UDC 621.742.4 (075) + 621.743.4 (075)

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INDUSTRIAL TESTS NONSTICK PROPERTIES OF MOLDING AND CORE MIXTURES WITH TECHNOGENIC WASTE

Annotation. The article deals with the analysis of the results of industrial tests of the antiadhesiveness properties of molding and core sand mixtures with technogenic wastes, for example, oil-containing bottom deposits and wastes from the sludge accumulator ponds of oil-refinery plants. The aim of testing is determination of their usage appropriateness in comparison with the workshop mixture. The properties of the tested mixtures were represented and the analysis of quality of technological samples was conducted. The possibility and effectiveness of mixture usage with technogenic wastes at manufacturing the steel moldings of small and average weight was established. It was found out experimentally that the rod mixtures with tested sludge prevent penetration of the molten metal in the space between quartz sand granules and formation of burnt-on. At the same time at usage of the serial mixture there are conditions for penetration of the molten metal into the form pores and formation of burnt-on. Form and rod mixtures with technogenic wastes are recommended for usage at production of the steel moldings as economically and ecologically effective.

Key words: technogenic waste, molding and core sands, industrial test, technological sample.

Ref. 3, fig. 7.

Introduction

The addition of an ethnogeny waste in molding materials to enhance their properties antiadhesiveness and is relevant scientific and technical challenge. As such waste can be used oily sediments (OS) and waste from the sludge ponds accumulate e lei refinery (PALR). Therefore, the development of Practical a measures and technical solutions to prevent pollution of oil wastes environ mental protection and the use of their waste in the foundry industry has not only environmental, but also about economic benefits [1; 2].

Statement of the Problem

Make production tests nonstick properties and molding the rod e O mixtures to identify advisability their use compared with plant mixture.

Basic material research

Industrial trials were conducted at the Baku steel plant in the production of steel castings. The aim was to compare comparable nonstick properties of a mixture of factory №12 and suggested blends with man-made waste.

Formulations factory test mixtures are given in Table. 1 and their properties - Table. 2. In a Laboratory from steelworks test mixtures were produced cylindrical bars 23 mm in diameter and 75 mm long. Fig. 1 is a flow test, with about representations of the rods. Technological sample was flooded with steel grade 45 L at a round temp 1823-1833K (1550-1560°C) melted in an electric arc furnace DSP-5M. Fig. 2 presented casting process samples after knockout of the form.

After cleaning the casting sample subjected to the following processing modes are p thermal treatment: hardening: heating to a temperature 920°C, shutter 30 min., Cooling water; holiday temperatures up to 400°C, exposure 30 min., air cooling.

Table 1

Formulations mixtures

The components of the mixture	Composition% by weight		
	guild №12	proposed №1	Offered №2
Sand 4 K1O2O2 GOST 2138-91	90.02	87.02	87.02
Binders LST TU 13-0281036-05-89	5.95	5.95	5.95
CO binding OST 38.01182-80	4.03	4.03	4.03
NGO	-	3.0	-
PALR	-	-	3.0

Table 2

The properties of the test compounds

Properties of mixtures	Performance during the test		
	guild №21	Offered №1	proposed №2
Strength of contraction in humidity state, 105 Pa	0.15	0.14	0.13
Tensile strength after drying, 105 Pa	18	18	17
Gas permeability units.	100	110	100
Sloughing, %	0.20	0.20	0.20

In order to determine the extent of damage at technological sample after thermal processing were cut. Fig. 3 shows the cut samples. The figure shows that the casting made in the forms of the proposed moldable mixture to a lesser extent amazed burnt. At the same time casting in the forms produced from the original mixture №12, almost completely amazed burnt.

Conducted research confirmed the effectiveness of the proposed mixture. After casting technology industrial test samples were purified from burn-hand. After cleaning castings of metal penetration amount of burnt mixture was: guild mix – 810 g; additive mixture OS - 230 g; mixture with the addition of ORRN - 255 g.

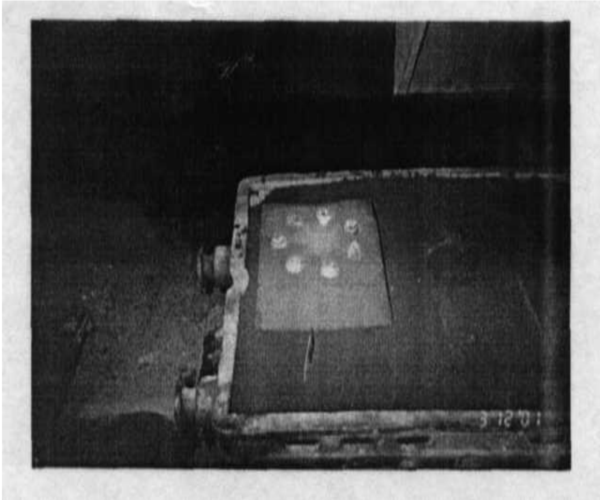


Fig. 1. Technological tests defined rods

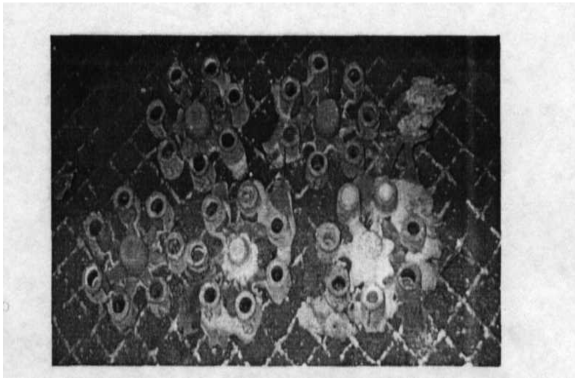


Fig. 2. The casting process samples

In terms Binagadinsk steelworks tested core sand slurry with the additive in the manufacture of advanced steel castings. The aims of study was identification nonstick offering a rod actuated moldable mixtures used in comparison with the plant moldable mixture №12.

a b c

Fig. 3. Cuts castings with the addition of technological samples: a - casting obtained from the original mixture; b - casting, obtained from the mixture with the additive OS; a - molding obtained from a mixture ORRN

Cores manufactured in a foundry plant, dried in a vertical conveyor with at 320^{0}C temperature for 90 min. The rods fit into the form of castings manufactured e "fork" (drawing 162.60.202) and at about 1550-1560^{0}C poured steel 45L. Fig. 4 shows the lower half-mold with rods installed.

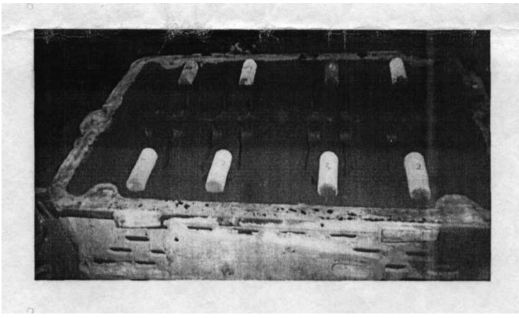


Fig. 4. The mold halves with established rods

Fig. 5 shows a group of castings made from rods made in the experimental mixture forms.

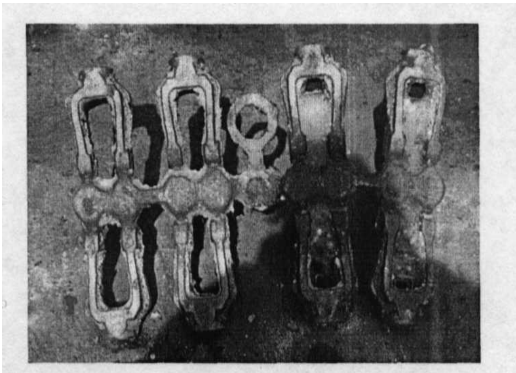
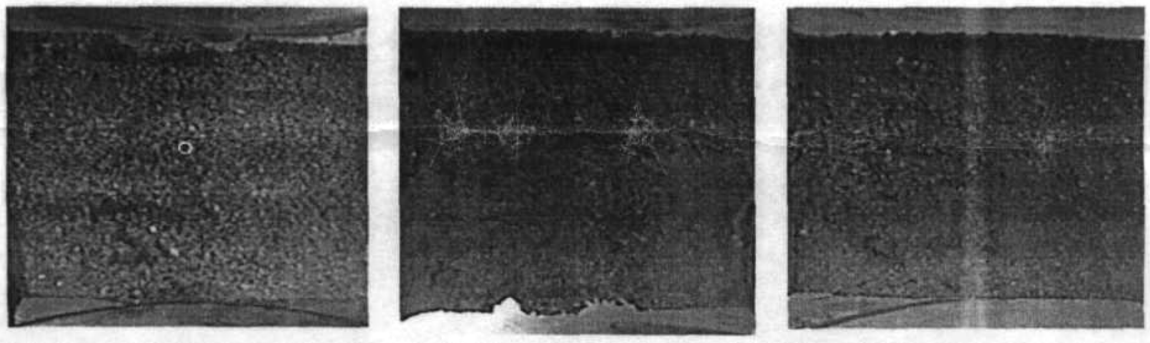


Fig. 5. Block experienced castings

After cooling and separation unit knockout castings, the latter were treated thermal a cal following modes: hardening: heating to a temperature 920^{0}C, shutter 30 min., Cooling water; holiday temperatures up to 400^{0}C, exposure 30 min., e Cooling of air.

To study the surface of the castings produced using cores from experience mixture, the latter were cut. Incisions castings are shown in Fig. 6, which shows that, compared with the mixture used in the plant, a casting obtained application experimental mixture differ almost completely lack of metal penetration [3].

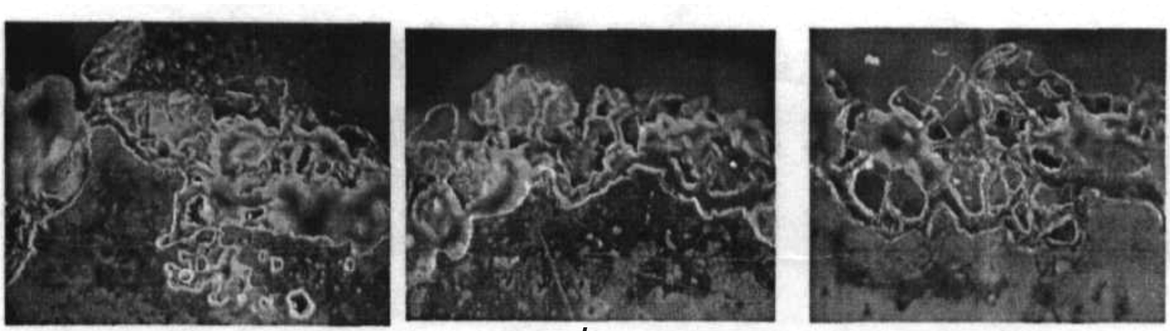


a b c

Fig. 6. Incisions trial castings: a) casting made in the form of a mixture of existing shop; b) casting, made in the form of a mixture with the additive NIR; c) casting made in the form of a mixture with the additive

Experienced castings were produced samples for metallographic studies. Samples were prepared in such a way that it was possible to study the surface of the casting with metal penetration and surface casting adjacent to the burnt. To prevent discoloration and shedding surface layer adhesiveness polishing surface of the sample with the burn-impregnated with epoxy resin. Of the so prepared thin sections of templates were made metallographic.

Fig. 7 shows the thin sections, is made of castings using a mixture of plant and mixed with a 3% slurry. Fig. 7 shows that the core mixture with a test slurry prevent the penetration of liquid metal into the space between the grains of quartz sand and the image of burnt metal penetration. At the same time when the use mixture has burst forth conditions for the penetration of liquid metal into the pores of the shape and formation of metal penetration.



a b c

Fig. 7. Microsections cut from the test castings: a) thin section made using a c e a dashed mixture; b) grinding manufacturing feudal with the use of a 3% cash circulation; c) grinding manufactured using 3% PALR

Findings

Thus, we have proved the usefulness of molding and core mixtures with man-made waste. The possibility and effectiveness of the use of such compounds in the manufacture of steel castings of small and medium weight.

It was established experimentally that the core mixture with a test slurry pre hinder the penetration of liquid metal into the space between the grains of quartz sand and the formation of metal penetration. At the same time when using continuous mixture are conditions for penetration of the liquid metal into the pores and the formation of shaped metal penetration.

Therefore, we recommend the use of molding and core mixtures with technological waste in the production of steel castings not only as a more cost-effective, but also more environmentally suitable.

References

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