Analysis of the application of light-transmitting concrete in interior design

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Abstract: As a new type of green building material, light concrete breaks the concept of traditional concrete, which combines optical fiber, resin and As a new type of green building material, light concrete breaks the concept of traditional concrete, which combines optical fiber, resin and concrete, and can produce multi-form and multi-style products through the change of light, but does not affect its load-bearing. Due to its unique decoration, it is widely used in architecture, landscape, interior decoration, furniture and other major fields. Outdoor light can enter the interior, and indoor privacy will not be conveyed to the outdoors, the change of light and shadow gives people a new feeling, its light transmittance and interior design style light transmittance and interior design style reflect each other, different time periods show different rendering power, the combination of lighting and architecture gives the space a new appeal and meaning.

1. Introduction

Concrete is still one of the most commonly used basic building materials in today's construction. While traditional concrete gives a monotonous, dull and dark feeling in use, the application of light-transmitting concrete changes the usual brutality and heaviness of concrete and introduces light into the interior in another way, and can be used as a decorative material to bring a new light and delicate aesthetic to the interior design environment, giving life and dynamism to the building.

2. Concept and characteristics of light-transmitting concrete

Translucent concrete is a new type of material, also known as transparent cement, in which a large number of optical fibres, a light-guiding material, are inserted into fine concrete, which is then polished and maintained after forming and eventually used in architecture and interior construction. Light-transmitting concrete has a large number of light-conducting fibres inserted vertically into the concrete, allowing light to pass from one end of the light-conducting body to the other, thus achieving a light-transmitting effect.[1] The colour effect can also be obtained by inserting different coloured optical fibres into the concrete according to the design requirements. When the density of the optical fibres is less than 3% of the total density of the concrete material, the mechanical properties are not affected and it has the same strength as traditional concrete, which can be used as a structure and as a load-bearing wall in construction.

Light-transmitting concrete has excellent characteristics such as light weight, light transmission, air permeability, fire resistance, durability, light and noise, and ease of forming.

Transparent concrete, due to its production process, requires the insertion of an appropriate number of light-conducting fibres into the concrete. As a result, the density of light-transmitting concrete is reduced by around 20% compared to conventional concrete for the same volume[2] Due to the addition of light-conducting fibres, the concrete shows different effects under different light conditions, especially during the day and night, with the cooperation of lights, and due to the production characteristics of the material, light-transmitting and opaque, it can well protect privacy and present different artistic and aesthetic features; transparent concrete, due to its When the ambient air is humid, the moisture in the air is absorbed by the concrete's base voids. When the ambient air is dry, the water vapour in the void of the concrete material can be released through the material until the dryness and humidity in the air is balanced; the material of translucent concrete is mainly made of fine concrete, and its fire resistance and wear resistance are comparable to ordinary concrete, so this material can be used in public spaces as a load-bearing and decorative material; as the light-conducting material used in translucent concrete is refractive to light, it can effectively filter out the stronger light. It can effectively filter out strong light and does not produce too much light agitation in the process of use;

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the translucent concrete is cast in one piece and can be moulded and designed with translucent patterns in advance according to demand, and can be used for decoration after the surface has been decorated.

3. Light-transmitting concrete in interior design

The style of interior design has gradually changed over time, with people's preferences changing from the original sophisticated, colourful collision to the simple and uncomplicated style of today.

The rugged, industrial style of the original concrete made people use it only for the foundation of the building, often wrapped in aesthetic materials, but nowadays, whether it is indoor or outdoor, or walls, floors, partitions, columns and other structural building foundations are always inseparable from the use of concrete, and the emergence of light-transmitting concrete has undoubtedly provided people with a new choice.

3.1 Walls

The wall is the interface that we come into contact with the most within our sight in the interior space, so the decorative design of the wall plays a vital role in people's visual perception. Today's walls are mostly painted or decorated with wallpaper beautification, with direct partial use of concrete rough walls, slightly decorated only to serve the overall design style. Today's walls are mostly used for advertising decoration, map displays, route guidance and sight attraction.

The use of translucent concrete can largely replace the use of electronic screens and ordinary advertising, reducing the waste of resources. The use of translucent concrete, with the use of natural light and artificial light at night, can present a different effect and create a different atmosphere, giving people a new feeling and bringing new vitality and life to the interior space (Figure 1).

Fig. 1 Example of a light-transmitting concrete wall

3.2 Partitions

The partition has a dividing effect in the division of the space area, but in use it does not completely divide the space like a whole wall, but is connected in the separation, with a certain continuity. In use, partitions require constant separation and generally have the need for light and air permeability, while there are no strong requirements for sound insulation or blocking the view.[3] There are no strong requirements for sound insulation or sight lines. The material characteristics and presentation of translucent concrete are ideal for use as partitioning, as it is light-transmitting and opaque, and has the effect of both separating space and providing aesthetic decoration. The use of light-transmitting concrete as partitions in indoor spaces allows light to be mapped through the concrete during the day under natural light, and at night the light from one end of the room to the other, changing the heavy, dull feel of previous concrete partitions and giving a sense of lightness and beauty (Figure 2). The use of translucent concrete as a partition in the bathroom not only solves the problem of waterproofing of the material, but also allows light from outside the bathroom to pass through the translucent concrete and shine vaguely inside the bathroom, which not only saves resources but also brings a different atmosphere to the bathroom (Fig. 3).

Fig. 2 Living room back wall partition

Fig. 3 Bedroom bathroom partition

3.3 Grounds

The ground is the general term for the ground and floor level of a building. It is mainly used in the building to separate space, to strengthen and protect the structural layer, to meet people's use requirements, as well as sound insulation, heat preservation, waterproofing, moisture-proof and heat insulation, etc., and occupies a large proportion of the human line of sight, so it must meet: (1) the requirements of sturdiness and durability, should not be easy to break, the surface is flat, no dust, etc. (2) Safety, the ground should be non-slip, corrosion resistant, good electrical insulation, etc. (3) comfort, the ground to meet the requirements of decorative[4] , should have a certain colour, pattern, texture, elasticity and sound insulation.

The use of translucent concrete as a ground material indoors not only maintains the characteristics of the original ground, but also adds to the aesthetic appeal (Fig. 4). The use of translucent concrete as a ground material outdoors unifies the park in the landscape and illuminates the ground at night, as well as serving as a walking guide for passers-by on the ground, with the whole style appearing exceptionally plain.

Fig. 4 Outdoor light-transmitting concrete floor

3.4 Top surface

Today's designs are increasingly pursued without mains lighting and the design of interiors is becoming more and more simple, while translucent concrete can partially replace the use of roof lights due to the good light transmission of the light-conducting fibres. With its built-in light-conducting fibres, the top pattern of the concrete can be arranged to achieve the desired effect according to the design idea.

The use of translucent concrete as a roof in the interior can reduce the application of indoor light sources, reducing the waste of resources and achieving the purpose of green design from the other side. In indoor use, it is often placed in places where the lighting requirements are not very clear, such as toilets, showers and private passageways, where the lights are turned on when in use, illuminating with a soft light that does not hurt people's vision and gives a feeling of understated luxury (Fig. 5).

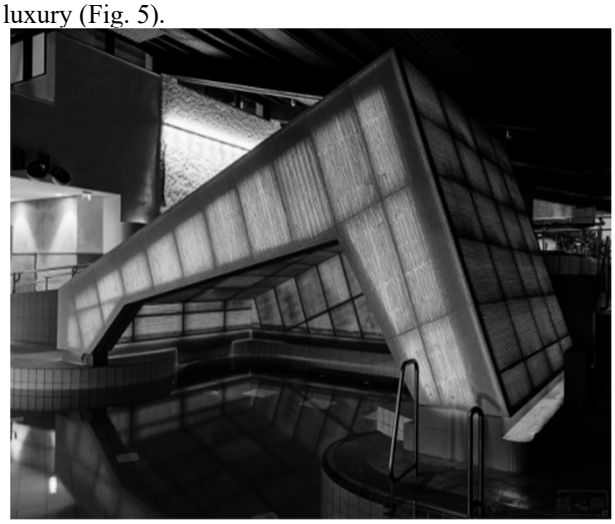

Fig. 5 Light-transmitting concrete top surface

4. Concluding Remarks

With its excellent performance, transparent concrete can be used as a green building material in the design of interiors and exteriors in today's increasingly polluted environment, reducing the use of traditional decorative materials and thus reducing the waste of resources. Light-transmitting concrete combines the strength and hardness of traditional concrete with good light transmission and light conduction, and can be widely used for facades, walls, floors and roofs of buildings and landscapes, as well as for interior and exterior hard and soft furnishings. In today's green design environment, with the advancement of technology, light-transmitting concrete as a green building material will be widely used in various designs one by one.

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