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INFORMATION SYSTEM FOR MAKING PC WIRE HEADS WITH PNEUMATIC SYSTEMS IN HEADING MACHINE

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Abstract: Pc wire or Prestressed concrete wire is iron thread with a round cross section and has indentations on its surface. Pc wire is widely used in the construction of buildings or buildings, railway sleepers and piles. This paper discusses the process of making pc wire heads and pneumatic systems that function as driving hammer dies in making pc wire. The aim of the research is to know the work process of making pc wire head (screw iron), calculating the pneumatic system for making pc wire head (screw iron). The data needed in the preparation of this report was obtained by collecting data, namely field studies which are direct data collection. data obtained through direct observation in the field accompanied by a field supervisor then Literature Study where literature study is data collection through literature books, journals, making pc wire heads by cutting pc wire with a diameter of 7.1 mm along 152 mm using a cutting grinder and then clamping it in a vise so that the screw iron does not shift when getting pressure from the die, the die will press the pc wire so that it is formed with a circular diameter of 13 mm and 7 mm thick. From the calculation of the density of dry air, the result is = 87.08 Pa, the result of the hydrostatic calculation is 609.78 Pa, and from the calculation of the Double Acting Cylinder, the result is 254.34 N.

Keywords: Pneumatic Systems, The process of making pc wire heads.

INTRODUCTION

In the competitive industrial world, companies are required to produce quickly and efficiently in order to achieve production on target. Few mistakes made by the company will make the company's image in the eyes of consumers bad. One of the efforts taken is to increase production and minimize poor quality products. One of the systems that continues to develop is pneumatic.

Pc wire or Prestressed concrete wire is threaded iron that has a round cross section and has indentations on its surface. Pc wire is widely used in the construction of buildings or buildings, railway sleepers and piles.

Pneumatics is a system that is often used in industry today. Basically pneumatics is a control system that utilizes compressed air as its output, this system is classified as a sophisticated system, because many industries use this system because this system does not require a lot of human resources and this can reduce the costs incurred by the company.

In connection with the science of pneumatics which continues to develop, on this occasion we will try to practice how air is actually compressed and with what tools so that all ideas regarding the use of air can be realized.

RESEARCH METHODS

Heading Machine

Heading machine is one type of tool for making wire pc heads or the same as making bolt heads. Forms a lump at the end of the PC wire which is often used by companies that have collaborated. The goal is to hold the pull of the wire pc itself. Commonly used PC headings are for sizes 7 mm – 13 mm. However, there are some companies that use PC headings beyond the usual size.

Figure 1. Heading Machine

At this stage the heading machine used is a Heavy Duty Cold Heading Machine which is commonly used to form PC Wire heads for sizes 7 mm – 9 mm with pneumatic pressure. The results of making this pc wire head are for companies that produce culverts, earth nails, concrete fire bearings.

PC Wire Head Production Process Flowchart

To find out the working process of the heading machine for making pc wire heads (screw iron). The following is a flowchart of the heading machine work process.

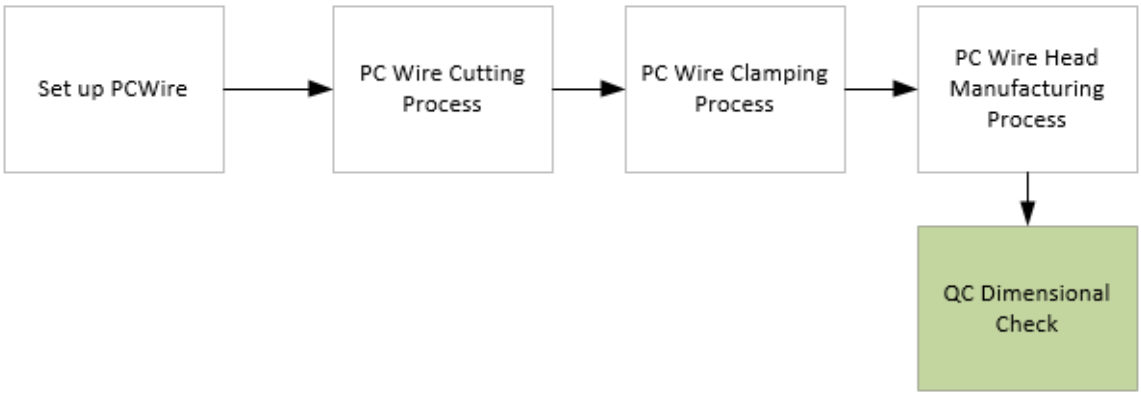

Figure 2. Heading Machine Work Process Flowchart

RESULT AND DISCUSSION

PC-Wire clamping process

This clamping process requires the performance of a heading machine with a pneumatic system which helps to make threaded iron heads. In this process, the threaded iron is clamped in a vise so that the threaded iron cannot shift when there is pressure from the dies for the manufacture of pc wire heads.

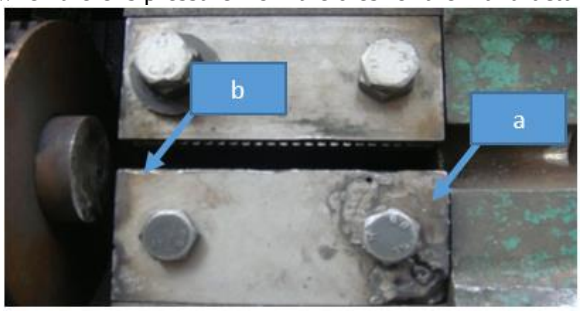

Figure 3. after the process of making the head of the pc wire

a. In figure 3, the threaded iron will be clamped in a doubt.
b. In figure 3 the dies will press the screw iron so that the screw iron head can be formed.

PC-Wire head manufacturing process

In the process of making the PC wire head, the vise has clamped the PC wire or threaded iron and then the dies will press the PC wire so that the PC wire head will form a standard size.

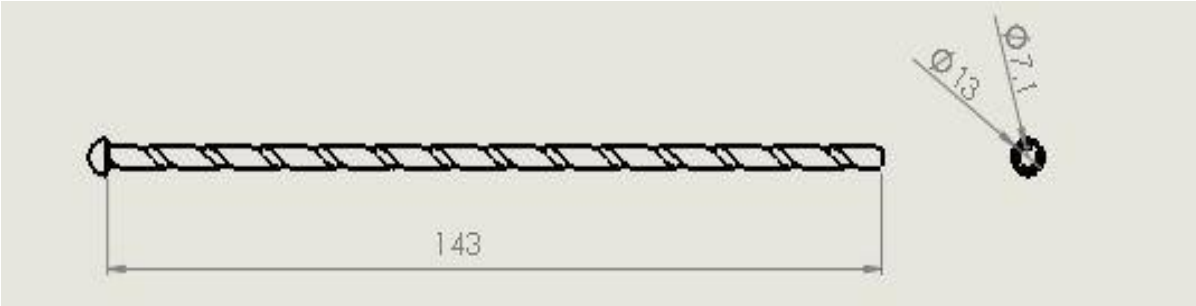

Figure 4. After making the threaded iron head

Calculation of Pneumatic Systems on Heading Machines

Dry Air Density Calculation

To determine the Density of Dry Air produced by the air filter to ensure the operation of a pneumatic installation that is free of trouble, it must be in a perfectly dry state, at least the air must contain as little moisture as possible, Where P is the pressure used, namely 9 Bar or $9 \times 10^5 \frac{N}{m^2}$ which is known from the manual book, Then T is the temperature of 80°C or 353 Kelvin which can be seen on the digital indicator, and the gas constant for dry air is 287 (J/Kg) and the density of dry air can be calculated by the formula :

It is known that: : $P = 9 \times 10^5 \frac{N}{m^2}$

$= 9 \times 10^5$ Pa

T = 80°C = 353 Kelvin

$R = 287 \left(\frac{J}{Kg}\right)$

Answer : $\rho = \frac{P}{R \,.\, T} = \frac{9 \times 10^5 \frac{kg.m/s2}{m^2}}{287\left(\frac{J}{Kg}\right) \times 353\ K} = 8{,}88\ \frac{Kg}{m^3}$

From the calculation of the density of dry air, the result is $8{,}88 \frac{Kg}{m^3}$ = 87,08 Pa

Perhitungan Hidrostatik

Hydrostatic Calculation

To determine pneumatic hydrostatic pressure, that is by calculating the pressure exerted by air in a motionless state, and having pressure energy caused by the density of air, gravity and distance to a reference point. Where ρ 8.88 Kg/m³ is the density of dry air calculated from the density of dry air 2.1 then g is the gravitational definition of 9.81 m/s² and point h is the reference point for the height of 7 meters, it can be calculated by the formula:

It is known that: $\rho = 8{,}88\ \frac{Kg}{m^2}$

$g = 9{,}81 \frac{m}{s^2}$

h = 7 m

Answer : $Ps = \rho \,.\, g \,.\, h = 8{,}88 \frac{Kg}{m^3} \times 9{,}81 \frac{m}{s^2} \times 7\ m = 609{,}78\ Pa$

From the hydrostatic calculation results, the result is 609,78 Pa.

Calculation of Pressure on Double Acting Cylinder

To determine the pressure required by the double acting cylinder tube to apply pressure to the pc wire so that it can be pressed perfectly by the hammer dies. Where the diameter of the cylinder is 0.06 m and the pressure is 9 Bar or 9×105 N/m² seen on the digital indicator to calculate the DAC cylinder pressure, it can be calculated by the formula:

Then: $A = \pi \,.\, r^2$

So: $P = \frac{F}{A}$

It is known that: : π= 3,14
d = 0,06 m
r = 0,03 m
$p = 9 \times 10^5 \frac{N}{m^2}$ = 9x10^5

Answer : $A = \pi . r^2 \ (m^2)$
$= 3{,}14 . 0{,}03^2 = 2826 \times 10^{-3}$
$F = P . A$
$= (9 \times 10^5 \frac{N}{m^2}) \times 2826 \times 10^{-3} \ m^2 = 254{,}34 \ N$

From the results of the Double Acting Cylinder calculation, the result is 254.34 N.
The results of this calculation are in accordance with the standards, whose maximum pressure limit is 260 N and the drink is 245 N.

CONCLUSION

Based on the results of practical work carried out at PT. Adhimix Precast Indonesia and based on the analysis previously described, the following conclusions can be obtained:

The work process carried out by the heading machine in making pc wire is generally carried out by the heading machine in the early stages of cutting pc wire with a diameter of 7.1 mm and a length of 152 mm with a cutting grinder and then clamped by a vise so that the threaded iron does not shift when getting pressure from the dies, then the dies will press the pc wire so that it is formed with a circle diameter of 13 mm and 7 mm thick.

The calculations obtained from the results of the pneumatic work system on the Heading machine are the calculations:

a. Dry Air Density Calculation
   The density of dry air is 8.88 Kg/m^3 = 87.08 Pa which is released as dew, if the dew is excessive it can cause rust in the heading machine.
b. Calculation of Hydrostatic Pressure
   hydrostatic pressure which is equal to 609.78 Pa of pressure flowing in the wind pipe, if the pressure is less then the force to push the die will be reduced, and the results will not be optimal.
c. Calculation of Double Acting Cylinder Pressure Strength
   Double Acting Cylinder which is equal to 254.34 N of force needed to press the hammer dies and apply pressure to the pc wire. If the pressure is less then the head is not formed properly.

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