Analysis Of Damage And Improvement Of Sledge Cross On Ghb-1340g Lathe Machine

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Abstract-In the machining process there are various tools that can be used to help work in the industry. Lathe is one of the machines that can cut metal with the shape, size and quality planned. In this study, the author took the topic of "Analysis and Repair of Latitude Sledge Lathe GHB-1340G". For the process of improving latitude slashes so that the composer can be reused to make improvements in the latitude slashes. After that, the composer conducts an experiment by turning the workpiece sample. The next stage after testing the workpiece samples by making a reduction, holes, and threads obtained a good, smooth, and even turning. The machine does not experience damage or problems anymore and can be used for a good turning process.
Keywords ; analyzers, lathes,Sledge, slurry repair and testing

1. Preliminary

A. Background

Lathe is one type of machine tool, which is used to cut objects whose main motion is spinning. Latitude crossing is part of a lathe, which functions as a tool holder clamp which also functions to regulate the magnitude of the progress of the tool chisel advanced in the process of turning thread, groove making, tapping, tapping, champering of the hip, and others whose accuracy can reach 0 , 01mm.

In analyzing and repairing latitude Sledge on this lathe is motivated because there is damage in one of the main components, namely damage to the slitting latitude. In analyzing damage to latitude slashes, we need literature studies relating to damage to latitude slashes.

B. Purpose

The objectives of this study are:

1. To find out the cause of damage to latitude slashes.
2. Repairing the Lathe which in this case is interrupted in its operation due to damage to the cross slash.
3. With improved cross slashes, the performance of the lathe will return to optimal.

2. Literature review

A. Literature Review

1. Lathe Machine

Lathe (Turning Machine) is a type of machine tool in the work process of moving rotating workpieces and using cutting tools or tools as a tool to slice the workpiece. Lathe is one of the production process machines used to form cylindrical workpieces. In the process, the workpiece is first attached to a chuck attached to the engine spindle.

Then the spindle and the workpiece rotate with the speed according to the calculation. Cutting tools (chisels) used to form workpieces, will be laid down on rotating workpieces generally lathe chisel in a stationary state, in its development there is a type of lathe that rotates its cutting tools, while workpieces are stationary. In rotating speed according to calculations, cutting tools will be easy to cut the workpiece so that the workpiece is easily shaped as desired.

It is said conventional because to distinguish machines that are controlled by a computer CNC (Computer Numerically Controlled) or numerical control (Numerical Control) and because conventional types of machines absolutely require manual skills from the operator. In the conventional lathe group there are also automatic parts and their movements and some are even equipped with an automated system service that is served by hydraulic, pneumatic or electric systems. The size of the engine is not merely small because not a few conventional lathes. For large works such as those used in the shipping industry in making or maintaining ship propeller shafts whose diameter reaches 1000 mm. According to Solih Rohyana (2008: p. 5), Turning

Figure. 1. GHB-1340G Lathe Type

GHB-1340G Lathe Machine Specifications:
Machine name: Lathe Machine GHB-1340G
Brand: CAYO
Made: China
The year 2009

Table 1. GHB-1340G Lathe Machine Specifications

Capacity Dimension Machine GHB-1340G		
Swing	over bed	13"(330mm)
	over cross slide	7-25/32" (198mm)
	over gap	18-3/4" (476mm)
	gap length	4-1/21" (115mm)
Center	height	6-1/2" (165mm)
	Center distance	39-1/3"(1000mm)
Bad	width	7-1/4"(185mm)
	heigt	11/18/25" (298mm)
Motor	main spindel	2HP
Headstock		
Spindle	bore	1-1/4"(38mm)
	nose	D1-4"
	taper in nose	no.5morse
	in sleeve	no. 5morse
Speeds	number	8
	range	70-2000rpm
Carriage and compound		
Cross slide	with	4-18/25"(120mm)
	travel	6-5/16"(160mm)
Compound rest	width	3"(76mm)
	travel	3"(76mm)
Leadscrew	diameter	7/8"(22mm)
	thread	8TPI or 3mm picth
Feed rod	diameter	22/35"(16mm)
Cutting tool		max.section1/2"x1/2" (12.7 mmX 12.7m
Tread and feeds		
Tread	imperial ptches	34kinds 4-56TPI
	metric pitches	26kinds 0.4-7mm
Cross feds	imperial	20Kinds 0.0015-0.0042in/rev
	metric	20kinds 0.04-1.07mm/rev
Tailstock	quil diameter	1-1/4"(32mm)
	travel	3"(76mm)
	taper	no.3 morse

2. Lathe Parts

Main Parts of Conventional Lathe are generally the same even though the brand or factory is different, it's just that sometimes the position of the handle or lever, button, table designation turning location / position is different. Likewise, how to operate because it has the same facilities is not much different. The following are the main parts of the lathe (ordinary) which are generally owned by the machine:

a. Main Axis or (Main
Spindle)

The main axis or also called the main spindle is the main axis of the machine which functions as a chuk holder, carrier plate, collet, fixed flashlight and others.

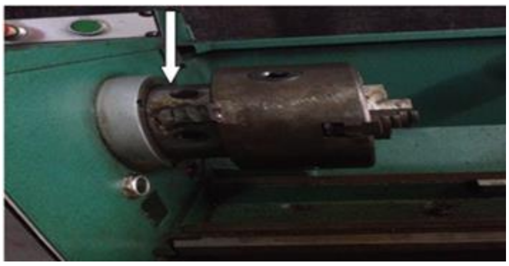

Figure. 2. Main axis

b. Sledge (Carriage)

Sledge consists of longitudinal slides (moving longitudinal carriage) along the base of the machine, cross sloping (cross carriage) that moves across the bottom of the machine and top slides (top carriage), which move according to the adjustment position above the transverse slides, the purpose of this slash is to provide the amount of feed can be adjusted according to the wishes of the operator which can be measured with certain accuracy contained in the spinning wheel.

c .Tail Head

The head is released as it is used for a swivel flashlight holder as a workpiece support during turning, taper shaft drill holder and drill claw as a drill clamp. The loose head can shift along the base of the esin, the shaft has a hollow hole making it easy for the drill stem to be clamped

d. Speed Adjusting Lever and Carrier Axis Speed Adjusting Lever

The lever is used to adjust the speed of the transporter shaft and the carrier axis. There are two choices, namely high speed and low speed. High speed is used for working small objects and finishing work, while low speed is used for roughing, threading, grooving, barging, and cutting (cutt off).

e. Table Plate

The magnitude of the speed attached to the lathe expresses the magnitude of the change between the relationship of the gears in the gear box or to the pulley wheels in a fixed head (head stock).

d. Turn reversing lever

Inverting Transporter Changing Lever and Carrier Axis The inverting lever, used to reverse the direction of rotation of the main axis, is necessary if you want to do rolling, wartering, or surface turning.

f. Speed Table Plate

Main Axis Speed can be shown by the main axis velocity figures contained in the speed table plate that is in the lathe section, the speed can be selected according to turning machining.

g. Axle adjustment lever

This control lever serves to adjust the engine rotation speed according to the results of calculations or readings from the rotation table.

h. Chisel clamp

Tool Brace (Tool Post) Tool Brace is used to clamp or hold a tool, which has several forms. This type is very practical and can clamp the chisel four (4) pieces at once so that in a workmanship if it requires four kinds of chisels can be installed and adjusted at once.

h. Slacking over

Sledge upper as a tool clamp holder which also functions to regulate the amount of tool progress in the process of making threads, grooves, tapering, champer (pingul) and others whose accuracy can reach 0.01 mm.

i. Cooling Faucets

Cooling Tap The cooling tap is used to deliver coolant to the workpiece that is being turned in order to cool the tool at the time of slicing so as to keep the tool sharp and long life, the result of turning is smooth.

j. Turning Wheel

The rotating wheel on the head is used to move the head shaft off forwards or backwards. How long will be taken when going forward or backward can be measured by reading the scale ring (dial) that is on the turning wheel. This movement is needed when going to drill to find out or measure how deep the drill bit must be inserted.

k. Transporters and Carrier Axes

Transporter or transporter shaft is a rectangular or threaded shaft

trapezoid which usually has a range of 6 mm, is used to carry sledding during automatic working time, for example when turning thread, grooves and other turning work. While the carrier axis or carrier shaft is the axis that is always spinning to carry or support sledding.

l. Latitude

Latitude sladge as it functions to move the tool across the machine base or forward or backward position of the operator, that is, in the eating of workpieces. On this sledding wheel there is also a measuring dial to find out how long the steps of the tool go forward or backward. The size of a lathe is determined by the length of the distance between the tip of the loose head flashlight and the tip of the fixed head flashlight. Lathes are capable of turning up to 100 mm.

3. Lathe Dimensions

Main Lathe Dimensions The size of a lathe is determined by the length of the distance between the head flashlight off and the tip of the fixed head flashlight. For example, a lathe height of 200 mm means that the machine is only able to run a transverse slope of 200 mm or is capable of turning a workpiece that has a maximum radius of 200 mm (400 mm in diameter). Likewise, for example, a machine length of 1000 mm means that it can only run longitudinal slashes along 1000 mm. However, there are some lathes that have facilities or completeness to increase the size of the object diameter by opening the base of the fixed head end.

a) Various Lathe Chisels

a. Flat lathe chisel

This type of lathe is used to turn flat surfaces on an elongated plane. The system works is by moving the tool from the outer end of the workpiece to the direction or vice versa depending on the tool right or left.

b. Lathe face chisel

The lathe has a 55 degree angle and is usually used for face turning or facing.

c. Lathe cut tool

This type of chisel is used specifically for cutting a workpiece to a certain length.

d. Lathe side / face

This type of lathe is used to lathe on the surface of the workpiece. The system works is by moving from the middle of the workpiece towards the exit or vice versa depending on the direction of rotation.

e. Chamfer lathe chisel

This type of chisel is used for champering at the surface end of the workpiece. Large champer angles are generally 45º.

b) The Principle of Latitude Eretan Work

The eretan functions as a chisel holder and regulates the cutting motion. The carrier eretan can be moved manually or automatically. Latitude Erethan (Cross Slide) Latitude Erethane Mounted on the saddle, serves to move the chisel towards the transverse, this is what functions to do the eating of objects from the front (front).

c) Type of Work in Turning

The works carried out by the lathe include the following:

1. Turning flat or turning straight.
2. Turning the face or leveling the end of the workpiece (facing).
3. Turning tapered outside or inside.
4. Making the right thread or left thread.
5. Eccentric (stem or hole).

4. Latest Reviews

In the machining process a lot of various kinds of tools for job aides in the industry. One of them is lathe, there are two kinds of lathe, namely conventional and non-conventional lathe. For the discussion this time we take the main discussion about conventional lathes related to our Final Project material. We take the topic of damage analysis and repair of cross slashes on the GHB-1340G lathe. To improve the latitude of the lathe slurry process is carried out repair process on the cross slurry thread(Antoni et al., 2019).

In conventional lathe (manual) the process of making thread is less efficient, because the repetition of cutting must be controlled manually, so that the turning process takes a long time and the results are less precise. With CNC controlled lathes the screw repair process is very efficient and effective, because it is very possible to make a thread with a pitch that varies greatly in relatively fast time and the results are precise.

In the process of analyzing the improvement of latitude slashes is done by observing, then turning on the lathe and then trying to move the slime latitude, in order to determine the damage to the latitude slime contained in the lathe. Henggar Patria Atmantawarna, he conducted a "analysis of the latitude of the lathe crossing". Some of the latest reviews that have been there, the authors do "Analysis of damage and repairs" this analysis is followed up by carrying out repairs, to run back cross slashes on the repaired lathe.

3. Research methods

A. Research Location and Time

The process of analyzing and repairing this tool is carried out using equipment in the STT Mechanical Engineering Workshop. Dr. KHEZ. Muttaqien. The implementation of this final project was carried out approximately 3 months from the stipulated month, which began July 2015.

B. Sources and types of data

Looking for literature as a support and reference in analyzing this latitude slash, so it can be seen the cause of damage to the latitude slash. Sources and types of data can be generated through:

1. Primary data derived from actual data from interviews or work processes on case studies.
2. Secondary data comes from publications as available literature, such as books, online and online journals, translated textbooks and online site pages.

C. Tools and Materials

1. Tools

The tools for analyzing and repairing cross slashes on the GHB-1340G lathe are:

1) Screwdriver
2) A Set of L Keys

3) A Set of Wrenches
4) Key ring
5) Brush
6) Majun
7) Lubricating Oil (oil)
8) Lathe
9) Calibration term
10) Dial indicator
11) Micrometer
12) Hammer

2. Materials used by slurred latitude

Gray cast iron is an alloy of iron with other elements such as: carbon, silisium, manganese, sulfur, and phosphorus, as well as other constituent elements. With the heat treatment process in FC 30 gray cast iron is expected to improve the mechanical properties of the metal.

Because this material is often used in the manufacture of lathe components such as cross slashes, head off the engine, and many other engine components, as well as a high ability to reduce vibration so that it is often used as a basic material for the framework or engine support. So it is necessary to do a study of the material whether it really meets the requirements regarding the quality of the material. The heat treatment aims to control the mechanical and microstructure properties of the material, prepare the semi-finished product to be feasible for further processing and increase the service life of the material.

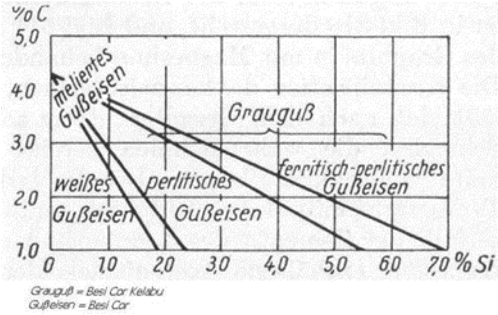

Figure 3. Diagram of Gray Cast Iron According to Maurer

Maurer developed a cast iron diagram with different C and Si contents at a certain cooling rate (ie in 30 mm diameter cast specimens) showing the matrix differences in each C and Si content.

D. Research Procedure

The stages of the research carried out can be seen in the diagram in Figure 3.1 below.

E. Data Analysis

Data analysis is a method used to process the results of research in order to obtain a conclusion. By looking at the theoretical framework, the data analysis technique used in this study is quantitative analysis.

4. Results and discussion

A. Results of damage damage checking

Look for damage and the cause of the damage, so that if there is a human / user factor, then after successfully being repaired so that the user in operating the machine is more careful and heedes the norms of work safety issues, so as to ensure the safety of workers, machines and equipment as well as the objects being worked on. Based on the search for damage, it was found damage to the cross-sloping thread. As a result of latitude slash damage so it can not be operated.

Figure. 4. Broken sledge

B. How to fix the outer quadrilateral thread

1. Preparation of the workpiece
a. Lathe the workpiece to the bottom diameter of the thread and as long as needed.
b. Make a groove at the end of the revolving about one width and a little deeper than the diameter of the foot.
2. Adjusting the tool
a. Pinch the chisel as high as a flashlight and clamp lightly.
b. Tulpos key and chisel in operation.
c. With the cutting edge of the tool close to the diameter of the workpiece, tap the tool to place the cutting edge parallel to the diameter of the workpiece.
d. Clamp the chisel and check again, then rotate the workpiece.
e. Touch the chisel to the diameter of the workpiece with a few traces of bruising as thick as the mouth of the chisel, indicating the position of the chisel is correct.
f. Set the zero index on the slate latitude and lock if necessary.

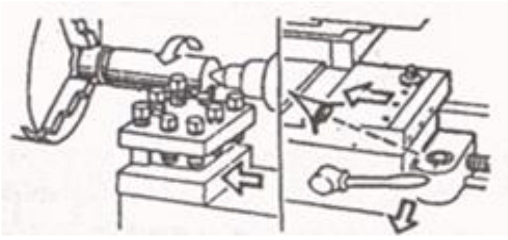

Figure. 6. Adjusting the tool

3. Adjusting the Machine
a. Select the position of the lever in accordance with the required threaded range.
b. Determine the position on the rolling dial where the rolling lever can be connected.
4. Cutting
a. Select the appropriate spin to scroll.
b. Determine the tool beyond the diameter of the workpiece and 0.003 advanced tool index 'for initial cut.
c. Connect the rolling lever to the appropriate dial position.
d. If the full width of the tool has reached the groove, release the screw lever
5. Check the threaded range
Calculate thread in inches by measuring using the bar.
6. Scroll the full depth
a. Continue to press the tool to the required depth.
b. Do not sledding over

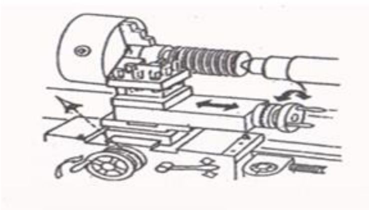

Figure. 5. Turning the outer rectangular screw

C. Turning the Quadrilateral Thread Inside
1. Turn the hole to a large size.
2. Setting the tool.
a. Pinch the chisel at or slightly above the height of the flashlight, guarantee the cutting edges are parallel to the hole and clamp slowly.
b. Guarantee the chisel has a full path through the hole.
c. Rotate the workpiece.
d. Hold backwards on the upper slash.
e. Touch the chisel to the hole.
f. Set latitude slate at zero.

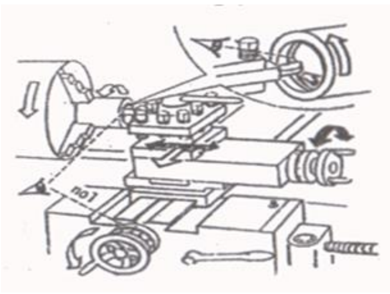

Figure. 7. Turning a square screw inside

Note: when trowing in, both the thread depth is set at the cross sloping index and the zero index is placed at the end of the hole depth.

3. Set the machine.

4. Do the initial cut.

a. Select the rotation according to the thread formed.

b. Place the chisel ¼ "away from the work area.

c. The latitude slash index is 0.003 '.' Don't forget this adjustment.

d. Connect the lever to the appropriate dial reading.

e. Release the lever as the chisel comes out of the hole.

f. Rewind the chisel from the workpiece.

5. Checking threaded.

Check many inch threads using the bar.

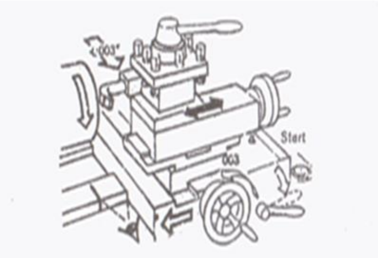

Figure.8. Setting the Machine.

6. Work on rolling.

a. Work the twisting until it reaches almost full depth.

b. Check the thread by using the bolt.

c. Work direct roll if necessary.

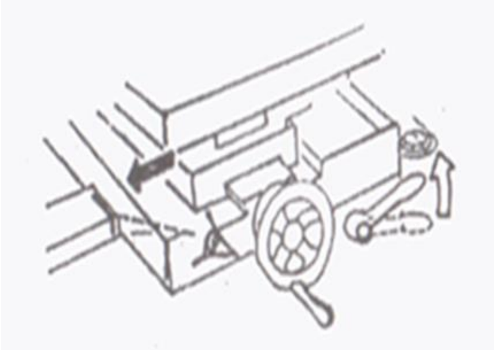

Figure. 9. Rolling

Note: the length of rolling can also be marked with a marker on the machine table or the tool handle, when the tool has reached its position.

D. Cutting Style

The cutting force that occurs in this lathe is, as follows:

Where ;

dm = Diameter of workpiece after turning (mm)

do = Initial workpiece diameter (mm)
m = Mass of workpiece (kg)
n = spindle main shaft rotation (rpm)
kr = Cutting angle (90o)
a = Cutting depth (mm)
f = Motion eating (mm / s)
π = Constant, 3.14

Figure. 10. Workpieces

Workpiece Diameter 25.3 mm
Panajang 80mm workpiece
Known :
dm = 25.3 mm
do = 30, 3 mm
d = (dm + do) / 2 = 27.8 mm
m = 0.3 kg
kr = 90^o
n = 755 rpm
a = 5 mm
f = 5 mm / s (obtained from the lathe specifications)
π = 3.14

According to the Journal (the influence of the tool cutting angle on the Cutting Force on the lathe process. Ivan normasusila. Zainal arifin.2013.

Cutting Force that occurs in slashes F latitude? is
$F = (m.v^2) / R$
The following calculations:

Cutting Speed
V = (π.d.n) / 1000
V = (3,14.27,8.755) / 1000
V = 65.90 mm / min
Feeding speed of movement
V = f.n
V = 5 mm.755 rpm
V = 3775 mm / min, 3,775 m / min
Cutting time
tc = lm / Vf
tc = cutting time
lm = workpiece length (mm) 8cm, 80mm
Vf = feed speed (mm / min)
tc = (80 mm) / (3775 mm / min)
tc = 0, 021 min
Furious earnings speed
Z = A. V
Where ;
Z = grower's speed (cm3 / min)
A = cross-sectional area mm2 (A = f. A)
Z = f. a. V
= 5 mm. 0.5 mm. 65.90 mm / min

= 164.75 mm3 / min, 0.16475 cm3 / min
Cutting width
b = a / sin kr
b = (0.5 mm) / sin 90^o
b = (0.5 mm) / 1
b = 0.5 mm
Furious thickness before cutting
h = f.sin kr
h = 5mm. sin 90^o
h = 5 mm .1
h = 5 mm

Cutting Style
F = (m.v^2) / R
F = (0.3 kg. 〖3,775〗^{2} m / min) / (0.0278 m)
= 4.2751875 / 0.0278
F = 153.78 N
So the cutting force that occurs is 153.78 N.

The cutting force that occurs during the turning process of the workpiece is known to be the result, then to look for the safety factor in the material can be calculated by decomposition according to; below this
F = 153.78 N
So, Tk = F / A
= 153.78N / (3,14.7,5)
= 153.78N / (56.25 〖mm〗 ^ 2)
Tk = 2.73 N / mm2
note: Tγ = 0.5 kg / mm
= 4.9 N / mm2
So, n = ty / tk
= (4.9N / mm) / (2.73N / mm)
= 1,795

5. Conclusion

From the results of improvements that have been made, conclusions can be drawn starting from the preparation, the process of analyzing, the process of unloading the latitude slash, until the process of repairing the cross slit. However, the authors only raise the following conclusions:

1. After analyzing latitude slashes, it can be seen that the cause of damage to latitude slashes occurs due to operator carelessness which results in cross slashes undergoing deformation or bending (broken) so that the lathe cannot be used.
2. Latitude erethan can be reused after repairing by repairing latitude slashes and replacing other damaged spare parts.
3. After conducting an operation test on the machine and a comparative calculation, the lathe can be used again with satisfactory results.

6. Suggestion

Before the analysis process takes place, all equipment to be used should be prepared in advance so that there are no obstacles in the analysis process. Here are suggestions from the authors:

1. The use of a lathe that will be used or operated should be a lathe operator must be directed or supervised by a lathe instructor that refers to the SOP (Standard Operating Procedure), so as to prevent lathe damage that occurs due to operator error.
2. Ensure the use is in accordance with the procedure for operating a lathe, which aims to prevent work accidents or damage to the lathe.

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