

# Research on the Innovative Design and Application of Patterns on the Theme of China's Third-line Construction

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## ABSTRACT

As a major strategic decision in China's specific historical period, the construction of the third line has formed a unique "three-line spirit" and industrial cultural style. This study aims to systematically explore the visual elements in the third-line construction culture, and carry out modern transformation and innovative application through design methods. Firstly, through historical literature research and field investigation, the cultural context and visual characteristics of the third-line construction are sorted out. Then, a cultural element extraction system is constructed to classify and refine visual symbols from different dimensions of industrial facilities, life scenes, and natural environments. On this basis, the design concept of "new industrial aesthetics" is proposed, and the pattern innovation design is carried out by combining abstraction, geometry, narrative composition and other techniques. Finally, through the application paths of cultural tourism products, fashion clothing, digital media and other fields, it provides practical design strategies and practical basis for the living inheritance and dissemination of third-line construction culture. This study not only broadens the disciplinary boundaries of third-line construction research, but also provides theoretical reference and case enlightenment for the design innovation and value regeneration of industrial heritage with Chinese characteristics.

**Keywords:** *Third-line construction, Pattern design, Cultural inheritance, Innovative design, Industrial heritage.*

## 1. INTRODUCTION

The third-line construction was China's large-scale defense and technology, industrial and transportation infrastructure construction in the central and western regions between 1964 and 1980. This national strategic action, which lasted 16 years and invested more than 2,000 yuan in manpower, not only reshaped China's industrial layout, but also nurtured the spirit of third-line construction with "hard work, selfless dedication, unity and cooperation, and courage to innovate" as the core. The cultural heritage of third-line construction includes various industrial sites, historical archives, oral historical materials and rich visual cultural resources, which have unique historical, scientific, social and artistic values. However, with the changes of the times, the historical memory of third-line construction is facing a crisis of fading. On the one hand, a large number of industrial sites

are idle and abandoned, and the original visual symbol system has gradually disappeared; On the other hand, most of the existing research focuses on the fields of history and sociology, and there is relatively little systematic research from the perspective of design. The use of third-line construction culture in contemporary design often stays in the simple reproduction of superficial symbols, and lacks in-depth excavation and modern translation of cultural connotations.

On an international scale, the protection and reuse of industrial heritage has become an important trend. For example, the industrial landscape renewal in the Ruhr area of Germany and the cultural tourism development of the Iron Bridge Canyon in the United Kingdom have provided successful cases for the revitalization of industrial heritage. There are also practical projects such as the renovation of Shougang Industrial Park and the

Wuhan Zhangzhidong Museum in China, but there is still a lack of systematic design theory and method system for industrial cultural heritage with special historical backgrounds such as third-line construction. Therefore, from the perspective of design, this study systematically extracts the visual elements of third-line construction culture and explores the innovative application path of traditional industrial culture in modern design, which is not only the protection and inheritance of third-line construction culture, but also a useful exploration of design language with Chinese characteristics.

## 2. THE MODERN SPIRITUAL VALUE OF CHINA'S THIRD-LINE CONSTRUCTION

According to archival historical research, the construction of the third line began in 1964 and ended in 1980, lasting 16 years, covering 13 provinces and autonomous regions in the central and western regions. The GDP during this period accounted for more than 40% of the country's total capital investment in the same period, which had a profound impact on China's industrial layout and regional economic development. The construction content mainly includes four aspects: the construction of national defense industry, such as weapons, aviation, aerospace, shipbuilding and other industrial bases; transportation construction, such as the Chengdu-Kunming Railway and the Hunan and Guizhou Railway; The construction of energy raw materials, such as Panzhihua Iron and Steel Base, Liupanshui Coal Base, etc., as well as supporting infrastructure construction, such as machinery, electronics, chemical and other supporting industries. The spirit of third-line construction is a precious spiritual wealth formed in this historical period, including the hard work and scientific and realistic work spirit of the previous generation, and more importantly, the patriotic spirit of Chinese people in special periods. The selfless dedication of the third-line builders to "dedicate their youth and their lives to their children and grandchildren" reflects their deep patriotic feelings. This spirit is often conveyed through images such as collective labor scenes and red flags flying in visual expression. According to oral history data, the builders showed amazing perseverance and creativity under extremely difficult conditions. This spiritual trait provides rich creative materials for pattern design. At the same time, it is found that third-tier builders have created a number of technological breakthroughs under

limited technical conditions, reflecting the attitude of respecting science and seeking truth from facts.

Due to this positive energy and in line with the needs of the times, in recent years, the historical remembrance of the third-line construction has shown a diversified trend. First of all, the third-line sites in many places have been included in the cultural relics protection units, such as the Chongqing 816 Project and the Guizhou 061 Base, which have become important memorial sites. Many regions have developed the third-line construction site into a patriotic education base and a research and study tour base, so that historical memory can be continued. Panzhihua preserves and disseminates the historical memory of third-line construction by establishing a museum (China's third-line construction museum), publishing memoirs, and carrying out oral history projects. At the same time, a number of works with the theme of third-line construction have appeared in the fields of art, photography, design and other fields, which reproduce historical scenes and convey the spirit of the third line through artistic techniques. However, the existing research has the following characteristics: the research on history and sociology is relatively sufficient, but the research from the perspective of design is relatively weak; there are many case studies, and the systematic visual symbol collation is insufficient; There are more studies on the protection of traditional culture and less research on innovative transformation. This shows that the research on the third-line construction has successfully passed the initial stage of historical combing, and has produced a wealth of case accumulation and protection awareness, but it is standing at a critical point where it needs to break through to a deeper, wider and more applied level. Future research urgently needs the strong intervention of design, the use of systematic semiotic methods to integrate scattered cases, and the brave practice of innovation and transformation, in order to truly let the third-tier culture go out of the historical library and museum, integrate into modern life, and achieve sustainable inheritance. This study aims at this frontier and pain point, which has important academic value and practical significance.

### 3. EXTRACTION OF CORE VISUAL ELEMENTS OF THIRD-LINE CONSTRUCTION CULTURE

#### 3.1 Element Extraction Methods

In this study, a multi-dimensional extraction method was adopted:

- Literature research method: the author analyzed the historical documents related to the construction of the third line and extract the visual information in the text description.
- Field survey method: the author conducted field investigation of ivory micro-carved steel city, Panzhihua China Third-line Museum, collect Chongqing 816 project, Guizhou 061 base, Hubei 066 base and other site materials, and collect first-hand information through photography, shorthand and other methods.
- Oral history research: the author interviewed 5 experts who are familiar with the history of third-line construction to obtain informal historical materials.
- Digital Organization: the author used Adobe Illustrator to vectorize and standardize the collected visual elements to establish a classified material library. Provide foundational resources for subsequent design practices.

#### 3.2 Subject Matter Classification and Cultural Connotation

During the construction period of the third line, materials were very scarce, and the working and living conditions were relatively difficult. Therefore, the scene elements recorded in the third-line historical materials have a distinct imprint of the times. It mainly includes two major scenarios: life and work. Through literature combing, it can be summarized that in the work scene, typical industrial symbols include machine tools, gears, Soviet-style workshops, and production lines; The symbols in the life scene include residential tube buildings, dry base buildings, enamel jars for daily necessities, labor cloth tooling, food stamps, and cultural carriers such as slogan walls, propaganda posters, and certificates of merit. The indispensable characters in the scene mainly include the two major workers of workers wearing hard hats and technicians wearing white coats, usually in the form of collective labor scenes and team discussion scenes. Therefore, the theme of the three-line

construction pattern can be divided into three categories:

- Industrial manufacturing: represented by mechanical equipment, production tools, industrial products, such as machine tools, gears, bearings, engines, etc., reflecting the sense of order and scientific and technological beauty of industrial production, and containing the craftsman spirit of "excellence".
- Living environment: including staff dormitories, canteens, clubs, slogan walls and other living facilities, as well as labor awards, work permits, food stamps and other daily necessities, reflecting the social outlook and collectivist values of a specific historical period.
- Natural environment: It shows the site selection characteristics of the third-line construction of "backing, dispersion, and hidden", such as mountains, tunnels, bridges, railways, etc., showing a magnificent picture of mutual transformation between man and nature.

#### 3.3 Color Characteristics

Through the color collection and sorting of China's third-line construction patterns, it is found that the color system of the third-line theme patterns has distinctive characteristics of the times:

- Industrial color: mainly mechanical primary colors, such as cast iron gray, rust red, oil black, etc., reflecting the simplicity and sense of power of industrial production.
- Environmental color: Mountain green, land brown, sky blue, desert yellow, etc. taken from the natural environment, reflecting the geographical characteristics of the third-tier area.
- Logo color: slogan red with the characteristics of the times, blue for workwear, etc., with a strong imprint of the times and political meaning.

#### 3.4 Morphology and Composition

After collecting and sorting out the three-line construction patterns, it is found that the three-line theme patterns have the following characteristics in form and composition:

- Geometric form: Industrial equipment mostly presents regular geometric shapes, such as circular gears, rectangular machine

tools, linear tracks, etc., with obvious constructivist characteristics.

- Symmetrical composition: reflects the sense of order of industrial production, and mostly adopts rigorous composition methods such as central symmetry and axial symmetry.
- Narrative combination: Different elements are often combined, such as "gear + ear of

wheat" symbolizes the combination of industry and agriculture, and "red flag + machine tool" reflects the unity of politics and production.

On this basis, the artistic characteristics of the theme pattern of the third-line construction are summarized, see the "Table 1" below:

Table 1. Analysis table of artistic characteristics of third-line construction patterns (drawn by the author)

Category	Representative element	Color characteristics	Morphological characteristics	Cultural connotation
Industrial symbols	gears, machine tools	Cast iron gray, rust red	Geometry, rules	Craftsmanship and industrialization
Architectural symbols	Tube building, slogan	The slogan is red and the workwear is blue	Flat and concise	Collectivism, dedication
Life symbols	Enamel jars, tooling	Characteristics of the times	Symmetrical composition, red main tone	Hard work
Natural symbols	Mountains and tunnels	The mountains are green, and the land is brown	Organic form and smoothness	People will conquer the sky and work hard

## 4. PATTERN INNOVATION DESIGN THINKING AND METHODS

### 4.1 Design Concept

In the field of pattern innovation design, new industrial aesthetics provide a path of "rebirth" and a contemporary expression language for China's industrial heritage during the third-line construction period. New industrial aesthetics is not an officially strictly defined academic genre, but rather an aesthetic trend and value orientation that has emerged widely in contemporary design, architecture, art, and popular culture. At its core, it is the rediscovery, interpretation and reuse of industrial heritage, elements and spirits, but its connotation is very different from that of the purely industrial era. The aesthetics of the third-line construction period were function-oriented, collectivist, and hard-working. Aesthetic considerations are almost zero, everything is for "preparation" and "production". Its spiritual core is "sacrifice" and "dedication". New industrial aesthetics are individualistic, consumerism, and nostalgic aesthetics. It transforms the hard-core history of production, preparation and collectivism into cultural resources and aesthetic objects that can be consumed, experienced and reflected on in the

present. It focuses on individual experience, emotional resonance, and cultural consumption. Its spiritual core is "reflection" and "feelings". The relationship between third-line construction and new industrial aesthetics is a review and tribute to the industrial era in the post-industrial era, a dialogue between aesthetic consumption and production practice, and a clever way to integrate the collective memory of the country into personal cultural experience. Through new industrial aesthetics, the history of third-line construction is no longer a cold text in textbooks, but has become a perceptible and immersive space and story. The design concept of "new industrial aesthetics" includes three principles:

- Unity of history and contemporary: while retaining the historical context, it meets the needs of modern aesthetics
- Combination of narrative and decorative: it not only tells historical stories, but also has decorative beauty
- Systematic and flexible: it is to establish design specifications while maintaining room for innovation

## 4.2 Innovative Design Methods

In the process of research, the author tried to innovate the three-line theme pattern from three perspectives.

### 4.2.1 Abstract Reconstruction Method

This is the most direct approach, and the core is to condense the grand historical narrative into a visual symbol that can be communicated. The three-line theme form is abstracted into dots, lines, and surfaces, and combined with the modeling method of plane composition to combine and express. The specific operation method is as follows:

- Geometry of iconic buildings and structures: The outlines and structures of the buildings unique to the construction period of the third line (such as the roof of the factory, the silhouette of the blast furnace, the cooling tower, the arched entrance of the cave factory, and the railway pier) are extracted, and simplified and abstracted into minimalist geometric figures. It is not a realistic depiction, but a highly recognizable symbol with points, lines, and surfaces. For example, a simple combination of triangles and circles is used as a metaphor for mountains and caves, or blast furnaces and chimneys, forming a cold and powerful modern icon.
- Symbolization of machinery and tools: focus on the industrial "totem" of that era: gears, wrenches, rivets, valves, pressure gauges, vintage trucks, milling machines, etc. Strip these elements from their specific functions and transform them into decorative patterns. Break down a complete gear into several fragmented arcs, or combine the shape of a wrench with smooth lines to form an "industrial rhythm" continuous pattern for textiles or packaging.
- Graphics of words and slogans: The slogans of the third line construction period (such as "Preparing for war and famine for the people", "Good people and good people are good for the third line") and their unique art characters (slogan style, black font) are very strong marks of the times. The text itself is the visual subject. It can be enlarged, misplaced, superimposed, or only extracted keywords (such as "three lines", "construction") and combined with industrial lines to form text graphics with a sense of power and history.

### 4.2.2 Texture Stacking Usage

At the heart of the new industrial aesthetics is the worship of "traces", which is the most attractive part of the heritage of third-line construction. Touching the traces of history by combining historical textures with modern materials. The specific operation method is as follows:

- Visualization of traces: Method: Through high-definition shooting, scanning, rubbing, etc., the texture of the mottled cement wall, rusted steel plate, worn wooden door, and oil-stained ground of the old factory building was collected. Digitize these authentic textures as a background or shading for your pattern design. For example, a rusty texture is used as the printing base of a silk scarf, and geometric industrial symbols are superimposed on it to form a strong texture contrast, luxurious and full of story.
- The construction of the color system of the times: Method: Abandon the high-saturation "propaganda poster" colors, and extract the true colors of the environment of that era: cement gray, rust red, military uniform green, engine oil black, log brown, and faded slogan red. Innovative perspective: establish a set of calm and advanced "three-line retro color palette". This set of low-saturation, grayscale-rich colors has a sense of history in itself, making it ideal for modern clothing, home and product design, creating a low-key, restrained and deep visual effect.

### 4.2.3 Narrative Combination Method

Combine different elements creatively to form a picture with a story. Let the pattern tell its own story, not just the arrangement of elements. The specific operation method is as follows:

- Aesthetic transformation of blueprints and engineering drawings: There are a large number of engineering design drawings, maps, and blueprints for third-line construction. The composition of these drawings themselves (strict lines, annotations, sections) is very industrial. The contour lines on the map and the plant area planning map are deconstructed, and superimposed with old photos and machinery and equipment fragmented to form an "information layer" design. It is like an infographic that tells the story of construction, full of knowledge and interest.

- Surreal collage of scenes: Breaking the limitations of time and space, juxtaposing elements from different time and space. For example, levitating huge gears above mountains and rivers; weave a slogan text into the form of a railroad track; Let tools like wrenches line up like starry sky. This technique is no longer nostalgia, but a poetic imagination and philosophical reflection on history. It explores the relationship between man, machine and nature, the relationship between collective will and individual destiny, which is very suitable for conceptual art posters or installations.

## 5. PRACTICE AND APPLICATION

### 5.1 Cultural and Creative Product Design Process

First, a standardized design process is established through peer review and expert group discussion. The meeting convened 3 associate professors and 2 industry designers in the field of design to determine the following design process through interviews, discussions and reviews

- 1. Theme positioning: First, the designers clarify the design purpose and cultural theme;
- 2. Element selection: the designers select suitable visual elements from the material library;
- 3. Style positioning: the designers determine the route of traditional reproduction or modern innovation;
- 4. Design execution: the designers use the above methods for specific design;
- 5. Feedback correction: the designers optimize the plan through expert review and user testing.

### 5.2 Innovation of Application Scenarios

The ultimate purpose of design is to apply and bring history back to life through contemporary lifestyles. The application of patterns to the design of cultural and creative products can assist in completing the transformation of third-line construction patterns from cultural symbols to trendy items. Cultural and creative products can be applied to the following scenarios:

- Cultural tourism products and city gifts: The designers design souvenirs for Panzhihua, Shiyan and other third-tier

representative cities. Patterns can be abstracted from the most representative local factories or products (such as Pangang's steel rails and FAW's trucks), and applied to silk scarves, tea sets, and stationery to become "urban memories that can be taken away".

- Trendy clothing and street culture: The designers cooperate with the national tide brand: Industrial symbols and slogans are presented in a more street and rebellious way, giving them new spiritual connotations - no longer "dedication", but "hardcore", "tenacity" and "hard work" attitude of contemporary youth. Printed T-shirts, sweatshirts, and skateboard surfaces are all excellent carriers.
- High-end home furnishings and cultural and creative products: Using the "three-line color palette" and industrial texture, the designers design wallpapers, carpets, and ceramics with a sense of quality. A cup with a cement texture and a gold gear motif that perfectly blends ruggedness and sophistication, typical of the new industrial aesthetic.
- Digital Media & Motion Graphics: The designers make static patterns dynamic, let the gears turn, the slogans appear one by one, and the light flows in the cold pipes, making short videos, exhibition opening animations, etc., which greatly enhance the visual impact and narrative.

In summary, the core of innovation lies in "translation" and "sublimation", translating the physical and heavy industrial heritage into visual, lightweight cultural symbols, and sublimating the arduous collective memory into cultural products that can be aesthetically pleased, thought about, and consumed. The final design should neither be a reproduction of cold historical materials nor a frivolous abuse of elements, but should be a sincere dialogue with it with contemporary design language on the basis of a deep understanding of history, creating a new pattern that has both historical depth and modern aesthetics.

## 6. CONCLUSION

This study systematically completes the construction of the methodology from the combing of cultural resources in the third-line construction to the transformation of modern design innovation. The main conclusions are as follows:

- The third-line construction culture is a visual treasure trove containing great value: its visual elements are not only historical witnesses, but also carry profound spiritual connotations, and its unique industrial aesthetics, colors of the times and compositional forms provide a rich source of creative inspiration and material for contemporary design.
- "New industrial aesthetics" is the core concept for effective translation: it successfully bridges history and contemporary, collective memory and individual experience, production practice and aesthetic consumption. It requires that design innovation should not stop at simple nostalgia and copying, but must carry out profound "translation" and "sublimation", that is, on the basis of respecting the historical context, activate its contemporary value with modern design language.
- Three innovative design methods constitute a feasible practical path: abstract reconstruction method realizes the condensation from grand narrative to microscopic symbols; the use of texture overlay captures and reproduces the unique beauty of "traces" in history; The law of narrative combination gives the pattern a deeper cultural story and philosophical speculation. The combination of the three can effectively create design works that have both historical depth and modern aesthetics.
- Diverse application scenarios are the key to cultural revitalization: The ultimate goal of innovative design is to integrate into contemporary life. Through cultural tourism products, national tide clothing, home decoration and digital media and other carriers, the third-line construction culture can come out of static sites and historical materials and transform it into "memories that can be taken away" and "experiential stories", so as to achieve a truly sustainable living inheritance.

In summary, this study confirms the necessity and feasibility of intervening in the cultural research of third-line construction from the perspective of design. Future work will further deepen design practice, improve the design element database, and continuously optimize this innovative transformation system through market and user testing, and finally make it an effective tool to empower regional cultural development and enhance cultural self-confidence.

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