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# Autosizing Control Panel for Needle Bearing

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**ABSTRACT**
A needle roller bearing is a bearing which uses small cylindrical rollers. Bearings are used to reduce friction of any rotating surface. Needle bearings have a large surface in contact with the bearing outer surfaces as compared to ball bearings. There is less added clearance(Diameter of the shaft and the diameter of the bearing are different) so they are much compact. The structure consists of a needle cage which contains the needle rollersthemselves and an outer race (The housing itself). Radial bearings are cylindrical and they use rollers parallel to the axis of the shaft. Radial pattern of needle are being used by thrust needles. Complement bearings have solid inner as well as outer rings and rib-guided cylindrical rollers. The bearings have the largest number of rolling elements and also have extremely high radial load carrying capacity and are suitable for compact designs.Needle roller bearings have relatively small diameter cylindrical rolling elements whose length is much larger than their diameter. As compared to other types of rolling bearings, needle roller bearings possess a small cross-sectional height and significant load-bearing capacity and rigidity relative to their volume. Also, because the inertial force acting on them is limited, needle bearings are an ideal choice for applications with oscillating motion. These bearings also work well in compact and lightweight machine designs and they serve as a ready replacement for sliding bearings. Needle bearings features are great rigidity, smaller cross-section, higher load-carrying capacity, and has lower inertia forces that facilitate to size and weight reductions in machinery. Needle bearings are designed to stand in oscillation, performwell under any conditions, and interchange with the sliding of bearings.

**Keywords**: programmable logic control, human machine interface, grinding machine, analog to digital converter.

## I. Introduction

Needle roller bearing is the bearing which is used for different electronic devices. In this project we are thinking to design the autosizing control panel for needle bearing this panel will produce needle of required size as per the need. As we know that the needle bearings are used in different electronics devices to reduce the force of friction which will reduce the noise as well as it will improve the life of a device.Needle bearings are heavily used in automobile component such as rocker, arm pivot, pumps, compressors, &transmission. The drive shaft of a rear-wheel drive vehicle typically has at least eight needle bearings and often more if it is particularly long, or operates on steeps lopes. The combination bearing and the cage assemblies and non-standard needle roller bearings are the main products. These products are beingused in automotive transmission, motorcycles, washing machines, Metallurgy, Textile machinery, electric tools and other fields. As these needle bearings are used in number of application so they are in different in size for every application, as there are number of sizes increases the rapid change in mass production and for this purpose we need an auto sizing in production. By the use of automation in the production we can manage the particular dimension in the needle, as the dimension is the criteria for the application.

## II. Previous Work

The use of bearing in machine is a old concept where it is firstly used for whehicles to reduce friction because of that the sound was decreased& as friction is reduced the life of whehicle is increased. But latterly these bearings are used in electronic devices as the use increase manufacturing of different types of needle increases but it needs separate configuration for different needle which is becoming very difficult for production as the cost of each machine is very high n maintains is very difficult so due to this it limits the production of different types of needle.As the market demand the production of needle chances as any machine manufacturing is stopped the needle machine was also wasted, which is cost inefficient.

## III. Autosizing Control Panel

A specific dimension needle is needed for

specific application, by the human error the required dimension is not achieved as there is very precision while considering the application hence we are going to use the automation system to automatically manage the size of needle bearingThe needle bearing production by using the automation, here we are thinking to replace human by some machines which will full-fill our requirement of producing needle bearing of specific dimension without any error. It reduces the time also and cost effective method is used, there is no limitation to the machines as the human have like environment friendly, limitation of human body. Repetitive in nature.The following fig shows block diagramof autosizing control panel.

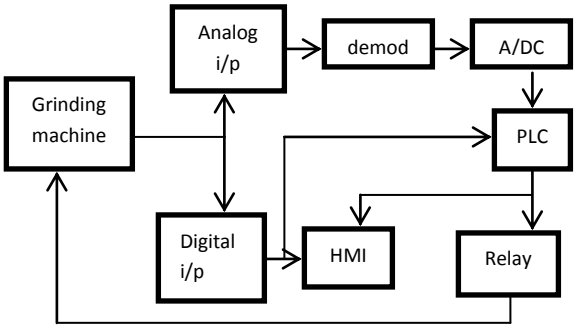


Fig:2.1 Autosizing control pannel

The figure shows the actual block diagram of the project. The diagram shows no of blocks which are grinding machine, analog and digital i/p &demodulator, analog to digital converter, human machine interface, programming logic controller and relays .In this project the grinding machine will take input and it will give the output as a unshaped needle which is again processed and converted into the dimensional needle as per the requirement.

**3.1. Grinding Machine**

A grinding machine us shorter than the grinder, and it is used for grinding, it uses an abrasive wheel as the cutting tool. Each grain of abrasive falls on the wheel's surface and cuts in a small chip from the work piece via shear deformation. Grinding machine is used to finish work pieces that must show high surface quality (e.g., low surface roughness) and high accuracy of shape and dimension. As the accuracy in dimensions by grinding machine is in the order of 0.000025 mm, in most applications it tends to be a finishing operation and removes little metal, about 0.25 to 0.50 mm depth.

**3.2Analog & digital I/P**

Analog and Digital I/P is the output of grinding machine which will produce two outputs in which one is analog input and second is digital. Analog i/p shows that current size of needle and digital input will give the digitized value of analog input which will be used by the PLC to recognise the change in needle size. And this digital value will be compared with the PLCs digital value and it will produce the needle with required size.

**3.3 Demodulator**

The demodulator takes the digital input and with reference to the staircase maker and the delay unit digital data is converted into an analog signal. The converted analog signal, however, the signals need to pass through a low-pass filter for smoothing. Demodulation is the act of extracting the original information-bearing signal from a modulated carrier wave. A demodulator is an electronic circuit (or computer program in a software-defined radio) that is used to recover the information content from the modulated carrier wave. These are traditional terms used in connection with radio receivers, but the other systems use different kinds of demodulators. A common one is in a modem, which is a contraction of modulator/demodulator.

**3.4 Analog to Digital Converter**

PLC systems comprise input/output modules. Since many of the input and output involve real-world analog variables—while the controller is digital—PLC system hardware-design tasks focus on the requirements for digital-to-analog converters (DACs) and analog-to-digital converters (ADCs), input- and conditioned output signal and also isolation of the electrical wiring of the input- and output modules from the controller and each other. Resolutions of I/O modules typically range from 12 bits to 16 bits, with 0.1% accuracy over the industrial temperature range. Analog output voltage and current ranges include ±5 V, ±10 V, or 0 V to 5 V, 0 V to 10 V, and 4 to 20 mA or 0 to 20 mA. Settling-time requirements for DACs vary from 10 µs to 100 Ms, depending on the application.

**3.5 PLC**

It uses PLC 16ES200R which is manufactured by DELTA.

Fig 3.2 PLC (Programmer Logic Control)

**3.6 HMI**

It uses DOPB07S211 HMI which is manufactured by DELTA


Fig 3.3 HMI

**3.7 Relays**

A relay is an electrically operated switch. Number of relays uses an electromagnet to operate a switching mechanism mechanically; other operating principles are also used for switching purposes. Relays are used to control a circuit by a low-power signal (with complete electrical isolation between control and controlled circuits), or where several circuits must be controlled by one signal. The relays werefirstly used in long distance telegraph circuits, repeating the signals which are coming in from one circuit and re-transmitting it to another station. Relays were used mostly in telephone exchanges and early computers to perform logical operations.

## IV. Comparison with Older System

The following comparison block shows why one should use automation for needle bearings, all the advantages are mention in terms of comparison. We are using some of parameter to make comparison.

**Table no: 4.1 comparisons with older system**

| Sr. no | Parameter | Without automation | With automation |
|---|---|---|---|
| 1. | No of machines | It takes no of machines equal to requirement. Ex= 10 types of needle needs 10 different types of machines | It needs only 1 machine |
| 2. | Machine cost | As no of machines are more so cost is very high | cost is low because of single machine |
| 3. | diameter | 10 different machine produces 10 different diameter needles | Single machine produces many different diameter needles |
| 4. | manpower | More manpower is required | Very less restricted to 1 or 2 |
| 5. | Maintains cost | Maintains cost is very high | Maintains cost is very low |
| 6. | Sudden change in requirement | If any type of needle requirement is down the whole set up is wastage | Not in this case |
| 7. | Size of needle | Lots of error as it is manual production | Less no of errors as it is automatic |
| 8. | efficiency | low | High |

## V. Application

As already mentioned all the feature of the automation in above comparison the application is in various types of needle production. Can be used in needle production to manufacture different types of needle from a single machine which will be cost efficient. Less manpower is required to look after as it goes according to programming so produces exact required size of needle. Here wastage of needle will be less as it is automatic. If any type of needle production suddenly goes down so no worry we can just stop the production of that needle as contrast if any additional size is required we can just change the arrangement and continue to produce that needle**.** After the production of needle with different sizes that can be used in different applications they are mentioned below.

1) Used in electronic devices
2) Motor vehicles
3) In industrial conveyors
4) Washing machines
5) Industrial robots

## VI. Conclusion

Autosizing control panel for needle bearing will overcome most of the disadvantages of single needle by single machine concept. It is cost efficient system, low maintains cost, The production of needle bearing can or will be manufactured by the use of automation which is new way for rapid and quality production. It increases the production of needle bearing which will be different in size and shape but the overall mass production is increased with this process. It uses the automation which is nothing but the use of automatic control of production of needle bearing.

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