

Chapter 4

Gas Turbine Power Plant of Low Power GTP–10S

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ABSTRACT

Currently, there is an increase in the use of gas turbines. Today they are used in the energy sector: aviation, armed forces, and the navy. The introduction of a new manufacturing technology developed by the authors will make it possible to manufacture cheap and reliable installations and thus ensure an exceptional position on the Russian market for goods and technologies, and taking into account the use of intellectual rights, abroad. The scientific novelty of the sample is the method of calculating small engines with a centrifugal compressor, a centripetal turbine and a combustion chamber with a negative thrust vector of the air flow. It is shown that the developed microgas turbine cogeneration power generator consists of a microturbine engine with a periphery, a free power turbine necessary for the selection of mechanical power, a high-speed electric generator with permanent magnets, an electronic power conversion system, exhaust heat energy recovery system and an automatic control system.

INTRODUCTION

For the harmonious development of the world, economy requires a balanced development of energy. World energy must be reliable with a focus on promising developments.

The modern development of scientific and technological progress, directly related to the development of the energy complex, allows a modern person to use his usual civilization achievements, which provide a high and comfortable standard of living for people living in countries with developed infrastructure.

The organization of trouble proof power supply of agricultural facilities in remote areas is fraught with great difficulties, due to significant investments in the construction and maintenance of low-voltage distribution networks.

As a result of the low payback of low voltage distribution networks, it is proposed to organize the power supply of agricultural consumers using the technology of building micro grids based on renewable energy sources (RES). For reliable operation of micro networks, it is necessary to use generating equipment that is capable, if necessary, of ensuring uninterrupted long-term power supply to agricultural facilities. This is an urgent need for the power supply of autonomous consumers.

Literature Review

At present, geographically distributed small power plants are being created in Europe, America, Australia and even Africa in non-electrified territories in the immediate vicinity of the consumer, which can be grouped together in a network and serve several consumers who live in isolation. The benefit of using them is associated not only with reduced fuel losses in plants operating in low-efficiency modes, but also with low maintenance costs. As a result of increasing the accuracy of energy consumption metering devices, it increases the accuracy of automated monitoring of power plant parameters, it becomes possible to use modern energy complexes capable of operating in an automatic mode, with a more reliable security system with less investment (Gusarov, 2004).

The practice and experience of many advanced countries shows that for reliable power supply in an autonomous electric network there must be both generators working on renewable energy sources and generators working on traditional hydrocarbon fuel. The main sources of electricity at autonomous facilities should be gasoline and diesel generators, micro gas-turbine generators operating mainly on hydrocarbon fuels, as well as small hydropower plants, biofuel generators, etc. Generators operating on renewable energy sources reduce the cost of electricity and reduce the need for continuous use of fuel generators, but are not the main and guaranteed sources of energy (Gusarov, 2016).

Of the traditional fuel generators on the world market, the most preferred is a micro gas turbine unit. Which can be used as a fuel, both liquid and gaseous type of fuel. It also has the greatest time to failure, and can work for a long time without shutting down in automatic mode.

The possibility of obtaining a large amount of thermal energy from gas turbine power plants implies a faster payback of the project (Adamavichus, 2016).

Gas turbine power plants used as heat-electric equipment for high-power thermal power stations and district heat-electric stations are economically justified. Today, gas-fired power plants have a low unit cost of fuel and equipment, and the relatively low cost of construction and installation and, subsequently, low operating costs, most favorably affect consumer interest in purchasing such a power plant (Gusarov, 2017).

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