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A METHOD ABOUT THE ARTIFACT DESIGN FOR INDOOR SURFACE: SILICONE MOLD TECHNOLOGY

Kemal SAKARYA[1*]

[1]Department of Interior Architecture/ Fine Arts Faculty, Cukurova University, 01330, Adana, Türkiye
ksakarya@cu.edu.tr

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*Corresponding author

Abstract

It is possible to say that the structures, which materials are used with nominative in today's technology, repeat themselves in variety of structure. Concrete mass which are exposed the holes of bolt mold, metal surfaces which are protected of view oxidized, wood plaques impregnated for avoid only the conditions of outdoor are frequently used in architecture, either indoor or outdoor, due to their natural appearances.
The designers, who adopted the approach of using materials in their natural states, tend to make difference in about structures in this repetition and try several technics. Approaches of usage by giving texture or forming pattern to surfaces of materials of concrete, plaster, etc., which are used pouring into molds pre-prepared, can give an example for those technics.
It's necessary to shear or contuse the certain regions of concrete surface to create pattern and texture on concrete out of the mold, and these operations create loss of time and energy in implementation process.
Another method of forming pattern and texture on concrete surface is to use the special-designed molds in casting process. It is taken a mold by forming model with the materials like clay, mud, plastilin, which can be shaped easily and pouring concrete to these molds, intended texture on the surface of concrete out of the mold is obtained.
In this study, different methods about the forming texture on the surface of concrete are obtained, starting from the traditional molding stage to silicone mold technology. Production method and process of texture, which are become different from standard operations and can be premeditated for the texture obtained are examined with positive and negative sides as main subject of the study.
Keywords: Texture, Silicone, Molding, Casting, Interior

İÇ MEKAN YÜZEYLERDE YAPAY DOKU TASARIMINDA BİR YÖNTEM: SİLİKON KALIP TEKNOLOJİSİ

Özet

Günümüz teknolojisinde malzemelerin yalın haliyle kullanıldığı yapıların, yapı çeşitliliği içerisinde kendilerini tekrarladığını söylemek mümkündür. Kalıp cıvata deliklerinin açıkta bırakıldığı beton kütleler, oksitlenmiş görünümünün korunduğu metal yüzeyler, yalnızca dış ortam şartlarından korunmak üzere emprenye edilmiş ahşap plakalar, doğal görünümleri nedeniyle mimari yapılarda gerek iç mekân gerekse dış cephelerde sıklıkla kullanılmaktadır. Malzemeleri doğal halleriyle kullanma yaklaşımını benimsemiş tasarımcılar, bu tekrarın içindeki yapılarında farklılık yaratmaya yönelmekte ve çeşitli teknikler denemektedirler. Önceden hazırlanan kalıplara dökülerek kullanılan beton, alçı vb. malzemelerin yüzeylerine doku verilerek veya desen oluşturarak kullanma yaklaşımları bu tekniklere örnek verilebilir.
Kalıptan çıkmış betonda desen ve doku oluşturabilmek için beton yüzeyinin belirli bölgelerini tıraşlamak veya zedelemek gerekmekte, bu işlemler ise uygulama sürecinde enerji ve zaman kayıpları oluşturmaktadır.
Beton yüzeyinde desen ve doku oluşturmanın bir başka yöntemi ise özel olarak tasarlanan kalıpların döküm sürecinde kullanılmasıdır. Kil, çamur, plastelin gibi kolay şekillenebilen malzemelerle model oluşturarak kalıp alınmakta ve beton bu kalıplara dökülerek, kalıptan çıkan beton yüzeyinde istenilen doku elde edilmektedir.
Bu çalışmada, beton yüzeyinde doku oluşturmadaki farklı yöntemler geleneksel kalıplama evresinden başlayarak silikon kalıp teknolojisine kadar ele alınmıştır. Standart uygulamalardan farklılaşan ve elde edilmek istenen dokunun önceden tasarlanabildiği bu üretim yöntemi ve süreci, çalışmanın ana konusu olarak olumlu ve olumsuz yönleri ile incelenmiştir.
Anahtar Kelimeler: Doku, Silikon, Kalıplama, Döküm, İç Mekân

1 Introduction

Concrete, with all its characteristics that allow obtaining different molds for aesthetic purposes and easiness of usage in all climatic conditions, is a necessary material used in architectural designing.

Starting from the second half of the 20th century, concrete has been used without any type of covering material, solely raw as a removed from mold. This type of method called "Exposed Concrete". In this study, the methods of texture formation onto the concrete surface are examined with its positive and negative aspects.

2 Methods of Texture Formation

2.1 Traditional Molding Method

In the traditional method of concrete casting, mold materials which form a flat surface are being used. These materials, which are wood boards, are the most commonly used ones. In case of roughnesses like snags, age circles, fiber slits on the boards, these patterns obtained as primary roughnesses on the concrete surface. Besides, gaps formed depending on curvurates of wood board sides cause from crook or joint gaps between two boards occur as a result of wrong assembly, concrete leaks from these gaps after casting into the molds and it creates secondary roughnesses.

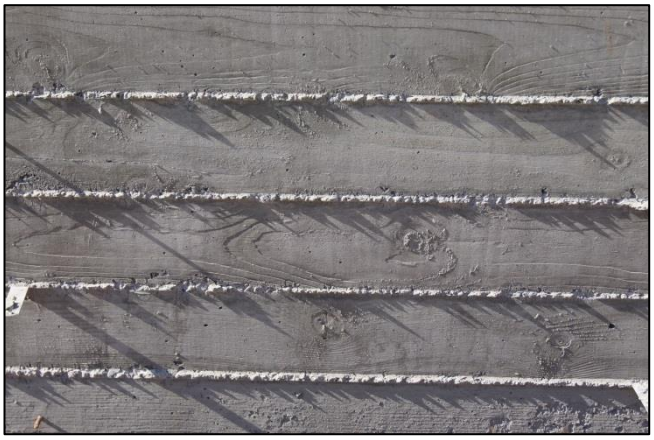

Figure 1. Mold board prints on concrete surface.

On this stage, designer give a decision for these negative or positive textures, use "the molding error" on concrete surface as remain or retouch them. If the surface is to be used in the form of exposed concrete, none of intervention is being conducted; as for retouching – flat and smooth surface is being obtained by means of plastering.

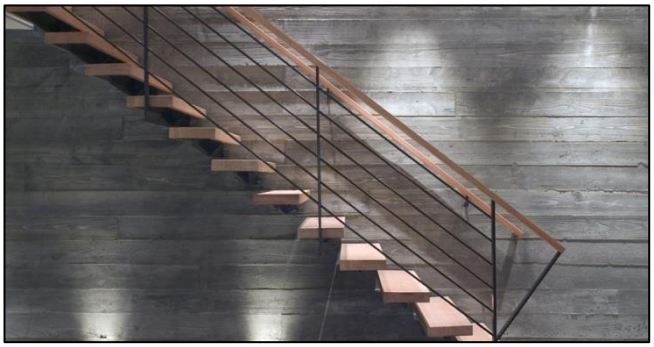

Figure 2. Raw wall surface.

Figure 3. Smooth wall surface.

Randomness of concrete surface patterns according to physical condition of wood boards and impossibility of prediction of patterns that will be obtained after the concrete molding are negative aspects of the mentioned method. Besides, there is a possibility for some board particles that break off the molds as a result of unrestrained contact between concrete and mold that remain on the surface of concrete.

2.2 Stamping Method

Stamping is a method of texture is given to concrete after molding using various fixtures. A stamp, which has a pattern on its front face is placed on the concrete surface when its hardening period have not been completed yet and the pattern is being transposed manually or by using mallet [1]. The same operation is repeated for the whole surface. The stamp used in this operation is of a square-rectangle form or can be of intertwined irregular form as well. In order to obtain patterns like stone or wood on the concrete surface, irregular form stamps that are most suitable to the original pattern are being applied. The small size of stamps increases time and energy loss while applying on wider surfaces. Need for additional attention and accurateness while using irregular form stamping is another disadvantage of this method.

Figure 4. Stamping method on concrete surface

2.3 Pattern Molding Method

In this method, in order to take undesirable pattern results of traditional molding methods under control, special patterns are being designed and used as molds before the actual concrete casting [2]. Firstly, previously prepared pattern mold is being taken and it is applied to the inner surface of the concrete mold, then concrete is casted into those molds and positive textured concrete surface is obtained as a result of setting. As for negative texture casting, figure stencil is installed into the mold, after concrete casting, desired figures are obtained on the concrete surface.

Figure 5. Positive and negative patterns on concrete surfaces

Figure 6. Negative patterns on concrete surfaces

2.4 Silicone Mold Technology

As materials used in molds are made of plastic characteristic, it reduces alternative numbers of textures that are applied onto the concrete surface. Generally, silicone molding method in restoration applications has become reference for designers and they try to use flexible materials as molds. Using silicone molding methods for spilling liquid silicone onto the patterns and solidifying after the setting application allows taking all forms on the surface in a detailed manner and increases alternatives of designing in terms of using it for molding methods, especially for relief depth of concrete surfaces, pattern forms and pattern duplications.

Figure 7. Silicone molding method in restoration application

2.4.1 Production Process

Needed texture is being modelled via CAD software and printed on CNC device. If designed concrete has negative surface, model must be negative characteristic too. By the way, the stamp obtained from those models will form the opposite texture of completed concrete surface. In case, if patterns are big, more than one model print is prepared. Surface roughnesses of printed patterns are processed in order for moldings to be impeccant.

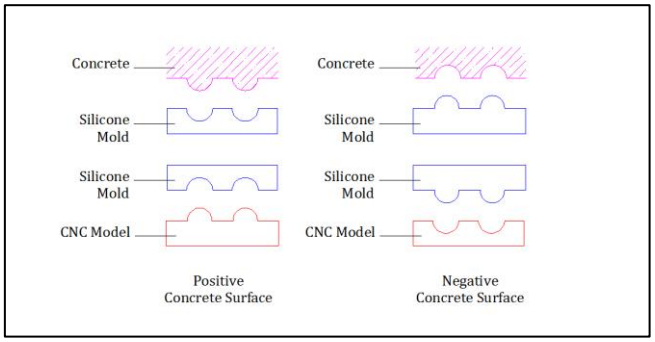

Figure 8. Concrete-Silicone Mold-CNC Model relations

Figure 9. CNC printing process

Figure10. Processing of surface roughness

Then printed patterns which cleaned from roughnesses are assembled for piece together the whole texture and interconnect on casting area.

Figure 11. Interconnecting printed pattern pieces together

Molding frame is assembled around the model and the whole surface including the frame is being warnished with special mold release agent. This material allows consolidation of silicone without sticking to mold and its free removal.

Figure 12. Assembling molding frame

Figure 13. Warnishing mold release agent

Figure 14. The model which warnished and ready for pouring silicone

Silicone and hardener components are mixed until it takes desired consistency and poured into molds. It is important of mixing homogenous both components.

Figure 15. Mixing silicone & hardener component

Figure 16. Pouring silicone & hardening component

As silicone has a tendency of forming more thickness in the frame sides and less in the middle, it is gauged on the scales until the leveled surface is being obtained and left for hardening.

Figure 17. Gauging silicone

Figure 18. Silicone cast, lefted for hardening

After enough hardening, silicone is removed from molds in the form of rolls and laid on the cutting area.

Figure 19. Removing silicone from molds

On this level burrs on silicone are checked manually and retouching is applied where needed sections.

Figure 20. Burrs of silicone

Then silicone is cut in needed mold sizes. If there, parts are assembled into molding frames and make ready for casting.

Figure 21. Cutting silicone

Figure 22. Silicone model, cutted and prepared for use

At the final of this process, concrete is poured into this moldings with silicone assembled inside. By this way, designed texture is obtained on the concrete surface. The size of silicone moldings are important in terms of sites where concrete casting will be conducted. Concrete casting may be performed on a building site as well as produced in precast factory and transport to the building site.

Figure 23. Casting in-site

Figure 24. Precast block in factory

If the wall with textured surface is also bearing wall of structure, then it is active for preferring cast-in-place method. In case the wall will be used as divider element in space, it can be preferred factory manufacturing method as precast block in factory.

3 Conclusion

In this study, it is examined the positive and negative aspects from traditional molding phrase to silicone molding technology by having in hand different methods at generating texture formation on concrete surface. According to the characteristic of texture which wanted to get, it is decided the using method in manufacture and it is done the application process.

Enabling manufacturing method in which is using silicone molding technology can be precluded other methods with various advantages such as enabling applied the designedly textures, ensuring design variety on structure surfaces, using same patterns on multiple surfaces. In addition to this, it should not have been ignored a number of disadvantages such as requiring professional team support in montage phrase, not being more than a certain high of relief depth, reaching high prices of initial investment cost of silicone molds.

4 Acknowledgment

This study was presented as poster in the II. International Furniture Congress, 13-15 October 2016, Muğla, Turkey.

5 References

[1] Engin, N. & Vural, N., "Brüt Betonun Mimaride Kullanımı", *Hazır Beton Dergisi*, p.64, 2005.

[2] Karagüler, M. E., "Mimari Beton Uygulamaları", Beton 2013 Hazır Beton Kongresi, p.77, 2014

6 Figure WEB Resources

Figure.1:
http://blog.lhwarchitecture.com/2014_06_01_archive.html

Figure.2:

http://static.concretenetwork.com/photo-gallery/images/1200x625Exact_0x5/site_26/concrete-walls-feldman-architecture_69542.jpg

Figure.3:

http://cdn.designrulz.com/wp-content/uploads/2015/09/concrete-interior-designrulz-2.jpeg

Figure.4:
http://66.media.tumblr.com/30b3c509b2d0e6654f5e9c19bded8f8c/tumblr_mo7i3zXWly1s0esujo1_1280.jpg

Figure.5:
http://static1.squarespace.com/static/504d0c4584ae9202895ea082/5144ebc3e4b0e599fc6ae64d/5144ee9ee4b0e93a319c69ea/1373005450251/Lynn_Takata_concrete_relief_with_children.jpg

Figure.6:

http://static.concretenetwork.com/photo-gallery/images/787x409Exact_0x15/interior-walls_32/stone-brewery-board-formed-concrete-wall-westcoat_61147.JPG

Figure.7:

https://www.polytek.com/wp-content/uploads/2013/12/tin-silicone-mold-rubbers.jpg

Figure.8: Author's archive

Figure.9-22: "*Reckli Manufacturing of a custom-made Formliner for Concrete Elements*" Video

https://www.youtube.com/watch?v=9d3fe0HEy5A

Figure.23:

https://www.smooth-on.com/pw/site/assets/files/18478/rebuilding_new_orleans.jpg

Figure.24:
http://www.bdonline.co.uk/Pictures/web/a/e/t/P07_Formliner-we_503.jpg