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THE PRINCIPLE OF OPERATION OF AUTOMATED LATHES

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Annotation: This article discusses lathes and the prospects achieved in mechanical engineering due to their automation. Modern machine tool companies produce the most modern types of metal cutting machines, reducing manual labor and doing everything possible to produce inexpensive and high-quality machines. Examples of these are automatic and semi-automatic machines, machines with numerical control, robotic manipulators and production lines built using technological processes performed by production robots. The existing shortcomings and the importance of their elimination are also considered in this area. The article also presents suggestions and conclusions on the topic.

Key words: Lathe, mechanism, automatic, semi-automatic, sensor, electric, pneumatic, pneumohydraulic, CAD, CAM, CNC, 1S, KOMPAS-3D, SiteLine, IFS Applications, Autodesk.

Introduction: Currently, due to the further improvement of technological processes, the requirements for metal-cutting machines are becoming more stringent. In the field of machine tool building, a whole lot of creative work has been carried out over several decades to solve this issue. They exist in the form of machining centers with several operations, ranging from simple mechanized universal machines to modern ones controlled by numerical software[3].

A lathe is a piece of equipment used to mass produce metal parts. A lathe, like other industrial equipment, consists of several components. All of them are associated with additional mechanisms and elements[3].

To increase productivity and improve quality, not only the lathe, but also the entire machine is now being automated. Automation refers to the process of complete machine control over instruments, mechanisms and the production process[3].

The automation process makes it easier to operate a lathe and quickly complete labor-intensive, tedious work. The process of controlling automation equipment is carried out through sensors, cameras, limiters and switches. For processing in parts, depending on the level of automation, loading devices are divided into:

- mechanized
-semi-automatic
- automatic

Automated lathes: Based on the type of production, automated lathes are divided into automatic and semi-automatic. These machines are automatic, follow the principle of machine operation without a worker, control the quality of processing and self-load the work. Semi-automatic workpiece parts are replaced with the participation of a worker who starts the machine, measures the workpiece, etc.[4].

Depending on the shaft axis, lathes are divided into horizontal and vertical. On the other hand, according to the number of miles, they are divided into single-spindle and multi-spindle [4].

When automating lathes, various copying (electric, hydraulic and pneumatic-hydraulic) and software systems are used to operate a complex cycle.

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There are two main types of systems used in turning automation practice.

These are: mechanical and electro-pneumatic. On these machines, programs are mostly programmed in a pre-planned manner, and with a relatively small amount of work, the operation of the program does not change.

The main directions of small-scale turning automation are speed control and mechanization.

Through software codes, the workshop undergoes preparation and the work cycle, thanks to automation, the machine is controlled digitally. G-code pre-processing involves installation and creation of operating conditions.

Programming: Management in CAD and CAM programs is very convenient and requires little labor. But when developing these programs, it is necessary to take into account that the compiled program must be more thorough and accurate. This, in turn, places greater responsibility on Digital Programming. If the appropriate interfaces are available, the computer is connected directly to the computer. If the machine needs remote control, the digital program is sent to the communication station. After that, it is transferred to the computer memory[5].

Modern automated modern lathes have additional elements, including a cooling system, an updated control system, a mechanism for chips, and a conveyor for moving finished workpieces. Additionally, the elements include a protective panel, lighting, and a revolver head for performing additional operations with gaps. This may include drilling, turning, milling and vibration[5].

On automated assembly machines, the quality of processed products improves compared to manual ones, the productivity of technological equipment increases, and manual labor is reduced. Automation complex for machine-building enterprises to solve problems “1S“,” KOMPAS-3D “uses software modules such as “SiteLine“,” IFS Applications,” “Autodesk”. In addition, the assembly process can be divided into five classes. These classes: mechanical assembly, welding and welding, gluing, magnetic and combined or threaded, welded based on fastening, welded, reinforced and under pressure[5].

A lathe is used for mass production of small parts. This is due to the high performance of the equipment. The machines are capable of processing up to 20 parts per minute. The device is intended for the production of axles, bolts, bushings, hollow cylinders, shafts[6].

Automated lathes have a number of advantages, which include: high precision of finished products, precision of surface quality, the presence of a multi-position axis and working heads that allow operations to be performed without constant reconfiguration of equipment.

Digitization is not just about finding an effective functional solution, it does not ground, but serves to meet the growing needs of people. The main requirements for digital management are reliability, manufacturability, standardization and limitation of harmful effects on the environment, and most importantly, cost-effectiveness[6].

Digital Control Panel is used in many areas to monitor and monitor system variables. Basically, this is the basis for the efficient operation of all equipment available in industry, technology and agriculture. Humidity, pressure and temperature are easily controlled using the electronic control panel and the variables are calculated. These panels help businesses save money by monitoring predictable behavior. They are essential equipment in compressors, circulation pumps, production systems, motor control panels and refrigeration units. Also in manufacturing, some components of mass-produced products vary. Using CNC machines to create different products can simplify the workflow in terms of accuracy, speed and reliability. As we know, mass production produces a lot of waste. However, in parts processed on CNC machines, cost reduction is achieved due to greater accuracy and less waste of raw materials[3].

Plus the advantages of using CNC machines consist of:

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1. Manual control of the machine cannot control the parts
risk of eviction. On the other hand, CNC machining is safe.

2. To avoid human errors associated with manual machine operation, it is necessary to produce the element in one cycle on CNC machines and repeat it quickly.

3. Once the CNC machine has been carefully programmed and set up, the cutting process will be exactly as shown for fast, quality work. After a good result, the machine performs this part with the same precision every time.

4. Operation of CNC machines on several axes, bent simultaneously
maybe even work in the corner.

5. Another advantage of CNC machines is that they can perform complex control techniques.

6. Physical quantities measured using digital control panels are usually similar. Digital control panels monitor and control the inputs and outputs of these physical quantities.

Conclusion: In conclusion, by introducing CNC machines into all industrial and technical sectors, we can achieve quality, speed and accuracy. While one of their biggest disadvantages is that they are financially expensive, large scale production of these machines would, I think, be one of the simple solutions to the problem.

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