

TECHNOLOGY FOR WORKING GRANITE MATERIALS FOR SINGLE THICK PRODUCTS

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ABSTRACT

It has been scrutinized the technological scheme for working granite materials used in big stone working factories. This scheme is unsuitable for the small factories from the same branch. The suggested technological scheme completely satisfies the following requirements of the small factories: low prime cost of the ready production, maximum using of stuff and rapidly executing the certain order.

ANALYSES OF THE TECHNOLOGICAL SCHEMES FOR WORKING GRANITE MATERIALS

Common information

It is well - known that the production of different granite products is made by different operations, executed by different orders, which compose the integrated technological process. As a result of these technological and production operations, the product with the necessary mould, size and fracture (stage of area working) is made.

The term technological scheme for working rock materials means the succession of the main operations for getting ready production. The technological scheme of working depends on many factors like: the physical and mechanical features of the rock material, the mould and size of the block and the index of the ready product (mould, size and the quality of working area).

The optimal variant for the technological scheme for producing a given product, except for the above-mentioned factors, depends on the production and economic conditions such as: availability of suitable machines, charges of technological materials, economic and effective prime cost.

Extant technological schemes for working granite materials

In the accessible technical literature and especially in Marhov (1993), is considered a technological scheme for working granite materials, shown in fig. (1).

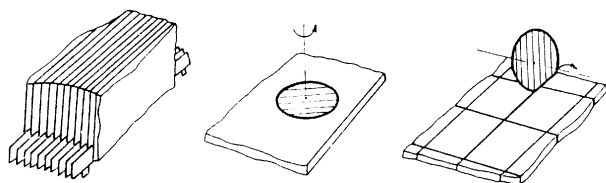


Figure 1.

In this technological variant, block sawing is made by saw mill, working with free abrasive (steel or cast iron shot), which are with high abilities up to 150 blades, allowing working blocks with length up to 4 m, width 3m and height 2 m. It is typical of these technological schemes that the slabs, obtained from block sawing, first are ground and polished and after that they are circumsised by length and width. This special feature is solely prompted by the circumstance, that for the granite materials, which are made of hard rock-forming minerals, with rigidness 6 and 7 by Moss's scale, much more pressure of the grinding instrument is necessary, than for other rock materials, like marble and limestone. In this case, when the granite slab is first circumsised to the necessary size and then it is ground, as a result of the big pressure and tangential strength of grinding instrument, the mineral grains near the edge of slab start to break off. This is so-called edge break off.

The technological scheme described in literature source \1\ is advisable only for sawing granite materials for manufacturing thin and medium slabs, in the condition of big serial production, which was the compulsory element for the so-called planned economy.

IMPROVED TECHNOLOGICAL SCHEME FOR WORKING THICK PRODUCTS FROM GRANITE MATERIALS

In the present conditions of market economy and high competition in the sphere of stone working industry, the small factories took the only available market niche, making non-standard products and finishing half ready products like - curb stones, memorials, monuments, pedestals, stairs and other. These conditions force the small factories to have fast retune of the technological processes, high flexibility of the technological scheme, low self cost of the production and high yield (maximum using of the stuff).

The limited investments and the specific working process in making thick granite products, reject the first section of the technological scheme working in the big companies - the saw

mill. The enormous investment and inability to fulfil the product capacity of the saw-mill are the reasons for the removal of the latter from the production nomenclature of small factories.

As the first section in the technological scheme in the small factories, a wire sawing machine with free abrasive, or a disk cutter with a disk diameter 2500 mm - 3000 mm can be used.

The disk cutter also requires high investments, has compound structure and its height of sawing is limited to 1200mm. A big priority of these machines is the high speed of sawing and comparatively flat sawing surface, which is connected with consumption of expensive diamond segments and high power capacity. The slot made of diamond circular blade reaches 14 - 15 mm, which leads to consumption of stuff.

Wire sawing machines, working with free abrasive, do not require high investment. They have the ability to saw blocks with big sizes, as the limits in height of sawing surface are 1800 mm - 2000 mm, which completely satisfy the needs of small factories. The expensive consumption is prerequisite for limited usage of these machines. Lately in the practice has been enforced the using of waste products like substitutes of silicon carbide (the main free abrasive used for sawing granite materials). These substitutes vastly decrease the prime cost of ready product. Due to the fact that the slot made by the wire reaches 5 - 6 mm and the power capacity of the machine is low, the using of wire sawing machines with free abrasive is most suitable for the needs of small factories.

The above economical and technological conditions apply using of automatic grinding machines with a single executive body and a manual grinding machine. The line grinding machines have limit in height of working surface - 200 mm, high investment, expensive maintenance and high power capacity, which do not agree with the given conditions. This leads to rejection of these machines from the technological schemes used in the small factories.

Technological scheme used in the small factories working thick granite materials

The suggested below technological scheme has been applied for the last 10 years with the creation of the small private factories.

This scheme fig. (2) consists of the following operations: 1/ block sawing, 2 circumcising the slab, 3 grinding and polishing, 4 secondary circumcising and 5 taking chamfer and polishing the forehead.

The special feature in this scheme is that the circumcising goes before the process of grinding. It is applied because of

the fact that the unduly part (waste) of the slab range from 10 % to 50 %. In this case grinding the whole slab is connected with the increase of the production cost-grinding abrasive and electric power. According to this the technological time, for making a given product, increase.

At the next operation grinding and polishing there is a risk braking off the slab edges. The break off is caused from the diamond, grinding head, which is made by a few segments. Its small size lead to increasing the pressure over a unit of grinding surface. This increases the probability of breaking off grains of the minerals. For evasion of this harmful effect, toward the first circumcising it have to be left larger size for next correct the right size by second circumcision. By the given technological parameters, breaking off edges can be smooth out, by taking a chamfer.

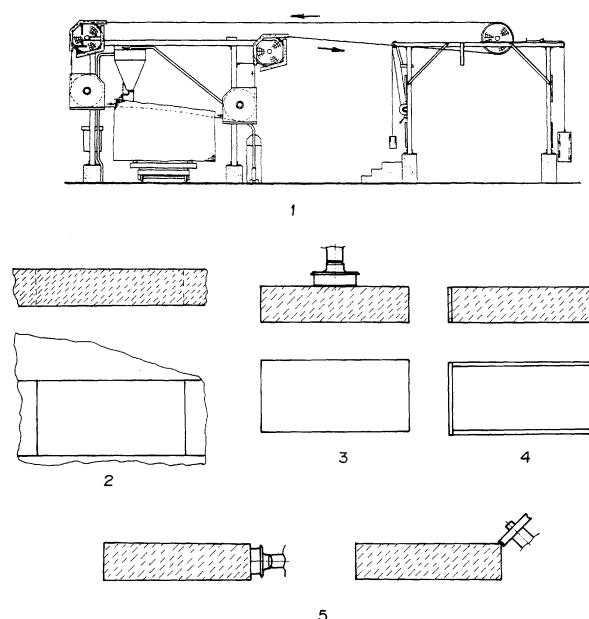


Figure 2.

These are the main reasons for choosing this technological.

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