Economic transformation of C616 general-purpose machine tool

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Abstract

With the development of modern science and technology and increasingly fierce competition, we need to develop an automated production machine suitable for product upgrading and quality, low cost and high production efficiency. The development of such equipment is very urgent. Now there is a kind of equipment or technology that is very suitable for the current production status, that is, CNC machine tools. The CNC lathe has many advantages, it has high machining accuracy, a guarantee of the quality of the products produced at the same time, the most important thing is to finish making some parts with complex surface, it is a common law lathe difficult to achieve or possibility is almost zero. Will the cost of the engine lathe into a numerical control machine tool is for buying a new fee, usually can save sixty percent to eighty percent of the cost, cost of special low, especially for some large and special machine tools. Usually for large average the cost of the numerical control machine tool, just buy a new numerical control lathe, and thirty percent of the cost and the transformation of machine tool time than making a shorter course of nc machine tools. After modification, the common machine tool not only makes the labor personnel reduced the labor intensity, also for the enterprise to reduce the surplus labor force, points out that needed to manufacture new products and production cycle has been cut short. In today's market, people tend to want is a CNC machine tool rather than ordinary lathe. The heart of the subject is to economization become common machine tool nc machine tools. In China, most of the small and medium enterprises in order to meet the needs of their own development, has come up with a method of economical for modification of machine tools, to transform it into numerical control lathe, never realize the lathe of numerical control, automation, flexibility management. Economical nc machine tools system combined with the actual production and national conditions, the operational performance of one of the biggest characteristic is to meet at the same time, the price is low enough, especially in the production of the first line of a large proportion of heavy duty engine lathe is particularly suitable for transformation.

Keywords

The C616 ordinary engine bed, the numerical control transformation, longitudinal enters for crosswise enters for, the engine bed contour transformation.

1. Introduction

The computer numerical control technology is referred to as the numerical control technology, which is defined as the technology which controls the running lathe and the process of processing through the digital signal. Usually, we divide CNC machine into two kinds, one refers to the ordinary lathe equipped with CNC system, the other refers to the lathe with numerical control device itself. That is to say that the computer program is used to control the machine and the process of machining the mechanical parts according to the program made by the staff in advance. Thus, in the process of machining, the motion track of the machine tool will be strictly controlled according to the control program section which was programmed by the microcomputer before. Various control functions, such as the storage and processing of the input operation instructions, can be realized. With the advent and extensive application of the microcomputer, the hardware logic circuit is replaced, and the computer software can be used to control the machine tools.

The reform scheme is mainly to further analyze the structure, performance and precision of the common machine tools. In the economic transformation of ordinary machine tools, we must pay attention to whether the structure of CNC machine tools is reasonable and whether the basic components are intact. Besides, the form of the transmission mechanism of each axis can be used normally. The accuracy of NC machine tool is also consistent with the accuracy after transformation. Finally, we should make a complete summary of the accidents that happen before machine transformation and the accidents that will happen after transformation. The task book is rewritten according to the problems considered, and the lathe is transformed into an ideal organization. At the same time, we should also consider whether the cost of lathe transformation is too high: mainly considering the value of machine tools, whether there will be quick gains after transformation, and whether we can improve productivity and accuracy. The numerical control of the ordinary lathe in small and medium enterprises refers to the rational transformation of the mechanical structure and the software structure of the machine tool.

1.1 Development of CNC machine tools

1.1.1 General principles of CNC machine tools

(1) the process analysis is based on the drawings of the parts. Then the processing scheme is used to ensure the accuracy of the processing data.

(2) to write the processing program for the parts, it can be generated by the program code or the CAD/CAM software directly.

(3) the processing program that is generated by the computer is transmitted to the CNC system.

(4) generated by the CNC system to generate the instruction program for translation and operation, using the servo system to make all moving parts of the machine operation, complete the corresponding instruction, and through the control of the cutting tool and the workpiece movement, machining all aspects to meet our design at the beginning of the parts.

1.1.2 Classification of CNC system for machine tools

In order to understand and study CNC machine tools, we can classify them through various angles. Classification according to the control mode of the servo system is the most common classification method.

The servo system of NC machine tool is composed of drive mechanism and mobile components. Servo system is the executor's identity in NC system, and can be divided into the following types.
(1)Open loop control machine tool

The open loop feed servo system is adopted. No position feedback device is the biggest feature, followed by one-way signal flow. Therefore, the stability of open-loop control machine is outstanding. But the corresponding disadvantage is that the accuracy is not up to the standard. The stepper motor as its servo drive unit, stepping motor has simple structure, stable operation, debugging can realize high, so the device can be widely used in precision and speed is not high and the driving torque demand is not great processing conditions.

(2)Semi closed loop control machine tool

The semi closed loop control system is defined as if the angular displacement detection device is installed at the end of the drive motor or installed on the end of the transmission screw rod, the actual position or displacement is an indirect measurement execution component. The movement of the worktable is measured indirectly through the angular position measuring screw mounted on the screw or the rotation of the motor shaft. No matter how the displacement of the worktable changes, the angular displacement measuring element can be recycled at 360 degrees. The semi closed loop control machine is between the open loop and closed loop control, so as to get higher position accuracy than the open loop system, but the closed loop is higher than that. Compared with the closed loop control system, it is easy to achieve the stability of the system. At present, in the Chinese market, the majority of the CNC machine tools are used in the semi closed loop control system.

(3) Closed loop control machine tool

The closed loop system of NC machine tool, the linear displacement detecting installation makes the work machine parameters that can directly with the input parameters are compared with the difference between the two parameters to compare the non-stop, until the difference is zero to the end of the run, the error will be eliminated in this time and again detection and in operation, so that the position and accuracy of the machine is very precise. But this kind of operation will also bring the corresponding malpractice, that is, the system is unstable. Therefore, the design, installation and commissioning of closed loop system has great challenges. Therefore, the accuracy, rigidity and transmission characteristics of these links need higher requirements, which leads to the expensive price of open-loop control machine tools.

1.1.3 Development and prediction of CNC machine tools

With the development of modern electronic and computer technology, the performance of CNC system is improving day by day. The field of numerical control system can also play a bigger role. CNC system must develop rapidly in the direction of accuracy, speed, reliability and openness, so as to meet the needs of social economic development and technological development.

(1) high speed and high precision

The most important technical index of CNC system is speed and accuracy. It plays a decisive role in the efficiency and quality of CNC machine tools. The most important way to improve production efficiency is to improve the cutting speed. The speed of data processing in CNC system determines the speed of NC machine. Therefore, the data processing speed of NC system can be improved by installing high speed microprocessor. Some systems also developed special chips to improve the interpolation speed of tools. Some of them adopted multi micro processing system, which further improved the control speed.

(2) High reliability

The most important measure of reliability is MTBF. The zero failure time of modern CNC system can reach ten thousand to thirty-six thousand hours. In addition, the modern control system also has the fault diagnosis system of artificial intelligence, which can alarm the potential and occur faults and prompt the solution.

(3) Stronger communication function

Usually, the CNC system is equipped with RS-232 or RS-422 high speed long distance serial interface to adapt to the rapid development of automation technology. Follow the customer's needs and exchange data to a computer program at the top level. The digital control DNC interface is now installed in some high-end CNC systems. The numerical control communication of this system can be realized between several CNC machine tools.

(4)Openness

Due to the manufacturer of CNC system technology security, most of the previous CNC system is closed, leading to between the product and the product information can not be used interchangeably, and machine maintenance and upgrade difficulty is a problem for the enterprise, the demand of the CNC technology is not the market. In view of these conditions, people have creatively proposed the opening of numerical control system. Domestic and foreign manufacturers are developing large-scale open CNC system. The open CNC system has a standardized man-machine interface and programming language, soft and hard compatibility, and convenient maintenance.

2. Design scheme

A CNC open loop servo control system is adopted to control the transverse feed and longitudinal feed system. The burden of the driver falls on the stepping motor body, and the ball screw pair is used for transmission control, and the automatic turning frame is adopted. A microcomputer is used to control the workpiece automatically. The main function of the transformed CNC lathe is to rotate the workpiece, and the feed motion is the motor driving the lead screw to make the lathe feed.

The CNC system manually inputs the microcomputer according to the machining program. The computer will output the signal of the processing program through the power amplifier to drive the motor, thus driving the tool carrier to complete the feed movement and complete the cutting of the workpiece. Alike。 When the tool holder is automatically converted, a pulse signal is sent out by the computer. The tool holder reaches the specified position and rotates to the specified tool to change the knife

3. Transformation of mechanical part

3.1 The calculation and design of the longitudinal feed system

(1) Longitudinal feed system of machine tool

Most of the transformation of machine tools usually use stepper motor, which is driven by the slow speed of the screw rod, and then fixed by the nut to the sliding board box at one end, so that the tool carrier can move around the lathe. And the stepper motor can be installed at any end of the screw. Considering the use of CNC lathes after convenience, the motor is placed on the right end of the screw.

(2) On the longitudinal feed system of the machine tool

Known conditions:

Workbench weight:	W=750N
Time constant:	T=28ms
The basic guide of the ball screw:	L_0=8mm
Itinerary:	S =700mm
Pulse equivalent:	Delta p=0.02mm/step
Step angle:	α =0.75 degrees /step
Fast feed speed:	$V_{\max}$ =2.5m/min

[1]The cutting force is calculated from the manual of the machine tool design, and the cutting power is

$$N_c = N\eta K$$

N - motor power, check machine tool instructions, N=4kW;

η -The total efficiency of the main drive system is generally 0.6 to 0.7.

K - the power coefficient of the feed system is K=0.96.

Then: x=4 * 0.65 x 0.96=2.496 kW

Also because of $N_c = F_z v / 6120$

Therefore $F_z = 6120 N_c / v$

V - cutting line speed, take v=100m/min.

Main cutting force F_z=6120×2.496/100=152.76（kg f）=1527.6（N）

It is known from the principle of metal cutting that the main cutting force is

$$F_z = C_{F_Z} \alpha_p^{X_{Fz}} f^{Y_{Fz}} K_{F_Z}$$

Look-up table: C_{F_Z} =188kgf/㎡=1880Mpa

X_{F_Z} =1 Y_{F_Z} =0.75 K_{F_Z} =1

The computable F_Z is shown as shown in table:

α_p (mm)	2	2	2	3	3	3
f（mm）	0.2	0.3	0.4	0.2	0.3	0.4
F_Z（N）	1125	1524	1891	1687	2287	2837

F_X =0.5Fz=0.5×1527.6=763.8N

F_Y =0.6Fz=0.6×1527.6=916.5N

[2] Design and calculation of ball screw

A.The advantages of ball screw pair drive:

1) with small friction and high efficiency of transmission, it usually can reach more than 90%. At the same time, the transmission efficiency of the inverse motion is quite high, which is almost equal to the positive phase. Therefore, it can be positive and reverse transmission.

2) the axial clearance can be eliminated by pretightening, so a higher transmission precision can be obtained.

3) less wear and longer life. Because the surface of its main parts has been treated by surface hardening (surface hardening, carburizing, quenching, nitriding, etc.), so it is wear-resistant.

4) cannot lock itself.

5) but the biggest drawback is that the structure is more complex, resulting in its high price.

B.The precision and code of the ball screw

C.Ball screw protection:

The ball screw pair can also be lubricated with a lubricant to improve the wear resistance of the ball screw and the efficiency in the transmission process. Lubricating oil and grease are the most common and most commonly used lubricants. The lubricating oil is generally used as a total loss system oil or no. 90~180 turbine oil or no. 140 spindle oil. Adding grease to the thread raceway is the most common way of grease lubrication, and the lubricating oil is injected into the inner of the nut.

[3] The calculation of gear and torque

1) the calculation of gear

transmission ratio

$$i = \varphi L_o / 360\delta_p = 0.75 \times 6 / 360 \times 0.01 = 1.25$$

So take Z_1 =32 Z_2 =40

m=2mm b=20mm α =20°

$$d_1 = mZ_1 = 2 \times 32 = 64mm$$

$$d_2 = mZ_2 = 2 \times 40 = 80mm$$

$$d_{a1} = d_1 + 2h_a^* = 68mm$$

$$d_{a2} = d_2 = 2h_a^* = 84mm$$

2) calculation of the moment of inertia

The quality of the worktable is converted to the moment of inertia on the shaft of the motor:

$$J_1 = (180\delta_p / \pi\alpha)^2 W = (180 \times 0.01 / 3.14 \times 0.75)^2 \times 80 = 0.467 kg.cm^2 = 4.67 N.cm$$

The moment of inertia of the screw:

$$J_s = 7.8 \times 10^{-4} D^4 L = 7.8 \times 10^{-4} \times 3.2 \times^4 \times 100 = 8.1789 kg.cm^2 = 81.789 N.cm^2$$

The moment of inertia of a gear:

$J_{Z1} = 7.8\times10^{-4}\times6.4^{4}\times2 = 2.617kg.cm^{2} = 26.17N.cm^{2}$

$J_{Z2} = 7.8\times10^{-4}\times8^{4}\times2 = 6.39kg.cm^{2} = 63.9N.cm^{2}$

As the motor's moment of inertia is too small, we ignore it here.

Therefore, the total moment of inertia:

$J = 1/i^{2}(J_{S}+J_{Z2}) + J_{Z1} + J_{1} = 1/1.25^{2}(8.1789+6.39) + 2.617 + 0.467$

$= 12.408kg.cm^{2} = 124.08N.cm^{2}$

3) the calculation of the required moment of rotation:

The torque required for fast no-load startup

$M = M_{a\max} + M_{f} + M_{o}$

Torque required for maximum cutting load

$M = M_{at} + M_{f} + M_{o} + M_{t}$

Torque required for fast feed

$M = M_{f} + M_{o}$

$M_{a\max}$ - the acceleration moment that is converted to the shaft of the motor when the empty load is started.

M_{f} -the friction torque converted to the shaft of the motor;

M_{o} -the additional friction torque converted to the shaft of the motor due to the pretightening of the screw.

M_{at} - the acceleration moment that is converted to the shaft of the motor during cutting.

M_{t} - the cutting load torque converted to the shaft of the motor.

$$M_{a} = Jn\times10^{-4}/9.6T \quad (2\text{-}11)$$

At that time, $n = n_{\max}$ $M_{a\max} = M_{a}$

$n_{\max} = v_{\max}i/L_{0} = 2000\times1.25/6 = 416.7r/\min$

$M_{a\max} = 12.408\times416.7\times10^{-4}/9.6\times0.025 = 2.15N.m = 21.5kgf.cm$

At that time, $n = n_{t}$ $M_{a} = M_{at}$

$n_{t} = n_{主}fi/L_{0} = 100vfi/\pi DL_{0} = 1000\times100\times0.3\times1.25/3.14\times80\times6 = 24.88r/\min$

M_{at}=12.408×24.88×10^{-4}/9.6×0.025=0.1286 N.m=1.286kgf.cm

$M_{f} = F_{0}L_{0}/2\pi\eta i = f'WL_{0}/2\pi\eta i$

So, the torque needed for fast no-load startup:

$M = M_{a\max} + M_{f} + M_{O}$

=21.5+1.223+0.462=23.185kgf.cm=231.85N.cm

Torque required for cutting:

$M = M_{at} + M_f + M_o + M_t$

=1.286+1.223+0.462+7.297

=10.268kgf.cm=102.68N.cm

Torque required for fast feed

$M = M_f + M_o$

=1.223+0.462=1.685kgf.cm=16.85N.cm

From the above analysis, we can know that:
The required maximum torque occurs at a quick start.

$M_{\max} = 23.185kgf.cm = 231.85N.cm$

3.2 Calculation and design of lateral feed system

(1)Design of a horizontal feed system for machine tools

Generally speaking, the transverse feed system for economical transformation of ordinary lathes usually also slows down the motor and then puts the ball screws, which enables the automatic tool carrier to work horizontally.

(2)Design and calculation of feed system

It is roughly similar to the longitudinal feed system, and no more explanation is done here, only the results are calculated.

Known conditions:

Workbench weight:	W=30kgf=300N
Time constant:	T=25ms
The basic guide of the ball screw:	L_0=4mm left-hand
Itinerary:	S =190mm
Pulse equivalent:	δp=0.005mm/step
Step angle:	α =0.75 º /step
Fast feed speed:	$V_{\max}$ =1m/min

[1]Calculation of cutting force

The transverse feed is 30%-50% in the longitudinal direction, and the transverse cutting force is about half of the longitudinal cutting force of 50%.

F_Z =1/2×152.76=76.38kgf=763.8N

When the workpiece is cut off:

$F_y = 0.5F_Z = 0.5 \times 76.38 = 38.19kgf.cm = 381.9N$

[2]Design and calculation of ball screw

1) stiffness checking:

The variation of the lead in the ball screw caused by the working load P $\Delta L_1 = \pm 74.74\times10\times0.4\times4/3.14\times20.6\times10^6\times1.7619^2 = \pm 5.96\times10^{-6}$ cm

The guide change of the ball screw caused by the torque is very small and can be ignored, that is, the total error of the guide deformation is $\Delta L = \Delta L_1$, so the total error of the guide deformation is ΔL_2.

Δ=100ΔL/Lo=100×5.96×10^{-6}/0.4=14.9μm/m

It is known that the pitch error (1m length) allowed by the E precision screw (1m length) is 15 u m/m, so the stiffness is sufficient.

2) verification of stability:

Because the diameter of the ball screw has not changed any more, so the original supporting way with one end fixed and one end suspended will become a supporting way with one end fixed and one end radial supporting, so the stability of the mechanism will be greatly enhanced and no longer checking computations.

[3] Calculation of gear and torque

1) the calculation of gear

transmission ratio

$$i = \varphi L_0 / 360\delta_P = 0.75 \times 4 / 360 \times 0.005 = 5/3 = 1.67$$

so take

$$Z_1 = 18 \quad Z_2 = 30$$

$$m = 2mm \quad b = 20mm \quad \alpha=20^{o}$$

$$d_1 = 36mm \quad d_2 = 60mm$$

$$d_{a1} = 40mm \quad d_{a2} = 64mm$$

$$\alpha = 48mm$$

2)calculation of moment of inertia

The moment of inertia of the worktable to the shaft of the motor

$$J_t = (180\delta_p / \pi\varphi)^2 W = (180 \times 0.005 / 3.14 \times 0.75)^2 \times 30 \times 1/100 = 0.0439 kg.cm^2$$

The moment of inertia of the screw

$$J_s = 7.8 \times 10^{-4} \times 2^4 \times 50 = 0.624 kg.cm^2$$

The moment of inertia of a gear

$$J_{Z1} = 7.8 \times 10^{-4} \times 3.6^4 \times 2 = 0.262 kg.cm^2$$

$$J_{Z2} = 7.8 \times 10^{-4} \times 6^4 \times 2 = 2.022 kg.cm^2$$

The motor inertia is negligible, so the total inertia

$$J = 1/i^2 (J_S + J_{Z2}) + J_{Z1} + J_t = (3/5)^2 (0.624 + 2.022) + 0.262 + 0.0439 = 1.258 kg.cm^2$$

Calculation of the required moment of rotation

$$n_{\max} = v_{\max} i / L_o = 1000 \times 5/3/4 = 416.7 r/\min$$

$$M_{a\max} = J n_{\max} \times 10^{-4} / 9.6T = 1.258 \times 416.7 \times 10^{-4} / 9.6 \times 0.025 = 0.2184 N.m = 2.23 kgf.cm$$

$$n_t = n_{主} f_i / L_o = 1000 vfi / \pi D L_o = 1000 \times 100 \times 0.15 \times 5 / 3.14 \times 60 \times 4 \times 3 = 33.17 r/\min$$

$$M_{at} = 1.258 \times 33.17 \times 10^{-4} / 9.6 \times 0.025 = 0.0174 N.m = 0.1775 kgf.cm$$

$$M_f = F_0 L_0 / 2\pi\eta i = f' W L_0 / 2\pi\eta i = 0.2 \times 30 \times 0.4 \times 3 / 2 \times 3.14 \times 0.8 \times 5$$

$$= 0.287 kgf.cm = 0.028 N.m$$

$$M_o = F_v L_o (1 - \eta_o^2) / 6\pi\eta i = 38.19 \times 0.4 \times 3 (1 - 0.9^2) / 6 \times 3.14 \times 0.8 \times 5 = 0.116 kgf.cm = 0.011 N.m$$

$$M_t = F_y L_o / 2\pi\eta i = 38.19 \times 0.4 \times 3 / 2 \times 3.14 \times 0.8 \times 5 = 1.824 kgf.cm = 0.179 N.m$$

So, the torque needed for fast no-load startup

$$M = M_{a\max} + M_f + M$$

=2.23+0.287+0.116=2.633kgf.cm=26.33N.cm

Torque required for cutting:

$M = M_{at} + M_f + M_o + M_t$

=0.1774+0.287+0.116+1.824

=2.40kgf.cm=24.04N.cm

Torque required for fast feed:

$M = M_f + M_o$

=0.287+0.116=0.403kgf.cm=4.03N.cm

The above calculation shows that the maximum torque occurs at the fast start of $M_{a\max} = 2.633kgf.cm = 26.33N.m$

4. Electrical part transformation

4.1 Selection of stepper motor

4.1.1 Determination of step motor for longitudinal feed system

$M_q = M_{L_0} / 0.4 = 23.185 \times 10 / 0.4 = 579.625N.cm$

The three phase six beat method used by the stepping motor is to meet the needs of the minimum step moment. $M_q / M_{im} = 0.866$

Therefore, the maximum static torque of the stepping motor is as follows:

$M_{im} = M_a / 0.866 = 579.625 / 0.866 = 669.31N.cm$

Maximum working frequency of stepper motor

$f_{\max} = v_{\max} / 60\delta_p = 2000 / 60 \times 0.01 = 3333.3Hz$

In comprehensive consideration, 110BF003 type DC stepping motor is selected for the look-up table, which can meet the requirements of use.

4.1.2 Determination of step motor for lateral feed system

$M_q = M_{Lo} / 0.4 = 2.633 \times 10 / 0.4 = 65.825N.cm$

Also take the three phase six beat way, through the lookup table to know:

$M_q / M_{im} = 0.866$

Therefore, the maximum static torque of the stepping motor is as follows:

$M_{im} = M_a / 0.866 = 65.825 / 0.866 = 76.01N.cm$

Maximum working frequency of stepper motor

$f_{\max} = v_{\max} / 60\delta_p = 1000 / 60 \times 0.005 = 3333.3Hz$

In order to facilitate the design and purchase, the 110BF003 type DC stepping motor is still selected, which can meet the requirements of use.

4.2 The design of the hardware circuit of the CNC system

For every CNC system, there is no doubt that it is part of it, and it is simply hard and software. As a symbol of this system is the most common and most core hardware, it plays a decisive role is the role can not be ignored on CNC system, hardware performance work represents a CNC technology advanced, can be directly reflected in the clear. It is a key link in the success and smooth operation of a system software.

But among the components, the most important and the most unquestionable is the CPU. Most of it is the role of the coordinator, and most of the time is running on a large number of information processing and control circuits. As we know the memory is used to store a wide variety of system software, and a lot of information. The input / output interface is a method of obtaining data between the system and the user that can exchange information between the user and the user.

4.3 Single chip microcomputer

The single chip microcomputer is also referred to as the single chip microcomputer. The single chip microcomputer integrates all the functions of the microcomputer on a chip. With the continuous expansion of the new generation of control functions and the updating of many peripherals that are installed inside the MCU, the A/D, PWM and WDT functions of these singlechips cannot be used to express their inner meaning only by SCM. In the current international society in SCM is often referred to as WCU, but in China, because before been called SCM, people used the term has been used so far, but its essence is MCU. Because most of the singlechip is oriented to control, it is often called a microcontroller.

4.4 Photoelectric isolation circuit

In the driving circuit of the stepper motor, all the driving signals must be amplified by the power amplifier and then control the motor. If the output signal and the power amplifier is directly connected, coupled with the driving voltage on the motor needed is not generally high, and the current is not small, it is easy to cause the interference, if the interference intensity is not so powerful when it will affect the normal operation of the computer program, on the contrary the interference intensity is heavy and will make computer interface the circuit, so usually isolation circuit to be connected to the interface circuit and the power driver,As shown in this Figure.

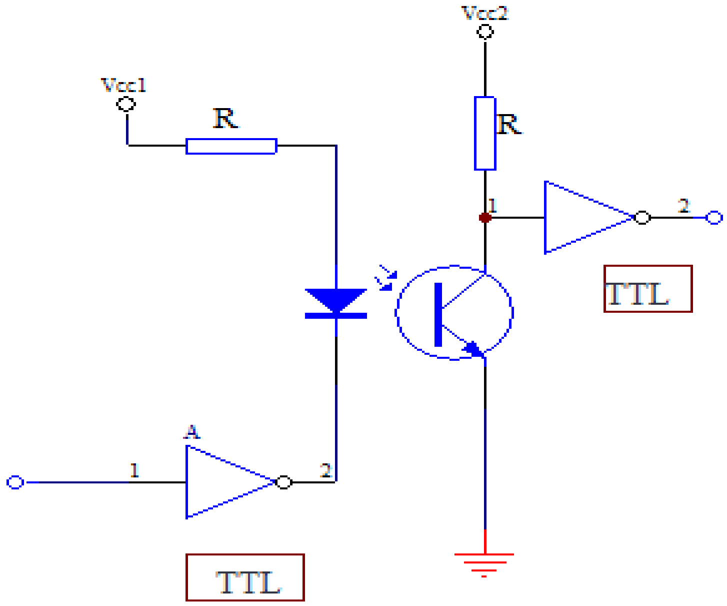

Fig. 1

5. Conclusion

In China's automated machining process, it is inseparable from the existence of numerical control machine tools. It is a practical and feasible way to transform the ordinary lathe into a CNC lathe. In the small and medium-sized factories in China, especially small and medium-sized factories in places, these factories are equipped with a large number of ordinary lathe, if these ordinary car factory all NC, then we put forward the reform scheme will occupy a large market. Compared with the installation of numerical control devices, I personally think it would be better to choose a single chip microcomputer as a central microprocessor. The cost of numerical control for large ordinary machine tools is only 30% of the cost of buying a new CNC lathe, and it can be delivered as soon as possible.

After analyzing the practicability and usage rate of C616 lathe, it is considered that it has many advantages, such as convenient operation and reasonable setting of technical parameters, so that machining efficiency can be continuously improved. In addition, this technology and other general machine tools also apply, only on the basis of cutting power corresponding lathe to meet demand, driven by the change of the system, a variety of other types of general machine tools can be applied, so I think this transformation has a very good market Chinese.

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