



Metal Molding Equipment for Yellow Pavet Forming

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Abstract

Taking into account the previous detailed studies of different compositions for yellow pavers and especially the air and fire compressibility of samples and products, metal molding equipment was developed for forming pavers with equivalent sizes and colors of the original samples from the center of Sofia. Based on the technological parameters, a design assignment was prepared and metal molding equipment was made for the production of yellow paving to cover experimental sections in the center of Sofia, in order to continuously test and prove in real conditions their tribological indicators.

Keywords: pavers, silicate materials, molding equipment.

1. Introduction

In Bulgaria there are a variety of deposits of sedimentary rocks (mergels) suitable for the development of formulations and technologies of production of yellow paving. The developed technologies for prototyping are based on classical methods [1-3] used in the silicate industry. This allows the rapid organization of production with available standard equipment. The prepared prototype samples are made in different types of matrices according to the chosen pressing method. For the production of single experimental products, gypsum matrices in a metal frame or metal matrices consisting of a metal removable frame, lower and upper floorboards and side plates are used to print the specific shape of the product – in this case paving.

The indicators of the finished samples comply with the requirements laid down for this type of ceramic flooring and the existing standard [4]. Based on developed technology, the works have been reported at international conferences and published in proceedings and journals [5–8], and with the created metal classical matrix, experimental products have been made to conduct research to establish their qualities. At the same time, the test matrix thus created will be tested, which will serve to create a working matrix when establishing the necessary quantities for production.

2. Aim

The purpose of the current work is to create a metal matrix, with the possibility of making a certain number of experimental products and then a certain amount of paving to cover an area in a real street space to prove the qualities of the pavements.

The conditions for achieving the goal is to create a base composition, which by modifying with various additives in order to achieve listed colors and qualities of the material of the paving stones from natural raw materials and to press with the proposed metal matrix.

3. Experimental technology

Technology for prototyping has been developed in detail and is based on a patently protected composition of natural raw materials. The mixture is homogenized in a colorang, plasticized with humidity of 18-20 %, allowed two days aging and pressed into special metal forms for paving with original sizes in press for plastic pressing.

Thermal treatment is carried out in a chamber furnace type “Cida” with programmatic regulator for programmed process management:

Heating speed: 1-2 to 3-4°C/min; temperatures, time and isothermal heating according to the selected composition and color; maximum firing temperature up to 1220°C up to 5 hours retention, depending on composition and color; cooling rate is from 6 to 7 to 8-10°C/min.

The new samples produced are also characterized of about 80 times less surface porousness and 19 times lower water absorption compared to the original yellow paving. The resulting prototypes found:

- Pressure strength – 2900-3000 kg/cm²;
- Wear resistance – 0.05 g/cm²;
- Micro hardness – 760-800 kg/mm²;
- Thermal resistance from 30 heat shifts per air (from 500 to 20°C).

4. Construction characteristics of metal shapes

Construction characteristics of metal shapes, creating a job according to the shape of a classic yellow pavement.

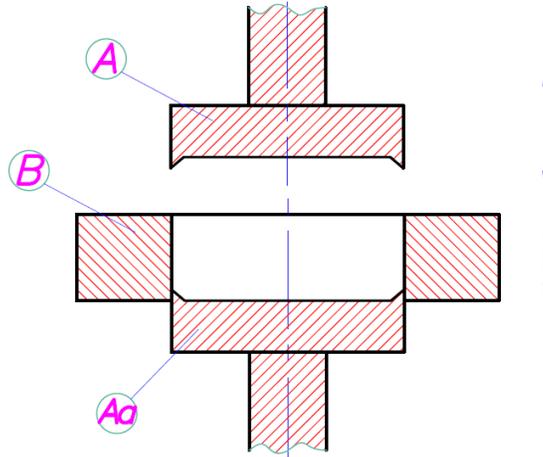


Fig 1. Principle scheme of metal shape

Technical data for a job for making the metal form:

- Useful working area volume of metal form 200 x 100 x 100 (80) mm;
- Frame stirred type pliers for clamping the working metal shape;
- Achieving load homogeneity by longitudinal and transverse screws of the moving frame

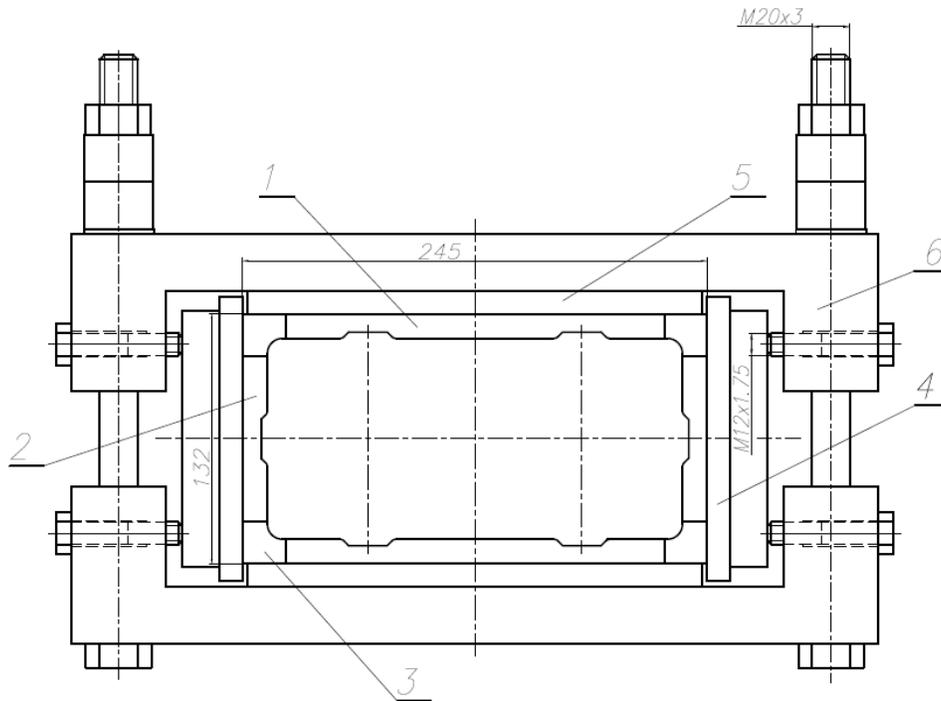


Fig 2. Drawing of a metal shape with a frame stirred

5. Conclusions

1. Yellow paving prototypes of a new, patent base composition with modifiers and additives for colored paving stones proceed without the use of sedimentary marble rocks have been prepared. Colorful pavers with stable colors are obtained.
2. Technological regimes for firing the pavings of different colors were created.
3. A metal molding equipment and a programmable setting of the temperature regime was created, made and tested.

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