DESIGNING THE SYNCHRONOUS OPERATION OF THE SENSITIVE ELEMENT AND ELECTRIC DRIVE IN CNC MACHINES.

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Annotatsiya. *The demand for printed circuit board (PCB) is increasing in the semiconductor and electrical engineering industries. In addition, it is a technology that should be available on the basis of the material and technical base in certain technical areas of education. By putting this project into practice, we can meet the demand for a certain amount of control boards (PCBs) around us, apply simple, materially economical solutions in the implementation of projects created by students in the future, and achieve the integration of theoretical knowledge and practice in education.*

Key words: *Semiconductor, electrical engineering industry, printed circuit board (PCB), material technical base, cost-effective solutions, integration of practical with theoretical knowledge, solenoid, milling process, chemical processing, laboratory, CNC machine, sensitive element, electric drive , synchronous operation.*

Introduction: Printed circuit boards (PCBs) are an integral part of this electronic revolution. It acts as a bridge for digital communication between several components of the electrical system. As a result, PCBs must be manufactured with the highest precision. A PCB milling machine is a special machine that creates PCB paths through a milling process. The milling process involves removing the copper material from the base plate. As these machines are connected to a computer, automation becomes possible. Minimization of human erosion is also achieved, which is very important for PCBs. To understand this machine, we need to know some factors. Among the various production processes, PCB milling machine is gaining popularity recently. Similar to the common and well-known chemical PCB etching process, the PCB milling process removes. The material is removed to create electrical insulation and the necessary ground planes. However, unlike chemical machining, PCB milling is generally a non-chemical process and therefore can be performed in a typical office or laboratory environment without exposure to hazardous chemicals. High-quality circuit boards can be produced using both processes. A prototype CNC machine can provide a fast turning board manufacturing process without the need for wet machining. Positioning data and machine control commands for machine control are sent from the control

software to the milling machine's on-board controller via a serial port or parallel port connection

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Figure 1. Sensi machine structure

For X- and Y-axis drive systems, most PCB milling machines use stepper motors that drive a precision screw. The lead screw is in turn connected to the gantry or milling head via a special precision machined coupling.

Z-axis control is implemented in several ways. The first and most common is a simple solenoid. When the solenoid is energized, it pushes the milling head into a spring-loaded stop that limits downward movement. The rate of descent, as well as the amount of force acting on the spring stop, must be manually adjusted by mechanically adjusting the position of the electromagnetic piston. The solenoid and pneumatic system cannot position the head beyond the end points and are therefore only useful for simple "up/down" milling operations. This makes it the best choice for PCBs with high precision and geometric accuracy, such as RF and microwave designs.

Laser etching of PCBs offers the same advantages as mechanical milling in terms of fast processing times, but the nature of the laser machining process makes it superior to both milling and chemical etching when it comes to the physical changes it makes to the obiect

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Figure 2. Sensi machine laser structure.

Methods:

Examples of automated manufacturing systems include: • automated machine tools that process parts

• transfer lines that perform a series of machining operations

• automated assembly systems

• manufacturing systems that use industrial robots to perform processing or assembly operations

• automatic material handling and storage systems to integrate manufacturing operations

• automatic inspection systems for quality control

Thus, Automation is a technology concerned with the application of mechanical, electronic, and computer-based systems to operate and control production. This technology includes:

• Automatic machine tools to process parts

• Automatic assembly machines

• Industrial robots

• Automatic material handling and storage systems

• Automatic inspection systems for quality control

• Feedback control and computer process control

• Computer systems for planning, data collection, and decision making to support manufacturing activities.

Programmable automation.

In programmable automation, the production equipment is designed with the capability to change the sequence of operations to accommodate different product configurations. The operation sequence is controlled by a program, which is a set of instructions coded so that the system can read and interpret them. New programs can be prepared and entered into the equipment to produce new products. Some of the features that characterize programmable automation include:

• High investment in general-purpose equipment

• Low production rates relative to fixed automation

• Flexibility to deal with changes in product configuration

• Most suitable for batch production

Linear machines can be classified as single-sided or double sided, can have either of flat, cylindrical or transverse air gaps; can be of synchronous, induction or reluctance types. Regardless of type, for increasing the travel length either the primary (winding part) or secondary (for example part carrying magnetic track) has to be elongated. Therefore these machines can be further categorized as short primary or short secondary linear machines depending upon which part is designed to move. Some of these types will be discussed in more detail in this section. The key point in all these topologies is to utilize the advantage linear motors have on directly producing thrust without any mechanism for converting rotary motion to linear. Figure 2.2 shows how the linear AC machines can be categorized

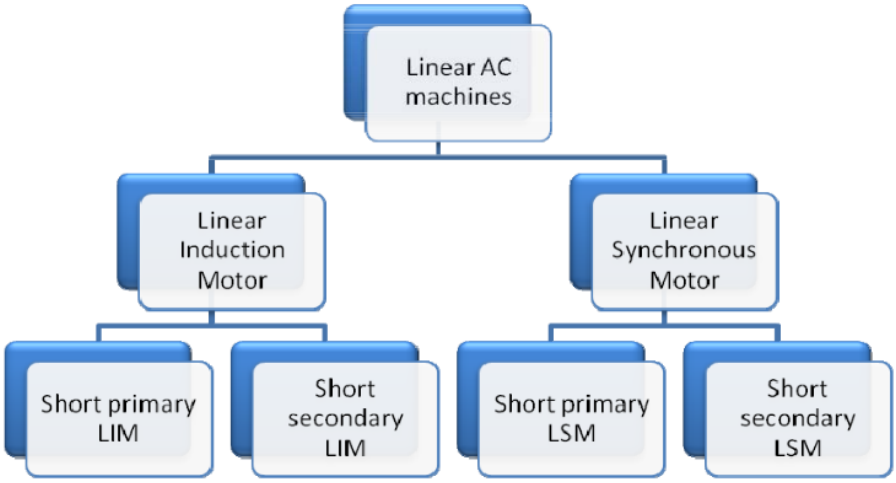

Figure 2.2: Hierarchy chart illustrating types of linear machines

Conclusion:

While preparing this article, I came to the following conclusions: The high demand for circuit boards in the field of semiconductors and electronics and the almost absence of such devices in our country motivated me to take this initiative. By preparing and putting this device into practice, it is possible to create a small LLC in the Institute and meet the demand for PCB in our country in a certain amount. After the device is made, the Institute becomes a direct supplier, and a certain part of the proceeds from the orders is transferred to the Institute's account. In addition, we will be able to create our own national brand by patenting the device. This is the main purpose of my promotion of this initiative

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REFERENCES

1.Alijon o‘g‘li, E. O., & Sodiq o'g'li, M. U. (2024). Uarm robots in python data base formation electrical principle and structure scheme design. European Journal of Emerging Technology and Discoveries, 2(2), 43-47.
URL:**https://humoscience.com/index.php/itse/article/view/42**

2.Alijon o‘g‘li, E. O. (2023). Robototexnik tizmlarning tashqi ob’ektlarga ta’sir ko’rsatishida gidroyuritmalardan foydalanish usullari. Mexatronika va robototexnika: muammolar va rivojlantirish istiqbollari, 1(1), 102-104.
URL:**https://humoscience.com/index.php/itse/article/view/43**

3.Ergashev, O. A. O. G. L. (2022). Robototexnik tizimlarning tashqi obyektlarga ta’sir ko’rsatishida suyuqlik oqimlaridan foydalanish usullarini tadqiq etish. Science and Education, 3(6), 399-402.
URL:**https://humoscience.com/index.php/itse/article/view/44**

4.Alijon o‘g‘li, E. O., & Baxodirjon o‘g‘li, S. T. (2024). SYSTEMATIC UARM DESIGN OF CONSTRUCTIVE AND OPTIMAL SOLUTIONS IN ROBOT CONTROL AND SOFTWARE CONTROL. *European Journal of Emerging Technology and Discoveries*, *2*(4), 92-98.

5. Alijon o'g'li, Ergashev Odiljon, va Juraev Asilbek Xotamjon o'g'li. “Zamonaviy scada tizimida isiliklarni loyihalashtirish”. *Rivojlanayotgan texnologiyalar va kashfiyotlar Yevropa jurnali* 2.4 (2024): 36-43.

6.Xolmatov Oybek Olim o‘g‘li, & Xoliqov Izzatulla Abdumalik o‘g‘li. (2023). Quyosh paneli yuzasini tozalovchi mobile roboti taxlili. *Innovations in Technology and Science Education*, *2*(7), 791–800.
URL:https://humoscience.com/index.php/itse/article/view/424

7.Xolmatov Oybek Olim o‘g‘li, & Vorisov Raxmatulloh Zafarjon o‘g‘li. (2023). Kalava ipi ishlab chiqarishda paxtani sifatini nazorat qilish muammolarining taxlili. *Innovations in Technology and Science Education*, *2*(7), 801–810.
URL: https://humoscience.com/index.php/itse/article/view/425
8.Холматов Ойбек Олим угли, & Иминов Холмуродбек Элмуродбек угли. (2023). Экстракция хлопкового масла с использованием технологии субкритической воды.экстракция хлопкового масла с использованием технологии субкритической воды. *Innovations in Technology and Science Education*, *2*(7), 852–860.
URL: https://humoscience.com/index.php/itse/article/view/432
9.Холматов Ойбек Олим угли, & Хасанов Жамолиддин Фазлитдин угли. (2023). Автоматическая система очистки солнечных панелей на базе arduino для удаления пыли. *Innovations in Technology and Science Education*, *2*(7), 861–871.
URL: https://humoscience.com/index.php/itse/article/view/433
10.Xolmatov Oybek Olim o‘g‘li, & Jo`rayev Zoxidjon Azimjon o‘g‘li. (2023). Machine learning yordamida idishni sathini aniqlash. *Innovations in Technology and Science Education*, *2*(7), 1163–1170.
URL: https://humoscience.com/index.php/itse/article/view/477
11.Холматов О.О., Муталипов Ф.У. “Создание пожарного мини-автомобиля на платформе Arduino” Universum: технические науки : электрон. научн. журн. 2021. 2(83).
URL: https://7universum.com/ru/tech/archive/item/11307
12.Холматов О.О., Дарвишев А.Б. “Автоматизация умного дома на основе различных датчиков и Arduino в качестве главного контроллера” Universum: технические науки : электрон. научн. журн. 2020. 12(81).
URL: https://7universum.com/ru/tech/archive/item/11068
DOI:10.32743/UniTech.2020.81.12-1.25-28
13.Холматов О.О., Бурхонов З.А. “проекты инновационных парковок для автомобилей” Международный научный журнал «Вестник науки» № 12 (21) Том 4 ДЕКАБРЬ 2019 г.
URL: https://www.elibrary.ru/item.asp?id=41526101
14.Kholmatov O.O., Burkhonov Z., Akramova G. “The search for optimal conditions for machining composite materials” science and world International scientific journal, №1(77), 2020, Vol.I
URL:http://en.scienceph.ru/f/science_and_world_no_1_77_january_vol_i.pdf#page=28
15.Холматов О.О, Бурхонов З, Акрамова Г “автоматизация и управление промышленными роботами на платформе arduino” science and education scientific journal volume #1 ISSUE #2 MAY 2020
URL: https://www.openscience.uz/index.php/sciedu/article/view/389
16.Кабулов Н. А., Холматов О.О “AUTOMATION PROCESSING OF HYDROTERMIC PROCESSES FOR GRAINS” Universum: технические науки журнал декабрь 2021 Выпуск: 12(93) DOI - 10.32743/UniTech.2021.93.12.12841
URL: https://7universum.com/ru/tech/archive/item/12841
DOI - 10.32743/UniTech.2021.93.12.12841
17.Холматов О.О., Негматов Б.Б “разработка и внедрение интеллектуальной системы управления светофором с беспроводным управлением от arduino” Universum: технические науки: научный журнал, – № 6(87). июнь, 2021 г.
URL:https://7universum.com/ru/tech/archive/item/11943
DOI-10.32743/UniTech.2021.87.6.11943.
18.Холматов О.О., Негматов Б.Б “АВТОМАТИЗАЦИЯ ПРОЦЕССА ОБРАБОТКИ ЗЕРНА” Universum: технические науки: научный журнал. – № 3(96). Часть 1. М., Изд. «МЦНО», 2022 г.
URL: https://7universum.com/ru/tech/archive/item/13235
DOI - 10.32743/UniTech.2022.96.3.13235

19.Холматов Ойбек Олим угли "Автоматизация системы зерновых осушителей с помощью плк" Universum: технические науки: научный журнал. – № 3(96). Часть 1. М., Изд. «МЦНО», 2022 г.

URL:https://7universum.com/ru/tech/archive/item/13234

DOI - 10.32743/UniTech.2022.96.3.13234

20. Холматов Ойбек Олим угли, & Негматов Бегзодбек Баходир угли. (2022). Методы организации логистических услуг с использованием интеллектуальных систем организации грузов. *E Conference Zone*, 219–221.

URL:https://econferencezone.org/index.php/ecz/article/view/196

21.Kholmatov Oybek Olim ugli, & Negmatov Begzodbek Bakhodir ugli. (2022). Optimization of an intelligent supply chain management system based on a wireless sensor network and rfid technology. *E Conference Zone*, 189–192.

URL: http://www.econferencezone.org/index.php/ecz/article/view/467

22.Oqilov Azizbek, Oripov Shoxruxmirzo, Eshonxodjayev Hokimjon Xotamjon o'g'li, & Sobirov Anvarjon Sobirov. (2022). Remote Control of Food Storage Parameters Based on the Database. *Texas Journal of Engineering and Technology*, *9*, 29–32. Retrieved from https://zienjournals.com/index.php/tjet/article/view/1872