UDC 666.97.031:693.542

A TEST CIRCUIT CHOICE OF COMPOSITE CONCRETE CONSTRUCTIONS FOR CONTACT JOINT STRENGTH TEST

VIKTORYIA KALITUKHA, KSENIYA KASTSIURYNA, ALENA KREMNEVA
Polotsk State University, Belarus

A significance of contact joints in Construction is being shown. Presumable test circuits of composite concrete constructions are being analyzed. A test circuit for contact joint strength test is being rated. Contact joints strength is being investigated by the results of a conducted experiment.

Today it is very perspective to use materials with various properties in many fields of national economy such as mechanical engineering, metalworking, chemical industry, medicine, civil engineering, etc.

The main advantage of using of materials with various properties is the opportunity to compound two or more elements with various characteristics in one product. In the process the advantages of every material individually are being used and in this way the universality of a result product is ensured, along with its combined action and dependable service.

In any field of national economy the usage of materials with various properties combines one thing: combined action of two or more materials which from the beginning can differ in properties, composition and manufacturing technique.

In the field of Construction contact joints are of great significance. From its strength and deformability the further strong combined work of a whole construction or a building is dependent. There are contact joints both in new construction (while manufacturing industrialized components, during concrete pause in monolithic construction, right up to long-delayed construction) and reconstruction. Also there are contact joints in composite reinforced concrete constructions, steel elements, etc.

One of the most important and difficult questions is the investigation of contact joints resistance to shearing action. When shear the work of contact joints has quite a complicated character depending on many factors. At the same time it is very important to investigate shear strength of contact joints because a combined action of adjoined elements and a bearing strength of whole construction are dependent on it [1].

There is a large quantity of investigations in the field of contact joints strength and deformability. There are some of native and foreign researchers: Gvozdev, Gorodetskiy, Mersh, Poliakov, Adamenkov, Medvedev, Valeev, Martynova, Korovin, Lazovskiy, Vasilyev, Mattock, Kaar, Saemann, Washa, Furtak and many others [2].

In spite of the large quantity of investigations there is a problem to choose a proper form of a model and a test circuit when conducting a shearing test.

The following test circuits of composite concrete constructions are offered by the above mentioned researchers (fig.1):

a) a test circuit №1 offered by Gvozdev, Vasilyev and Dmitriev;
b) a test circuit №2 offered by Khagger;
c) a test circuit №1 offered by Mersh.

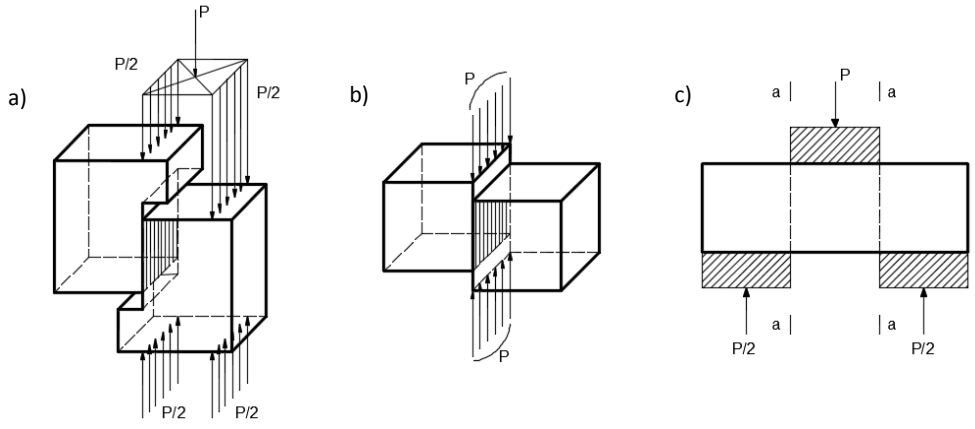

Fig. 1. Test circuits of composite concrete constructions:
a – № 1; *b* – № 2; *c* – № 3

Test circuit № 1 (Fig. 1, *a*) ensures a shear at the place of a studied section, but it's too cost-based. Test circuit № 2 (Fig. 1, *b*) ensures a shear at the place of a studied section, but the models do not possess resistance and require pin-point accuracy of installation. Test circuit №3 (Fig. 1, *c*) doesn't ensure a pure shear, but the models have a bigger surface of contact in comparison to previous test circuits.

The research work on contact joints strength test of composite concrete constructions is being conducted at Polotsk State University. As the basis of the test circuit test circuit № 3 was laid along with some additional development according to test circuits № 1 and № 2. Test circuit of this kind allows reaching much more accurate results owing to a big area of contact joint between old and new concrete. Also a significant advantage is simplicity of fabrication and economy of materials (Fig. 2).

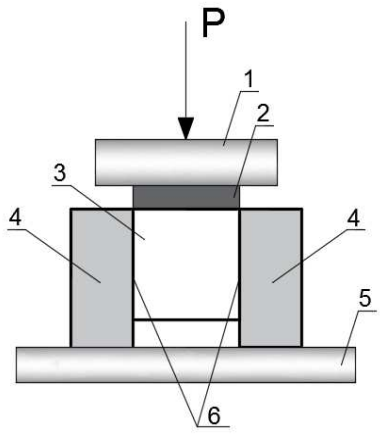

Fig. 2. An experimental test circuit: 1 – a working press rod making a shearing force; 2 – a metal plate, which transfers a load on a middle part of a model; 3 – an "old' concrete; 4 – a "new" concrete; 5 – pressure pad of a press; 6 – a surface of shear

There were the investigations about strength test of contact joints modified with hyperplasticizer STACHEMENT-2000M witnessed according a chosen test circuit. Experimental models were a combination of an "old" concrete (in the middle) and "new" modified concrete (along the edges). A concrete mix of the "old" part was the same for every model. The surface was previously cleaned through cement skim erasing. The sets differed by concrete mix. The first concrete mix of "new" part was without any admixture, the second – with hyperplasticizer STACHEMENT-2000M (table 1).

Table 1 – The strength characteristics of composite elements

Number of a set		The used admixture	Procent of admixture, %	$f_{c,cube}^{G}$, MPa of "new" concrete	Conditional strength class of "new" concrete
Without admixture	C2-12-0%	-	0	39,45	$C' 31,56/39,45$
With admixture	C2-12-0,7%	STACHEMENT-2000M	0,7	58,67	$C' 46,94/58,67$

According to the results of investigations the following deductions were made:

- there is enough quantity of test circuits for shear of composite concrete constructions, but the most efficient have not been discovered yet;
- the research work on contact joints strength test of composite concrete constructions is being conducted at Polotsk State University ;
- the best strength of contact joint is reached when the dosage of the admixture is 0.7% by weight of cement.

REFERENCES

1. Скворцов, А.Г. Сопротивление контактных швов железобетонных конструкций при действии сдвигающих сил : автореф. дис. … канд. техн. наук : 05.23.01 / А.Г. Скворцов. – М., 2000. – 126 л.

2. Хасанов, Р.Р. Прочность и выносливость плоских контактных швов сборно-монолитных железобетонных конструкций в зоне действия изгибающих моментов и поперечных сил : автореф. дис. … канд. техн. наук : 05.23.01 / Р.Р. Хасанов. – Казань, 2002. – 193 л.
3. Гвоздев, А.А. Изучение сцепления нового бетона со старым в стыках железобетонных конструкций и рабочих швах / А.А. Гвоздев, А.П. Васильев, С.А. Дмитриев. – М. : ОНТИ, 1936. – 54 с.
4. Головнев, С.Г. Сцепление бетона в зоне технологического шва / С.Г. Головнев, С.Б. Коваль, М.В. Молодцов // Вестник Южно-Уральского гос. ун-та. Сер.: Строительство и архитектура. – 2005. – Вып. №13(53). – С. 71–75.