сравнению с синхронными двигателями асинхронный двигатель не имеет щеток и поэтому требует минимального обслуживания. В асинхронном двигателе, как и в синхронном, отсутствует физический контакт между деталями. Поэтому они очень долговечны и не подвержены износу. Кроме того, такие двигатели изготавливаются дешевле синхронных двигателей.

Ключевые слова Мощность, вал, ротор, статор, асинхронные и синхронные двигатели

Список литературы

1. Salimov J.S. Pirmatov N.B. «Trasnformatorlar va avtotransformatorlar». 2010 Toshkent. Vektor-Press.
2. Ivanov-Smolenskiy A.V. Elektricheskie mashinq. V 2-x t. Uchebnik dlya vuzov.-M.: Izd-vo MEI, 2004. Tom. 1-652s, Tom 2
3. Kopqlova I.P. Elektrcheskie mashinq: Uchebnik dlya baklavr.-Moskva, YUrayt.2012.
4. M.M.Katsman. Sbornik zadach po elektrcheskie mashinam. – Moskva. –Izdatelskiy sentr «Akademiya». 2012. sr 154.
5. Goncharuk A.I. Raschet i konstruvanie transformatorov. M.: Energavtomizdat, 1990.
6. Salimov J.S. Pirmatov N.B. Elektr mashinalari:-T "O`qituvchi" NMIU, 2005.
7. Арипов Н.М. Автоматизация технологических процессов шелко-мотания с применением регулируемых электроприводов. Т. 2000. 72с.
8. Влияние способа снятия ваты-сдира на длину струны и число нитей в сечениях. /Х. Т. Мирхаликов, И. З. Бурнашев //Шелк: Реф. сб. /УзНИИТИ. 1991. N3. с. 20-21.
9. Технологические испытания коконорастрясочной машины модели РК-4-01. /И.У.Умаров, //Шелк: Реф. сб. /УзНИИТИ, 1989. N3 с. 19-20.
10. Egamov, Dilmurod, Saydullo Sharobiddinov, Oybek Qosimov, and Dilrabo Olimjonova. "Mobile device for automatic input of reserve of electricity." In *AIP Conference Proceedings*, vol. 3244, no. 1. AIP Publishing, 2024.

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REQUIREMENTS TO VARIABLE ELECTRIC DRIVECOCOON SCRATCHING MACHINE

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ABSTRACT

The article examines the issues of improving the processes of finding the ends of cocoon threads and cleaning them based on the analytical determination of the optimal rotation frequency of the brush head of the shaking cars,based on ensuring the rhythmic operation of this machine and the required productivity of the cocoon winding machine. In existing silk reeling machines, more than the ends of the threads are lost for retrieval. The retrieval of the ends of the cocoon threads is accompanied by the simultaneous exposure of the cocoon to the warm water environment and the thread retrieval devices, which should be inversely proportional to each other in size, that is, the more intensive the heat treatment of the cocoon with water, the less the effect of the thread retrieval devices should be.

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Introduction

The purpose of the technological process of processing cocoons into raw silk thread – silk reeling – is to produce a smooth, complex, continuous in length and uniform in linear density and other properties raw silk thread of a given assortment with the fullest possible use of the silk mass of the cocoon shells.

Here we can distinguish the following groups of operations performed on silk-winding machines and units and determining the requirements for control, regulation and management systems:

- primary processing,
- preparatory,
- preparatory,
- the actual unwinding and
- control and cleaning.

As a result of the operations to prepare cocoons for unwinding,

- steaming cocoons to reduce the force of thread descent due to softening of sericin ;
- weighting the cocoons with water filling to provide resistance when winding the thread, as well as
- finding the end of a continuously unwinding thread with cleaning (shaking) and sorting cocoons with found thread ends from cocoons with unfound thread ends.

Correct execution of these operations ensures high unwinding of the casing, labor and equipment productivity, yield and quality of raw silk, as well as reduced yield of silk waste [1] .

Improving the unwinding of cocoons and increasing the yield of raw silk plays an important role in improving the processes of retrieval. ends of cocoon threads and their cleaning (shaking).

On existing ones In silk shaking machines, more is lost than is necessary to find the ends of the thread [2]. The search for the ends of cocoon threads is accompanied by the simultaneous action of the cocoons of the warm-water environment and thread-finding devices, which in magnitude should be inversely proportional to each other, i.e., the more intense the water-heat treatment of the cocoons, the less should be the effect of the thread-finding devices and vice versa.

When setting the speed of unwinding cocoons, it is necessary to take into account the capacity of the shaking machines. With an increase in the unwinding speed, the output of cocoons with ends decreases. This is explained by the fact that with an increase in speed, the need for cocoons to load the pre-bowls of the machine increases, which creates tension in the operation of the shaking machines and complicates compliance with the mode of technology for finding ends and shaking cocoons.

In addition, with the increase in speed unwinding speed is the main indicator: the output of raw silk also decreases. This is also the result of the failure of the shaking machine, since its incoherence in operation with the cocoon winding machine increases the return of cocoons from the machine and from the cocoon shaking zone back to the end- finding zone [2].

The analysis of technical characteristics of existing stretching machines is carried out. As can be seen from the analysis, the designs of RK type machines provide for a change in the rotation frequency of the brush disk by mechanical means, i.e. the electric drive is operationally unregulated. Therefore, given that the kinematic diagram of RK type machines allows for a separate drive in the movement of the brush head, there is a need to use an automated adjustable electric drive with a speed range of at least 3:1. This ensures the required conjugation in productivity with the cocoon winding machine, as well as the optimal speed mode of all working parts of the machine

Analyzing the previously listed requirements for the value of the cocoon shaking speed, we can conclude that the adjustable electric drive of the shaking machine must perform the following functions:

- optimize the speed modes of all working parts of the machine to ensure the specified modes of finding the ends of cocoon threads and, as a result, increase the efficiency of using cocoons, as well as the productivity of equipment and labor;[2]
- ensure smooth operation of the shaking machines in the modes of starting, stopping and regulating the speed of the brush head, eliminating significant acceleration or deceleration of the movement of the ends of the cocoon threads and the associated increased dynamic components in its tension;

ensure coordinated operation of the cocoon winding machine with the shaking machine in order to optimize the technology of the process of finding the ends of threads and shaking the cocoons.

Existing electric drives of both domestic and Japanese stretching machines , as a rule, do not ensure the performance of the above functions. Mechanical regulation of the electric drive speed using toothed clutches and variators is imperfect.

The process of changing the rotation frequency of the brush head with such a drive system is not automated and is carried out using manual control. This necessitates continuous monitoring of the cocoon shaking mode by the service personnel. Step-by-step speed control does not ensure operation with the optimal, from the point of view of quality and output indicators, rotation speed of the brush head.

Such obsolete drives do not meet the requirements of the technology and are subject to complete exclusion during reconstruction.[2]

The main direction in the reconstruction of obsolete electric drives, existing stretching machines and the design of electric drives, newly created stretching machines, is the direction associated with the creation of automated adjustable electric drives, which must ensure:

1) Stepless regulation of the working speed of the brush head of the shaking machine in the range of at least 3:1, necessary to increase the efficiency of cocoon use, reduce defects and improve cleanliness, as well as equipment and labor productivity;

2) Smooth start and slow stop of the shaking machine, eliminating the increase in the number of breaks in the ends of cocoon threads

3) Operational restructuring of speed modes from the coupling of the shaking machine with the cocoon

winding machine serviced by it, taking into account the quality of the cocoon raw material and the degree of steaming of the cocoons

4) Control of the operation of the shaking machine in conjunction with computer technology to optimize technological processes.

5) High reliability in operation under aggressive environmental conditions.

Table 1 shows the main technical requirements for electric drives of stretching machines. General requirements for the electric drive can be formulated as follows:

the power of individual electric motors does not exceed 2.0 kW;

the drive operating mode is continuous and non-reversible with a constant or slightly changing load;

adjustable drive parameter and its change limits: a) change in the rotation frequency of the brush head (or cocoon shaking speed) in the range from 2.0 to 6.0 rpm ·depending on the quality of the cocoon raw material and the degree of cocoon steaming; b) maintaining a smooth start and slow stop of the shaking machine, eliminating an increase in the number of breaks in the ends of cocoon threads; c) coordinated operation of the cocoon winding machine with the shaking machine to optimize the technology of the process of finding the ends of threads and unwinding cocoons;[3]

start and braking – controlled;

the possibility of remote and centralized control of an analog signal up to ±10.0 V and ±5.0 mA ;

drives, mainly built into the design of process equipment; operating conditions: ambient temperature -10.0 ... +40.0 0 C, relative humidity no more than 85 %.[3]

Table 1

Technical requirements for electric drives silk-winding shaking machine

Equipment characteristics	**Machine name**
	Shaking machine
Room category	P-P-A
Power of individual machines, kW	1.7
Nominal speed of the output shaft electric motor, rpm $^{-1}$	1420
Power supply voltage, V	380/220
Working hours	long
Power of the converter unit, kW	2.0
Speed reduction range	1:3
Control inputs: quantity and signals	2...5, 0...5 Ma , 0...10 V
Controlled start: time, sec.	5.0
Controlled braking, s.	3.0
Changing the speed ratio of adjacent devices	Yes
Reverse	No
Maximum speed accuracy	-
The nature of the transient processes	without overshoot
Operation in braking mode	No
Work in the automatic control system, adjustable rotation parameter	rotation speed brush head
Start, stop and speed control	combined/remote or centralized/
Control station execution	built into process equipment
terms of Use	temperature -10...+40 ^{0} C, relative humidity 85%

Based on a systematic approach to creating modern electric drives for machines and silk winding devices, methods for their improvement have been developed based on the synthesis of the "frequency converter - asynchronous motor - working machine" system. "as a single electromechanical system that performs a specific technological task ... The solution of this problem is of particular importance for silk winding production at the stage of technical re-equipment and widespread introduction of an automated system of control of technological processes, since it allows equipping machines and units with high-quality single systems of controlled electronic devices. reducing the time required for research, design and commissioning of automated electronic devices for new units, increasing equipment productivity and improving the quality of the product being manufactured during the modernization of existing silk winding drives. Accordingly, below we offer a functional diagram of the control of a stretching machine equipped with an automated controlled EP, developed taking into account the specific features of its design and operating mode, natural changes in system parameters, the action of characteristic external disturbances. as well as the interrelation of electromechanical and technological factors. When creating an automated system for controlling technological processes for silk reeling, special difficulties are encountered in the selection and development of primary measuring instruments - sensors that monitor and measure the technological parameters of cocoons and raw silk threads.[10]

Information on the relevant technological parameter, the accuracy of its measurement and the timely provision of information determine the quality of regulation and the correctness of decisions made in process control.

Currently, technological control of silk reeling processes is at a very low scientific and technical level. This is due to the fact that at present the industry produces a very limited number of sensors that can be used for this purpose. Therefore, when designing such automation systems, developers, as a rule, create their own sensors.

Of the number of sensors required for the regulated operation of the EP of silk reeling, so far only one sensor measuring the concentration of sericin (IKS-001 device) has been industrially tested and adopted for implementation; prototypes have been created for some of them (sensors for cocoon caliber, cocoon shell hardness and conductivity), while others are being developed: including breakage, tension, numberof cocoons with ends, thickness of unwound thread, etc.[18]

Conclusion

Analyzing the previously listed requirements for the value of the cocoon shaking speed, it can be concluded that the adjustable electric drive of the shaker should perform the following functions:

- optimize the speed modes of all working bodies of the machine to ensure the specified mode of finding the ends of the cocoon threads and, as a result, increase the efficiency of cocoon use, as well as equipment and labor productivity. ;
- ensure the smooth operation of the RM in the modes of starting, stopping and speed regulation of the brush head, with the exception of significant acceleration or deceleration of the movement of the ends of the cocoon threads and an increase in the dynamic components of its tension;
- ensure the coordinated operation of the KMA with the shaking machine in order to optimize the technology of finding the ends of the threads and shaking the cocoons.

Existing electric drives of both domestic and Japanese shaking machines. as a rule, do not provide for the implementation of the above functions. The mechanical speed control of the electric drive using gear couplings and variators is imperfect.

With such a drive system, the process of changing the brush head rotation frequency is not automated and is carried out using manual control. This requires constant monitoring of the cocoon shaking mode by technical personnel. Stepless speed adjustment does not ensure operation at the optimal brush head rotation speed in terms of quality and output. Currently, the technological control of silk-winding processes is at a very low scientific and technical level. This is due to the fact that at present the industry produces a very limited number of sensors that can be used for this purpose. Therefore, when designing such automation systems, developers, as a rule, create their own sensors.

ТРЕБОВАНИЯ К МАШИНЕ ДЛЯ КОКОНОЧЕСАНИЯ С РЕГУЛИРУЕМЫМ ЭЛЕКТРОПРИВОДОМ

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В статье рассматриваются вопросы совершенствования процессов поиска концов нитей кокона и их очистки на основе аналитического определения оптимальной частоты вращения щеточной головки встряхивающих машин, исходя из обеспечения ритмичной работы этой машины и требуемой производительности коконмотальной машины. В существующих шелкомотальных машинах на извлечение теряется больше концов нитей. Извлечение концов нитей кокона сопровождается одновременным воздействием на кокон теплой водной среды и устройств для извлечения нитей, которые по величине должны быть обратно пропорциональны друг другу, то есть чем интенсивнее тепловая обработка кокона водой, тем меньше должно быть воздействие устройств для извлечения нитей.

КЛЮЧЕВЫЕ СЛОВА Оптимизация, машины, индивидуальные электродвигатели, технологические процессы, коконные нити, повышение эффективности использования коконов.

REFERENCE:

1. Арипов Н.М. Автоматизация технологических процессов шелко-мотания с применением регулируемых электроприводов. Т. 2000. 72с.

2. Влияние способа снятия ваты-сдира на длину струны и число нитей в сечениях. /Х.Т. Мирхаликов, И.З. Бурнашев //Шелк: Реф. сб. /УзНИИТИ. 1991. N3. с. 20-21.

3. Технологические испытания коконорастрясочной машины модели РК-4-01. /И.У.Умаров, //Шелк: Реф. сб. /УзНИИТИ, 1989. N3 с. 19-20.

4. Egamov D., Sharobiddinov S., Qosimov O., Olimjonova D. "Mobile device for automatic input of reserve of electricity." In AIP Conference Proceedings, vol. 3244, no. 1. AIP Publishing, 2024.

5.Qosimov, Oybek, Shahzod Sayfiyev, Gulrux Sultonova, and Aziz Dauletbayev. "STATISTICAL DYNAMICS AND ACCEPTABLE FILTERS: https://doi. org/10.5281/zenodo. 11256785."International Journal of scientific and Applied Research 1, no. 2 (2024): 204-206.

6. Qosimov O. "ELIMINATION OF ELECTRICAL ENERGY WASTE IN RESIDENTIAL BUILDINGS OF 10-04 SQUARE METERS."Лучшие интеллектуальные исследования 21, no. 2 (2024): 21-26.

7.Касимов О.А., Баходирова А. (2025). Энергетический аудит промышленных предприятий на основе оценки энерго-и ресурсосбережения. Образование наука и инновационные идеи в мире, 64(2), 27-37.

8.Qosimov O.A., Muhriddin I. (2025). SANOAT KORXONALARINI ENERGIA AUDITI. ОБРАЗОВАНИЕ НАУКА И ИННОВАЦИОННЫЕ ИДЕИ В МИРЕ, 64(1), 400-406.

9. Abdumannon o'g'li, Qosimov Oybek, and Ibrohimov Muhriddin Muhammadjon o'g'li. "ELECTRICITY SAVING." FORMATION OF PSYCHOLOGY AND PEDAGOGY AS INTERDISCIPLINARY SCIENCES 4.40 (2025): 202-206.

10. Kasimaxunova, A., & Umarova, G. (2023). Issues of Effective Study of Semiconductor Device Properties in Engineering Educational Institutions. Journal of Higher Education Theory and Practice, 23(12). https://doi.org/10.33423/jhetp.v23i12.6236

11. M.O. Atajonov, S.J. Nimatov, A.I.Rakhmatullaev. «Formalization of the dynamics of the functioning of petrochemical complexes based on the theory of fuzzy sets and fuzzy logic» AIP Conference Proceedings 2552, 050014 (2023); Published Online: 05 January 2023. https://doi.org/10.1063/5.0112403

12. Olimjoniva, D., & Topvoldiyev, N. (2023). ANALYSIS OF HEAT STORAGE CAPACITY OF RESIDENTIAL BUILDINGS. Interpretation and Researches, 1(8). Izvlecheno ot http://interpretationandresearches.uz/index.php/iar/article/view/518

13. Alijanov, D. D., & Topvoldiyev, N. A. (2022). Physical and technical fundamentals of photoelectric solar panels energy. Theoretical & Applied Science, 501-505.

14. Donyorbek Dilshodovich Alijanov, ., & Utkirbek Akramjonovich Axmadaliyev, . (2020). The Pecularities Of Automatic Headlights. The American Journal of Applied Sciences, 2(10), 13–16. https://doi.org/10.37547/tajet/Volume02Issue10-03

15. Abbosbek Azizjon-o'g'li, A. GORIZONTAL O 'QLI SHAMOL ENERGETIK QURILMALARINING ZAMONAVIY KONSTRUKSIYAL

16. Sharobiddinov, S., & Mamarasulov, Q. (2023). QUYOSH HAVO ISITISH KOLLEKTORINI ENERGIYA SAMARADORLIGINI OSHIRISH. Interpretation and researches, 1(8).

17.ME Yulchiev, AAO Qodirov Electricity Quality And Power Consumption In Low Power (0.4 Kv) Networks, THE AMERICAN JOURNAL OF ENGINEERING AND TECHNOLOGY (TAJET) SJIF-5.32 DOI-10.37547/tajet

18. Арипов Н. М. Вопросы выбора способа частотного управления асинхронным электроприводом шелкомотания /Сб. материалов междун. меж-вузов. конф. "Теория и методы расчета нелинейных цепей и систем". 30-31. 10. 95. Ташкент. 1995. с.96.

19. Арипов Н.М. Способ управления асинхронным электроприводом и устройство для его осуществления /Предварительный патент IDP №04499, кл.7Н 02 Р 532. опубл. 31.10.2000.

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