

# Research on methods of automatic control of constant pressure compressors

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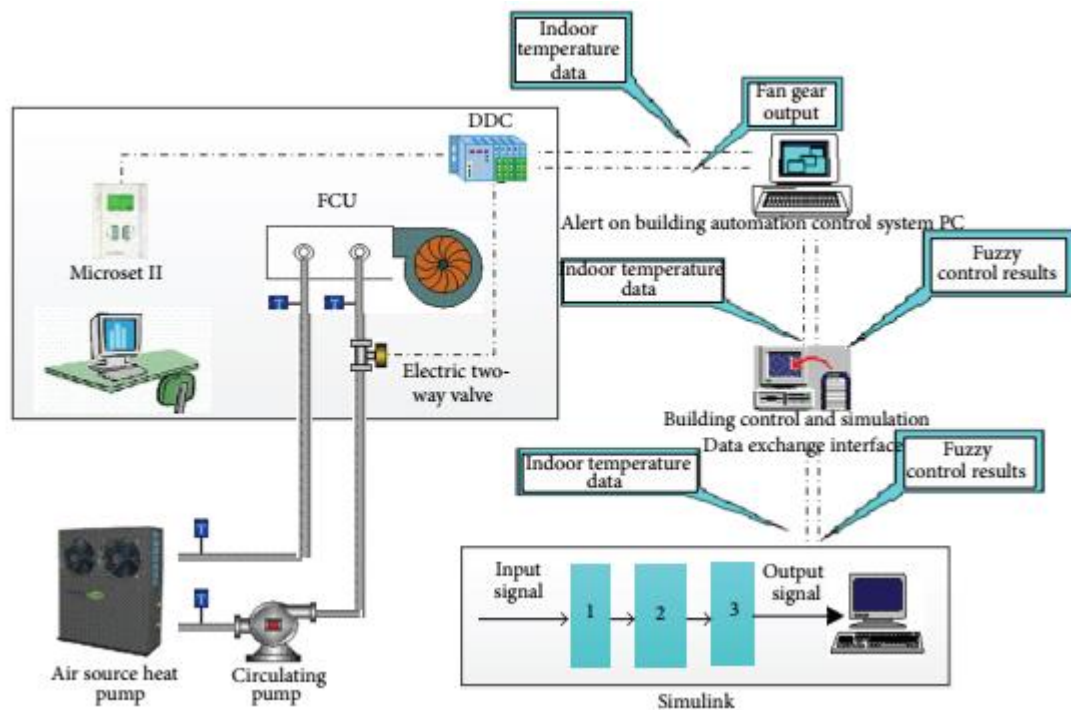
**Abstract:** Currently, air-separating compressors are widely used in many industries in the Republic of Uzbekistan. Air separation plays a very important role in the industry its role in the development of the metallurgical industry is considered to be large and not only the required air compressor cooling equipment and compressed air for cooling plant, but also the raw material needed for separation the plant is the main device in the air separation plant. Usage most of the air compressor is very wide used in important departments such as metallurgy, oil and chemical industry. An air compressor system is a complex time-varying, delayed, and nonlinear system. Defects in content the traditional control method and the controller leads to instability of the pressure of the released compressed air air compressor in conditions of volatile gas consumption, wide range fluctuations that sometimes occur, for gas consumption in the industrial sector creates a chaotic environment. That is why, the working condition of the air compressor will be unstable. In general, the electricity consumption of air the compressor system operates at steady state and it is twenty percent of the total energy consumption affects the economic condition of the enterprise. In addition, energy consumption unstable condition will be more. This also leads to wastage of resources and causes more energy consumption. Therefore, the guarantee the output pressure of the air compressor system is stable it is extremely important to increase efficiency and energy saving will be necessary for the general air separation system. This turbine compressor system was taken as the research object and analyze its characteristics and control requirements. Technological control technology applied to the system, ECS-500 the SUPCON system was used for air conditioning compressor system and monitoring real time values important parameters of various components were calculated. According to the working characteristics of the air compressor system, technical system control theory, as one modern control theories were applied to the constant and pressure control system for technical pressure design set by the manager. The simulation results showed that the controller and not only more convenient and efficient, but that provided a specific guideline value and reference for and studies were conducted on the control of other parameters of the air compressor system.

**Keywords:** Time mode, variable mode, system control, simulation, intelligent control, air compressor, sensors.

## Introduction

An air compressor is a compression mechanism and carries out air transfer processes. This is especially important in air-separated equipment apparatus, which not only provides compressed air and forced regulated pressure for cooling equipment and refrigeration cars but also transport it and also supplies air to the separation equipment. This household, some enterprises choose air compressors and loading/unloading tools with features it is characterized by simple methods of control and low cost. Nevertheless, negative effects occur simultaneously. For example, a lot of energy was wasted during no-load operation and when the main motor starts, the current is carried much higher, which reduces the power consumption. In addition, its frequent activation has a dramatic effect, equipment and motor bearing control will also cause serious damage. The amount of maintenance for the equipment is huge and the decompression energy in the relief valve is wasted. Also, continuous supply and demand adjustment air supply is not accomplished by regulating access and the position of the sensor is shown to the force of air pressure in mechanical devices. When air consumption changes non-stop, the air supply pressure changes dramatically and becomes unstable. Therefore, it has a bad effect and operating process of pneumatic components and product quality, even leading to waste products. Such situations seriously damage the company's activity and economic

development. The controller of the technological process has a small size, high improved reliability, stable control and easy manipulation. It is also possible to set human-computer parameters interaction was achieved and control precision was greater high, it was less than 0.01Mpa. Swing in time this is because the device has less performance and energy consumption is a lower result. As a result, the cost of production has decreased. It's technological an intelligent controller was implemented in the system structure and monitoring everyone's working conditions in real time components and important parameters will be based. Data received compared to the nominal parameters of the system, appropriate start-up and shutdown controls have been implemented and in accordance with the control requirements, the air compressor system in the system is time-varying, delay and is attached to the control value of the time modes based on the nonlinear complex system. This is the original management system technology makes the pressure to become obsolete and compressed air is unstable, especially in some cases where gas consumption is more volatile, flow it is difficult to meet the requirements of traditional controllers fulfills the requirements. Therefore, it is urgently needed technical transformation of outdated management the system stabilizes the compressed air pressure requirements to meet the requirements of the devices adapted to the industrial environment. Technological system is based on set theory, system linguistic variable and system inferential logic, the the system synthesizes expert expertise to simulate management and the human thinking and decision-making process makes approx.. Uncertain features of management are that it is not required and obtaining an accurate mathematical model of the controlled object during the design of the control system, only necessary synthesis of expert experience knowledge and activity based on information from manipulators in the field. Also, it's blurry the controller is compatible with an air-like system compressor is non-linear, time-varying and delay. In this article, the system for monitoring the working condition air compressors are designed to monitor and control it operation to ensure stable operation of the air compressors and should be shut down during malfunctions. Mechanisms of the experimental device and sequence of technological processes. Shown in Picture. 1 fan coil air conditioner smart schematic diagram taken as a control experimental device. The main structure of the experiment the device can be divided into three parts. The first part is this Alerton is a building automation control system and the system in operation of the simulation program. The second Part of the information exchange system organized by the building Based on automatic management of Windows software. The third part is this equipment system consisting of an air conditioner rooms (including fan coil units, indoor cooling equipment, and envelope structure), heating and cooling systems ( air source heat pump, circulating water pump), temperature sensor. Alerton is a building automation control system the indoor air temperature can be measured through the indoor space temperature sensor Microset II. Data can be exchanged between Alerton and Simulink through data exchange interface, that is, the BAC window is formed. Internal deviation temperature and rate of change of temperature deviation as input signals are sent to the technological system controller. These are input signals fuzzing, go through the fuzzy logic decision process making and causing blurring. Results of the process Returned to the Alerton system. Then, the Alerton system can control the internal temperature of the air-conditioned room by adjusting fan gears such as high, medium, low and stop. In the device, the data exchange system acts as a bridge and can include an intelligent automatic control scheme. Its main part is the Window data exchange interface will be attached to the software.



Picture 1. Schematic diagram of the experimental device

Heat exchange between warm air and the environment the motor causes energy loss. In order to improve it compressor efficiency, temperature increased air must be cooled. Air after high temperature compressed air subjected to multi-stage compression the water is cooled by the cooler and then it enters and the next step is performed. cooling system and lubricating air compressors are used. The main process of air compressor system: first the air from the atmosphere enters the air filter and secondly, after the impurities have been eliminated, the air air is transferred to the air compressor, is subjected to compression in several stages and its the pressure rises gradually. Also, water cooling should be done in compressed air it is necessary to increase each level. At the same time, the engine transmits oil delivered to the air compressor. Lubricate equipment, oil the circulation system also takes some heat. Finally air from the last stage is transferred to the Nitrogen pre-cooler and for further cooling before serving devices are used. The most basic controls in air compressors include and start/stop air compressor motor as well constant pressure or constant flow control controls the output pressure. Constant pressure control or constant flow control ie air compressor output the pressure or flow is kept constant by certain means of adjustment observed when compressor flow or pressure changes. There approaches such as input-output flow regulation and and variable speed regulation, etc. The variable speed regulation is the biggest adjustment range and the most economical regulatory approach, but it is it is not easy to master the accuracy of its regulation; input current the regulation method is simple and comprehensive the adjustment range is set. This is a method of economic regulation and mainly applied to centrifugal compressors provides a constant speed. Alternate between constant pressure and constant flow control are actually related based on practical processes. The first controlled object in both is constant pressure or constant flow control and constant opening of the inlet guide vane (rotation velocity is constant while the motor is moving) and constant pressure air compressor signal control, but controlled by the opening of the inlet guide vane, air outlet pressure difference (outlet flow). is sent to a constant flow controlled compressor. Permanent pressure control is usually chosen for large-scale air separation systems. The rest of the control, for example, is automatic loading/unloading of air compressors, anti-surge control, motor overload protection control, starting control and anti-blocking protection of air compressors is installed for ensures safe operation of the unit.

## Conclusions

Effective operation of the monitoring system is guaranteed, scientific and since safe and stable operation a reasonable control project was chosen. Its main effect was shown as follows: a) The was the fluctuating

range of outlet air pressure decreased by and the quality of air supply improved perform efficient loading/unloading operation on each air compressor in the unit. b) Regulation of initiation and stop each compressor intelligently in accordance with state of work, state of resource utilization rationally, energy consumption and cost are reduced was preserved. c) mutual blocking of compressors were made automatically damage to the output pressure time reduction equipment air compressors were also higher than the specified value long d) Malfunctions that occur during system operation can be located quickly and then the manipulator will work intensity decreased. e) It had a satisfactory HMI and abundant flow charts demonstrated the real-time parameter value of each component. System management function was strong. It is aimed at changing the air outlet pressure the compressor is designed by the pressure fuzzy controller using fuzzy control theory. It is calculated and is analyzed to obtain the curved surface of the output control and control rule table using fuzzy tool In Matlab. Thus, not only the air supply was controlled the air becomes constant pressure in the compressor system more reliable and stable, but at the same time control efficiency improved. Otelbayev Azizbek, a student of the Nukus Mining Institute under the Navoi State University of Mining and Technologies, carried out numerous research works based on the activities of air compressors, sensors and ventilation system technologies. Scientific research is being carried out on the ventilation system in the mine and its placement schemes. Many of Azizbek's articles on the activities of mining enterprises were published in prestigious magazines. Azizbek has a high level of interest in the processes of mining enterprises.

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