ISSN: 2776-0960 Volume 4, Issue 4 April, 2023

ResearchJet Journal of Analysis and Inventions
https://reserchjet.academiascience.org

THE IMPORTANCE OF DIGITAL TECHNOLOGY IN MECHANICAL ENGINEERING

G'ovsiddinova Mavludakhon Khayrullayevna
Tashkent State Pedagogical University named after Nizami, Faculty of Professional Education, Technological Machines and Equipment Direction - 201 Group Student

Annotation

Mechanical engineering is characterized as a highly competitive industry in which the key success factor is the effectiveness of the use of new innovative technologies and methods of organizing product quality control at all stages of its life cycle. Enterprises gain competitive advantages through the introduction of these technologies and methods that increase the productivity of production processes and improve the quality of products. In this article, we can discuss about the significance of digital technology in mechanical engineering.

Keywords: Digital technology, mechanical engineering, process, machine learning, methods, industry, production, high-tech, innovations.

Introduction

Today, mechanical engineering is a single integrated system of high-tech production and modern design technology. The production processes of enterprises in this industry are extremely complex and saturated with information flows. Automated or automated production lines are an essential attribute of modern machine-building production. The operation of equipment with numerical control (CNC), as well as programmable industrial robots, can significantly increase productivity, eliminate the possibility of human influence and improve product quality. The availability of programmable equipment increases production efficiency several times and significantly reduces costs.

In the transition to automated production, information plays a key role the information defining the technological process. Information technologies provide significant advantages in the work of mechanical engineering enterprises. With the use of modern information technologies, the efficiency of production processes is significantly increased and the costs of information processing procedures necessary for the production of products of a machine-building enterprise are reduced. With the help of information technologies, it is possible to solve the problems of collecting,

ResearchJet Journal of Analysis and Inventions
https://reserchjet.academiascience.org

storing, processing information about all the main characteristics of products, product testing, product operation throughout the entire life cycle up to disposal.

At the same time, the well-known works did not sufficiently reflect the issues of integrated application of digital technologies based on the integration of technological processes of manufacturing products with the processes of their design, technological preparation of production, control. This article is devoted to solving some of these issues, using the example of quality management of the technological process of pipe manufacturing.

Research Results and their Discussion

With the integrated use of modern information technologies, it is possible not only to significantly increase the efficiency of production processes and reduce the cost of information processing procedures necessary for the production of machine-building enterprise products, but also to significantly improve its quality. Product quality indicators can be divided into groups:

- indicators that determine the technical level;
- operational indicators;
- production and technological indicators.

The indicators that determine the technical level include power, accuracy and productivity, efficiency, specific consumption of fuels and lubricants, the degree of mechanization and automation, efficiency, environmental friendliness, etc. The most important operational indicator of product quality is reliability. Reliability is the property of a product to perform specified functions, maintaining its operational performance within certain limits for the required period of time or operating time.

The reliability of machines is largely determined by the strength and rigidity of their designs. for example: rational placement of supports, giving structures rigid shapes, etc.

The quality and reliability of products directly depend on the accuracy of their manufacture. Precision in mechanical engineering technology is understood as the degree of conformity of manufactured products to their pre-established standards or samples. Accuracy is a complex concept that characterizes not only the geometric parameters of products and their elements, but also the uniformity of various properties: elastic, dynamic, electrical, etc. One of the main indicators determining the accuracy of the machine is the accuracy of the relative movements of the working organs, i.e. the maximum approximation of the actual nature of the movement of the

ResearchJet Journal of Analysis and Inventions
https://reserchjet.academiascience.org

executive surfaces to the theoretical law of motion chosen based on the official purpose of the product.

Production and technical indicators, or indicators of the manufacturability of the design, establish the effectiveness of design solutions in terms of ensuring optimal labor costs and funds for the manufacture of the product, its operation, maintenance and repair.

Types of control are classified depending on the purpose, methods of control-management, controlled parameters and other features. During the input control, the main parameters of raw materials, raw materials, the quality of blanks, semi-finished products and supplied products are checked. The effectiveness of input control measures directly depends on the scale of these measures. The purpose of the input control is to ensure the degree of control of materials (intermediates, blanks, etc.) entering the enterprise, which are required for proper use in production. The scope of control procedures depends on the type of material and varies depending on the technological process. During the operational control during the technological process, the parameters, properties and compliance of the semi-product, billet, assembly units and products with the requirements are checked. This type of control is considered the most critical in the manufacture of high-quality products. It ensures the correct approach of the production shop staff to quality issues.

In the manufacture of technically complex products, it is not always possible to carry out a complete assembly at the enterprise. For a control check of the assemblability of mating parts in these cases, it is recommended to make sketches of parts indicating in them the actual most critical dimensions obtained during machining. By comparing the mating dimensions of the parts and taking the necessary measures, it is possible to prevent the occurrence of large fitting works during the installation of the machine. For simple parts, final control is applied, in which all parameters are checked. For complex or large parts, especially those that are checked on the machine, operational control is required in order to detect deviations or defective parts in a timely manner. Manufacture of any kind and type of product in all branches of machine-building production from the moment of receipt of blanks, semi-finished products, materials fishing, components and up to the moment of sending it to the customer is accompanied by control operations. Controlled parameters include:

- physical, chemical, mechanical properties and chemical composition of raw materials;
- structure and internal defects of the product material, control is carried out during the technological process and in finished products;

ResearchJet Journal of Analysis and Inventions
https://reserchjet.academiascience.org

- geometric parameters and surface defects of parts at the manufacturing stage and in the finished product;
- dynamic characteristics and technical condition of parts, assemblies and structures during manufacture and operation;
- technical parameters and properties of finished products during acceptance, testing and operation.

The introduction of integrated information systems in the organization of production will optimize and improve production processes and control processes of complex products, which include the technological process of manufacturing pipelines. When creating pipelines or supporting structures, it is often necessary to organize turning parts without reducing the quality of installation and increasing the risk of creating emergency areas. The strength qualities of the segment fastened with fittings will differ for the worse from the properties of a monolithic pipe. To create bends, pipe processing technology is used, which in industrial conditions is carried out with the help of special equipment - automatic pipe bends.

A non-core pipe bending machine with CNC usually works according to the pipe running-in system. The product is mounted between two rollers, one of which is rolling, the other is stationary. The winding roller moves around the stationary one, as a result of which the pipe is pressed against it more tightly. Thanks to this, the product receives the specified the shape determined by the radius of the stationary roller.

Pipe bends and pipe bending machines working by the winding method are most often used for bending pipes in the aviation and space industries, automotive, tractor construction and other areas of mechanical engineering. Such pipe bends make it possible to obtain high-quality pipe bends with small radii and provide high and absolute repeatability of the geometry of parts in the manufacture of parts with spatial flexibility.

A large amount of information on each individual product complicates the process of its processing. During the design, technological preparation, testing and verification of products, more than 120 documents are used: dimensional drawings of components, technical specifications for components, technical descriptions, control methods, test programs, operating manuals, etc. All these documents are stored on paper in archives and require time to search for them. While working with CNC machines, there are many times fewer paper documents, however, it is not yet possible to completely abandon their use.

ResearchJet Journal of Analysis and Inventions
https://reserchjet.academiascience.org

At the same time, digital technologies can be implemented in the form of a set of technologically and programmatically interconnected modern equipment, which allows using technologies based on 3P modeling to produce pipelines in the most automated mode, starting from blanks and components at the input to the finished product at the output. The advantages of digital pipe bending technologies, in comparison with manual bending technologies, include the following:

- reducing the complexity of manufacturing;
- high performance;
- ensuring the quality and repeatability of pipelines;
- creation of an electronic database of reference models of pipelines;
- active control of the manufactured pipeline by comparison with an electronic digital model.

In conclusion, this scanner can be used in the absence of design documentation, when it is necessary to scale or change the geometry of the part. This procedure allows you to get an editable CAD model based on scanning. The SD scan gives the initial data in the form of a Point Cloud. This dataset contains points taken from the surface of the part and described by three coordinates. The point cloud is almost not used for further work and is immediately transformed into a polygonal grid, using which the designer creates a solid-state CAD model. The resulting model can be edited or used as a source for designing other parts. Thus, it becomes possible not only to computer model the bending process, but also to perform stress-strain state analysis and assessment of stresses and deformations occurring in the walls of the bent pipe in the deformation center and beyond.

REFERENCES

1. Ismagilova L A, Gileva T A, Galimova M P, Glukhov V V 2017 Digital Business Model and smart Economy Sectoral Development Trajectories Substantiation Lecture Notes in Computer Science pp 13-28
2. Galimova M P, Gileva T A 2017 Technology transfer in digital economy: criteria for selection of a business model in the book: Digital Economy and "Industry 4.0": problems and prospects of scientific-practical conference with international participation pp 418-23
3. Dobrynin A P, Chernykh K Yu, Kupriyanovsky V P, Sinyagoa P V 2016 Digital Economics - Various Ways to Effective Application of Technologies International Journal of Open Information Technologies p 24

4. Gasov V M, Tiganenko A M 1998 Information technologies in publishing and printing Publishing house of MSUE "World of Book" p 189.
5. Gimush R.I., Matmuradov F.M. Innovative management. Tutorial. - Tashkent: National Society of philosophers of Uzbek press, 2008.- 143-p

ResearchJet Journal of Analysis and Inventions
https://reserchjet.academiascience.org