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

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Abstract— Till now process in cutting 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 semiautomatically 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 semiautomatically.

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 cutting 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 industri-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 cutting by cutting machine.

II. MATERIALS AND METHOD
2.1 Time and Place Scheme
This Scheme [is] executed on 01 August 2008, to 30 Oktober 2008, [in] workshop of Las / [LIMITED PARTNER, CV] bubut of WAKIDI DIESEL Jln. Metro-Km wates. 5 Countryside of Purwodadi, District Of Trimurjo Float Middley

2.2 Appliance and Materials
Equipments weared in scheme of machine cutter of plate use gas of asetilin semiautomatically

2.3 Diagram Emit a stream of Scheme
Diagram Scheme can be seen [by] [at] picture 9

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

Calculation of locomotion with formula :

\[ T = (F \text{ Gear } 1 \text{ gear } 1 r x) + (\text{ Gear } 2 \text{ gear } 2 r x F) + (X \text{ wheel } r \text{ Froda of } x 4) \]

Where :
- \( F = \text{ heavy } \times \text{ gravitation in N} \)
- \( r = \text{ radius in mm} \)
- \( T = \text{ torsi (N mm)} \)

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

1). T for the gear of :

\[ T = (\text{ big } F \text{ Gear } [of] \text{ big } \text{ gear } r x + \text{ ( small } \text{ Gear } F \text{ [of] small } \text{ gear } r x = [(0.2 \text{ singk of x } 9.8m / s^2)x(29.3mm + [(0.1 \text{ singk of x } 9.8m / s^2)x(15.2mm = (-57.428) + (14.896) \]

\[ T = 72,324 N.Mm. \]

2). T for wheel :

\[ T = (F \text{ roda } x r \text{ roda } x 4) = (0.55 \text{ kg } x 9.8 m/s^2 x 32.5) \times 4 \]
\[ = 175,175 x 4 \]
\[ = 700,7 N.mm \]

And then

\[ T = \text{ gear } + \text{ roda} \]
\[ = 72,324 + 700,7 \]
\[ = 773,024 N.mm \]

The power of motor is

\[ P = \frac{2\pi nT}{60} \]
\[ = \frac{2\pi(22)(0.77)}{60} \]
\[ = 1.77 \text{ watt} \]

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).

\[ a = \frac{b}{(X \text{ Sf2 Sf1})} \]
\[ a = 58 / (6.0 x 3.0 = 3.2 N / mm2 \]

where:

Sf1 = Factor of safety to fatigue of torque
Sf2 = factor of safety usage of lounching path
b = Interesting strength [of] materials ( N / mm2)
\[ a = \text{Tension shift which [in] permitting for the axis of ( N / mm2) } \]
(Sularso, Suga Kiokatsu, 1997)

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

\[
d = \left[ \frac{5,1 \times 1,5 \times 2 \times 773,024}{32} \right]^{1/3}
\]

d = 15 mm

where:

- \(K_i\) = moment of rotation
- \(C_b\) = Factor of bending moment
- \(T\) = Torque (N.mm)
- \(d\) = Diameter of shaft (mm)

The speed of wheel:

\[
v = \frac{\pi . D . n}{60.000}
\]

\[
v = \frac{\pi . (65) . (11)}{60.000}
\]

\[
v = 0,04 \text{ m/s}
\]

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 \((t_i)\) = 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 \((F)\) :

\[
F = T / (d/2) \text{ (N)}
\]

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

103,07 N

Tensile stress permitted \((\sigma_a)\) :

\[
\sigma_a = \frac{\tau_b}{(Sf_1 \times Sf_2)} \text{ (N/mm}^2\text{)}
\]

\[
= 48 / (6,0 \times 1,3)
\]

\[
= 6,15 \text{ N/mm}^2
\]

Shear stress permitted \((\tau_{ka})\) :

\[
\tau_{ka} = F / (b.l)
\]

\[
= \frac{103,07}{5 \times l_1} \leq 6,15 \Leftrightarrow l_1 \geq 3
\]

Pressure permitted \(8,0 \text{ N/mm}^2\) there fare

\[
\tau_{ka} = \frac{103,07}{l_2 \times 2.5} \leq 8,0 \Leftrightarrow l_2 \geq 5
\]
The top frequency:

\[ f = \frac{1.44}{(1000 + 2.20000) \times 47.10^{-9}} \]

\[ = 747.2755574 \text{Hz} \]

\[ = 0.75 \text{kHz} \]

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

REFERENCES


