дисперсию и недостатки низкой прочности связи матрицы и полимеризации волокон требуют дальнейшего изучения и обсуждения многими учеными, чтобы разработать больше новых волоконных продуктов из скорлупы кокосового ореха и новых строительных материалов, которые подходят для строительства инженерных зданий.

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ANALYSIS OF THE DEVELOPMENT STATUS OF MY COUNTRY'S WIND POWER INDUSTRY AND ITS FUTURE PROSPECTS

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Summary. *First, the distribution of wind energy resources in my country is described, and then the development status of onshore wind power and related technologies of wind turbines, as well as the distribution and utilization of coastal wind energy resources are analyzed. Finally, the current problems of wind power generation in my country are analyzed, and the future development of wind power is given an outlook.*

Keywords. *distribution of wind energy resources; onshore wind power; coastal wind energy industry; offshore wind power; offshore wind turbine support technology; problems and challenges; prospects*

1 Development of onshore wind power

1.1 Development history of land-based wind energy resources

Since the beginning of the new century, my country’s wind power industry has continued to develop rapidly. Since 2005, my country’s cumulative total installed capacity growth rate has exceeded 100% for six consecutive years. By the end of 2010, my country’s total installed wind power capacity had surpassed that of the United States and ranked first in the world [6]. In 2009, the "New Energy Industry Plan" was also promulgated, which confirmed that 7 wind power bases with a capacity of 10 million kilowatts will be established in Gansu, Inner Mongolia, Xinjiang, Jilin, Hebei and Jiangsu. In 2020, the total installed capacity of the seven bases will reach 170 million kilowatts [7].

1.2 Related technologies for onshore wind turbines

At present, the operation modes of wind turbines in the world mainly include independent operation, joint complementary operation and grid-connected operation. Among them, wind turbines and generators are the two main parts of wind power generation systems that realize electromechanical energy conversion, and the power and speed control of wind turbines and generators is one of the key technologies for wind power generation.

In order to control wind turbines and generators, there are currently three main methods in China: constant-pitch stall adjustment, pitch adjustment, and active stall adjustment.

In addition, in terms of wind power grid-connected simulation technology, research institutes such as China Electric Power Research Institute, Tsinghua University and other institutions of higher learning have strong simulation simulation technology capabilities and related testing capabilities. "Technology" to "Leading the world technology". And the establishment of a large-scale simulation wind power laboratory [10].

2 Utilization and Development of Coastal Wind Energy Resources

2.1 The rise of the coastal wind energy industry

In recent years, the wind power industry has developed rapidly. With the gradual development of high-quality terrestrial wind energy resources, onshore wind power has become saturated. According to the latest relevant national policies, many companies have turned their attention to the construction of offshore wind turbines. Refers to offshore wind power.

2.2 Distribution of coastal wind energy resources

China has a vast territory and many regions with rich wind energy resources. The theoretically developable total wind energy is 3.2 billion kW, and the actual developable capacity is about 250 million kW, second only to the United States and Russia [13]. According to data released by China's National Climate Center in 2017, my country's offshore areas are rich in energy, and the four major sea areas have the most abundant wind in the Middle East. Among the straits, the Taiwan Strait has the most abundant wind.

3 Problems and challenges of wind power generation in China

Chinese wind power industry has developed vigorously in recent years. Both in terms of installed capacity and scale of development, it has become one of the world's largest wind power countries, and wind power technology has also made great progress. However, many problems have also appeared in the development of wind power:

3.1 Wind curtailment problem

3.2 Wind power grid connection problem

3.3 Weakness of power storage technology

3.4 Imperfect industrial structure

3.5 Insufficient safety performance of wind turbines

4 Wind power development outlook

With the continuous consumption of traditional energy, the international call for the search for new energy is getting higher and higher. Therefore, my country's support for the development of new energy is also increasing, and many policies have been given to the development of wind power, so The development of wind power is very rapid, and it can be said that the development prospects are very good.

At present, the development of wind power has begun to take shape. The installed capacity of wind power grids continues to expand and production continues to increase. However, in the future development process, the installed capacity will need to be further expanded. We will increase efforts to develop wind power technologies to improve the efficiency and efficiency of wind power generation. Stability has continuously increased the proportion of wind power in the total power generation and has become an important part of my country's power system. In addition, offshore wind resources are rich, even more abundant than terrestrial wind resources. Therefore, the simultaneous development of offshore wind power and onshore wind power can greatly promote the development of wind power.

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ТЕХНОЛОГИЯ ЛАЗЕРНОГО ЛЕГИРОВАНИЯ ЧУГУННЫХ ИЗДЕЛИЙ

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Summary *The article presents the study results of the microhardness and microstructures of gray cast iron СЧ20 after laser quenching and laser alloying with silicon carbide. The treatment was performed using a continuous CO_2 laser with a power of 1 kW at a laser beam speed of 100-1100 mm/min. As a result of laser surface alloying of gray cast iron SiC, the microhardness increased from 2.2 GPA (initial structure) to 10.6...12.8 GPA (after quenching 6.1...7.7 GPA).*

Ключевые слова. *лазерное легирование, лазерная закалка, карбид кремния, микроструктура, микротвердость.*

Введение

Серые чугуны нашли широкое применение в машиностроении. Поверхность чугунных деталей подвергается тяжелым локальным нагрузкам и значительному износу. В следствие чего возникает необходимость проводить поверхностное упрочнение сопрягаемых поверхностей. С точки зрения эффективности, экономичности и качества в настоящее время наиболее предпочтительным является использование высококонцентрированных источников нагрева – например, лазерное упрочнение [1-2]. Лазерные технологии поверхностной обработки материалов находят все большее и разнообразное применение [2–4]. Лазерная закалка применяется для упрочнения серого чугуна, а для придания поверхности чугунных деталей дополнительных свойств применяется лазерное легирование. В данной работе рассмотрено сравнение лазерной закалки и лазерного легирования серого чугуна СЧ20.