

Автор:

Куликов Дмитрий Александрович

магистрант

Научный руководитель:

Безбородова Светлана Анатольевна

канд. пед. наук, доцент

ФГБОУ ВО «Уральский государственный горный университет»

г. Екатеринбург, Свердловская область

APPLICATION OF THE CASTING TECHNOLOGY TO PROVIDE THE IMPROVED OPERATION CHARACTERISTICS OF THE COMPONENTS IN OIL AND GAS INDUSTRY

Аннотация: данная статья посвящена технологии литья в нефтегазовой отрасли, представляющей комплекс промышленных предприятий по добыче, транспортировке, переработке и распределению конечных продуктов переработки нефти и газа. Многие детали, используемые в машинах и оборудовании нефтегазового комплекса, изготавливаются литьём. Литейное производство – один из старейших и до настоящего времени основных способов получения металлических изделий и заготовок. Главным плюсом литейного производства в нефтегазовой промышленности является то, что литьём можно изготовить любую деталь или запасную часть машины и оборудования, используемого при добыче нефти или газа различной конфигурации и массы. Нефтегазовое оборудование является продукцией, работающей в сложных климатических условиях, поэтому используемые детали, изготовленные литейным производством должны обладать высокой точностью и достаточной прочностью, т.е. иметь улучшенные эксплуатационные характеристики.

Ключевые слова: технология литья, нефтегазовая промышленность, прочность, оборудование, эксплуатационные характеристики.

Abstract: this article is dedicated to the casting technology in oil and gas industry, representing a complex of industrial enterprises for the extraction, transportation,

processing and distribution of final products of oil and gas refining. Many components used in machines and equipment of the oil and gas complex are made by casting. Casting is one of the oldest and main methods of obtaining metal products and blanks. The main advantage of casting production in oil and gas industry is that it is possible to produce any component or spare part of the machine and equipment used in the extraction of oil and gas of various configurations and masses. Oil and gas equipment is a product operating under difficult climatic conditions, therefore the used parts manufactured by casting must have high accuracy and sufficient strength, i.e. have improved operational performance characteristics.

Keywords: *equipment, strength, oil and gas industry, casting technology, operational performance characteristics.*

The oil and gas industry is the generalized name of a complex of industrial enterprises for the extraction, transportation, processing and distribution of final products of oil and gas refining. This is one of the most powerful branches of the economy of Russian Federation, largely forming the budget and the country's balance of payments, ensuring foreign exchange earnings and maintaining the exchange rate of the national currency. The oil and gas industry of Russia includes 2,352 oil fields being developed. The largest oil and gas region of Russia is Western Siberia, accounting about 60% of all extracted black gold. A significant part of oil and gas is extracted in the Khanty-Mansiysk and Yamal-Nenets autonomous regions.

The oil and gas equipment is in high demand all over the world and in our country. Therefore, the process of its production must fully comply with world and state standards. This is a very wide group of different equipment, it includes machinery for all kinds of geophysical and geological work, for drilling maintenance and subsequent repair of wells, equipment for extraction and transportation of raw materials. Many parts used in machines and equipment of the oil and gas complex are made by casting. Casting is one of the oldest and main methods of obtaining metal products and blanks for various industries, the oil and gas industry is no exception [1, с. 23]. Casting production can produce such details as: separators, screws, bearing housing of submersible

centrifugal pump, divider, rectifier, submersible centrifugal pump screw, submersible centrifugal pump guide, submersible centrifugal pump wheel, etc. The main advantage of casting production in the oil and gas industry is that it is possible to produce any part or spare part of the machine and equipment used in the extraction of oil or gas of various configurations and masses. Oil and gas equipment is a product operating under difficult climatic conditions, therefore used parts manufactured by casting must have high accuracy and sufficient strength.

Let's consider an auger used in drilling rigs. To achieve the greatest efficiency and quality of drilling, the focus is on the working tool – auger. This word is of German origin and has such meanings as snail, curl, spiral. As is known, the auger is a rod having a continuous screw surface along the longitudinal axis. Screw drilling – mechanical drilling, in which the breaking force is created by the continuous rotation of the rock-cutting tool with the application of the axial load. Drilling auger refers to one of the types of drilling tools. The most famous example is a meat grinder. The auger is designed for moving and compressing various materials and is used in drills, meat grinders, drilling rigs and other similar devices. Screw drilling is used most often for wells of small depth (up to 20 meters) with screws of small diameters (up to 1500 mm). The manufacturing of screws depends on their purpose, material, dimensions and configuration, and possibly in several ways: simple casting, casting with subsequent turning, hot deformation with further turning or cold bending.

The main way to get augers of any configuration is casting. Metal casting is the process of manufacturing metal products by pouring molten metal into a cavity of a special casting mold. The metal melts in the casting furnaces. Sectional or long-length auger blanks are mainly cast in sandy-argillaceous, earthen, shell, ceramic, polymeric, cone-shaped and chill molds, casting on gasifiable models (injection molding with foaming polystyrene), investment casting and pressure casting.

The augers are made of various steels and cast irons. Steel is an alloy of iron with carbon (and other elements). Carbon content in steel is usually set in the range of 0.1 to 2.14%, with a content of 0.6% or higher corresponding to high-carbon steel. An alloy with a carbon content of more than 2.14% is called cast iron [2, c. 67].

One of them is steel for castings alloyed with special properties. This steel is corrosion-resistant, heat-resistant, heat-resistant at temperatures up to 1100–1200 degrees. Basically, this steel is used to manufacture parts that operate at high temperatures in a heavily loaded state (furnace conveyors, screws, fasteners). This steel refers to the austenitic class. The heat treatment of this steel is made by tempering at a temperature of 1150 degrees Centigrade, also heat treatment can be carried out in chilled water.

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