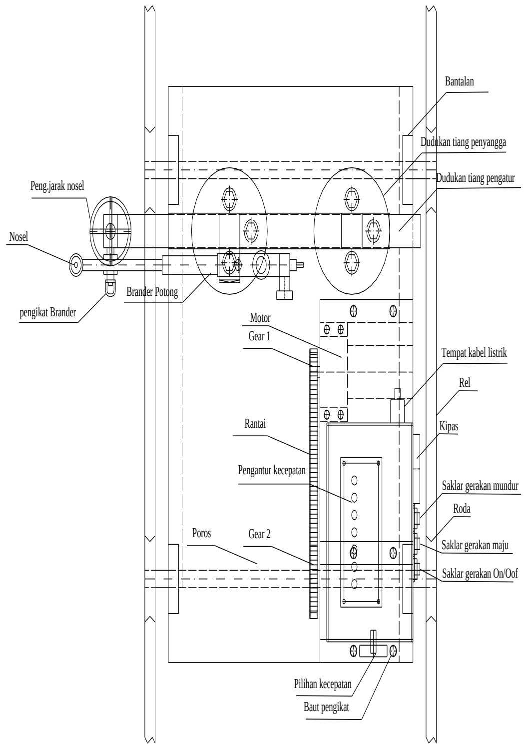

Fig. 1. Machine of plate cuter for Cane Cuter

Calculation of locomotion with formula :

T= (F Gear1 gear1 r x)+(Gear2 gear2 r x F)+(X wheel r Froda of x 4)

Where :

F = heavy x gravitattion in N

r = radius in mm

T = torsi (N mm)

Note :. (F equal to weight of wheel and gear in kg)

hence

1). T for the gear of :

T = (big F Gear [of] big gear r x + (small Gear F [of] small gear r x = [(0,2 singk of x 9,8m / s2)x(29,3mm + [(0,1 singk of x 9,8m / s2)x(15,2mm = (57,428) + (14,896)

T = 72,324 N.Mm.

2). T for wheel***:***

T = (F roda x r roda x 4)

= (0,55 kg x 9,8 m/s^2 x 32,5) x 4

= 175,175 x 4

= 700,7 N.mm

And then

T = gear + roda

= 72,324 + 700,7

= 773,024 N.mm

= 0,77 Nm

The power of motor is

$$P = \frac{2\pi.n.T}{60}$$

$$= \frac{2\pi.(22).(0,77)}{60}$$

= 1,77 watt

In scheme of this machine the axis diameter used are:

Axis motor diameter : 20 mm

Axis diameter for wheel 15 mm

T = 773,024 N.Mm

Tension shift which [is] permitted (a).

a = b / (X Sf2 Sf1)

a = 58 / (6,0 x 3,0 = 3,2 N / mm2

where:

Sf1 = Factor of safety to fatigue of torque

Sf2 = factor of safety usage of lounching path

b = Interesting strength [of] materials (N / mm2)

a = Tension shift which [in] permiting for the axis of (N / mm2)

(sularso, Suga kiokatsu, 1997)

$$d = \left[\frac{5,1}{\tau_a} \times K_t \times C_b \times T \right]^{1/3}$$

$$d = \left[\frac{5,1}{3,2} \times 1,5 \times 2 \times 773,024 \right]^{1/3}$$

d = 15 mm

where :

K_t = moment of rotation
C_b = Factror of bending moment
T = Torque (N.mm)
d = Diameter of shaft (mm)

The speed of wheel :

$$v = \frac{\pi.D.n}{60.000}$$

$$= \frac{\pi.(65).(11)}{60.000}$$

= 0,04 m/s

where:

D = inside diameter of wheel (mm)
n = Inside rotation (rpm)
v = speed of wheel (m/s)

Dowel size (*bxh*) = (5 x 5)
Length of dowel = (15 – 20)
Depth of dowel in the shaft (t_1) = 3,0 mm
High of dowel in the shaft = 2,5 mm

The force in the dowel as following
Momet of rotation (T) = 773,024 N.mm
Tangensial force in the dowel (F) :
sularso, kiokatsu Suga.1997)

$F = T / (d/2)\ (N)$

$$F = \frac{773,024}{15/2}$$

= 103,07 N

Tensile stress permitted (σ_a) :

$\sigma_a = \tau_b /(Sf_1 . Sf_2)\ (N/mm^2)$
= 48 / (6,0 x 1,3)
= 6,15 N/mm^2

Shear stress permitted (τ_{ka}) :

$\tau_{ka} = F / (b.I)$

$$= \frac{103,07}{5 \times l_1} \leq 6,15 \leftrightarrow l_1 \geq 3$$

Pressure permitted Pa 8,0 N/mm^2 there fare

$\tau_{ka} = F/(b . l)\ (N/mm^2)$

$$\tau_{ka} = \frac{103,07}{l_2 \times 2,5} \leq 8,0 \leftrightarrow l_2 \geq 5$$

where:

σ_a = Tensile stress permitted (N/mm^2)
τ_b = Rotattion stress in the dowel (N/mm^2)
τ_{ka} = Shear stress permited in the dowel (N/mm^2)
Sf_1 *dan* Sf_2 = safety factor

Number of chain = 40 (one set)
Distance of part(*p*) = 11,30 mm
Diameter of rol (*k*) = 5,90 mm
Wide of rol (*w*) = 5,20 mm
Diameter lock chain(*D*) = 2,40 mm
Distance between shaft = 200 mm.

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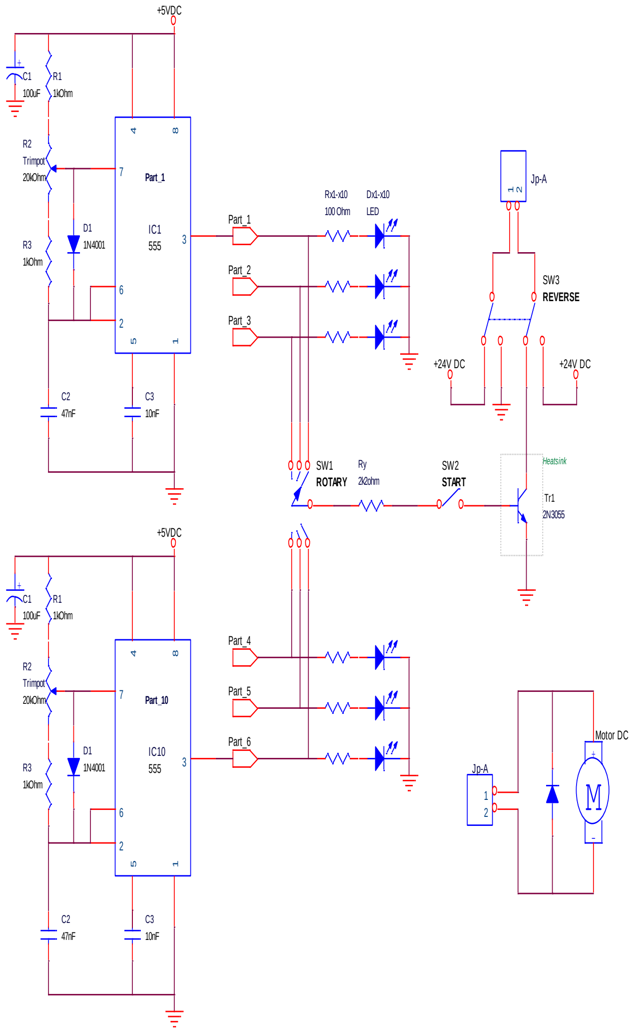

Fig.2. (Scheme of speed regulator)

Calculation of frequency

From the fig of : speed regulator

C1 = 100µFarad = 0,0001 Farad = $1x10^{-4}$ Farad

C2 = 47nf = 0,000000047 Farad= $47x10^{-9}$ Farad

C3 = 10nFarad = 0,00000001 Farad= $1x10^{-8}$ Farad

Ra = 1kΩ = 1000 Ω

Rb = 20kΩ = 20000 Ω

where *Ra* = R1

Rb = R2

C = nilai C2

The average frequency is:

$$f = \frac{1{,}44}{(Ra + 2Rb)C}$$

$$= \frac{1{,}44}{(1000 + 2.20000)\,47.10^{-9}}$$

$$= 747{,}2755574 Hz$$

$$= 0{,}75 kHz$$

The top frequency :

:

C1 = 100µFarad = 0,0001 Farad = $1x10^{-4}$ Farad

R1 = 1kΩ = 1000 Ω

R2 = 20kΩ = 20000 Ω

R3 = 1kΩ = 1000 Ω

then:

$$f = \frac{1{,}44}{[R1 - 2(R2 - R3)]C1}$$

$$f = \frac{1{,}44}{[1000 - 2(20000 - 1000)]1 \times 10^{-4}}$$

f = 1896,2 *Hz*

f = 1,9 *KHz* (Petruzella, 2001)

IV. CONCLUSION

1. Semiautomatic cutting machine " Energy Motor activator : Motor of DC 20,4 Watt 0,85A 24 volt 22 rpm " The weight of machine : 20 kg " Length of machine : 495 mm " Width of machine : 330 mm " High of machine : 400 mm " Maximum speed of wheel : 0,04 m / s " Wheel diameter : 65 mm " Axis diameter : 15 mm " Amount of tooth of gear small and big : 14 and 28

2. Plate cutting machine can cut plate thickly minimize 3 mm and maximal 15 mm

3. Arrangement of speed of machine motion use electronic network which consist of 6 degree of speed

4. Each election of speed earn in tuning by adding and lessening value of resistor 1 by using plus screwdriver

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