# 基于时代特征的后工业景观设计方法研究

# Research on Post-industrial Landscape Design Methods Based on the Characteristics of Era

周雅琴* 王炤淋

ZHOU Yaqin*，WANG Zhaolin

DOI: 10.12145/202201032

---

**摘要：**由于经济全球化和信息技术的广泛应用带来的产业结构调整，我国主要城市进入后工业时代。城市用地功能的调整和服务产业的快速发展，导致大量工业遗产面临转型升级的状况。为了更好地推动城市更新、延续工业历史文脉、发挥工业遗产价值、满足大众生活需求，探索符合我国现状的后工业景观设计方法显得尤为重要。因此，本文通过对已完成的工业遗产升级改造案例进行系统分析，归纳总结出五种设计方法，为工业遗产的景观环境提升和转型利用提供必要的设计策略。

**关键词：**后工业时代；工业遗产；后工业景观；设计方法

**Abstract:** Due to the adjustment of industrial structure caused by economic globalization and the widespread application of information technology, major cities in China have entered the post-industrial era. The adjustment of urban land functions and the rapid development of service industries have caused a large number of industrial heritage to be transformed and upgraded. In order to better promote the urban renewal, continue the industrial historical context, give play to the value of industrial heritage, and meet the needs of the public, it is particularly important to explore post-industrial landscape design methods that are in line with the current situation in China. Therefore, this article systematically analyzes the completed cases on upgrading and transformation of industrial heritage, summarizes five design methods, and provides necessary design strategies for upgrading and transforming the landscape environment of industrial heritage.

**Key words:** post-industrial era; industrial heritage; post-industrial landscape; design Methods

---

周雅琴 / 女 / 1981 年生 / 天津大学建筑学院博士 / 天津理工大学副教授、硕士生导师 / 研究方向：文化遗产保护设计研究

通信作者邮箱(Corresponding author E-mail)：studio_zhou@163.com

ZHOU Yaqin, female, was born in 1981. She is a PhD student in the School of Architecture of Tianjin University , and she is an associate professor and master supervisor in Tianjin University of Technology. Research direction: research on

cultural heritage protection design

王炤淋 / 女 / 1997 年生 / 天津理工大学艺术学院硕士 / 研究方向：文化遗产保护设计研究

WANG Zhaolin, female, was born in 1997. She is a postgraduate in the School of Art & Design of Tianjin University of Technology. Research direction: research on cultural heritage protection design

**1. 后工业时代的产业特征**

19 世纪 80 年代至 20 世纪 40 年代，机器生产替代手工劳动、重工业与 化学科学的兴起以及能源的大量开发与利用见证着工业时代的开始。随着 20 世 纪 80 年代经济全球化的发展和信息技术的广泛应用，社会的主要发展动能由工 业生产和机器转向理论知识和社会精英，产业结构发生了巨大的变化，促进新 一轮的产业分工，这标志着后工业时代的开始。

我国的主要城市从 2010 年开 始也逐步进入后工业时代，制造业的布局逐步向城市边缘地区转移，以互联网 为标志的新兴产业开始迅猛发展。后工业时代标志着先进制造业和前沿信息技 术的高度融合，促使创造力不断提升，促进对新技术、新材料、新能源的广泛 利用，从而推动城市功能的更新与发展，使城市逐渐向生态化、多元化和智能 化转变。对于工业制造业来说，随着城市更新的进程加速，产业的主要功能和 性质发生了根本改变，很多旧有的生产空间由于技术设备、生产模式的滞后， 逐步被现代加工制造技术所淘汰，从而产生了大量的工业遗产，这些工业遗产 在近现代工业发展史上具有重要意义和价值，它们不仅承载着工业文明的历史 印迹，也为工业遗产与文化产业的深度融合提供了契机。

另一方面，大众的生活方式随着后工业时代的来临发生了转变，人们开始 追求更高的精神享受和情感价值，主要表现为大众的生活结构产生了变化，出 现了多元文化和多元消费模式。工业遗产特有的空间形态、场域特质和文化创 意产业自然地结合在一起，为其提供衍

生发展的空间，工业遗产的功能也由原 来的加工制造转变为以第三产业为主导的文化创意和文旅消费。由于工业遗产 的主导对象从生产转向生活，这也促使场域内的景观需求发生了根本变化，并逐步形成了成熟的后工业景观设计方法。

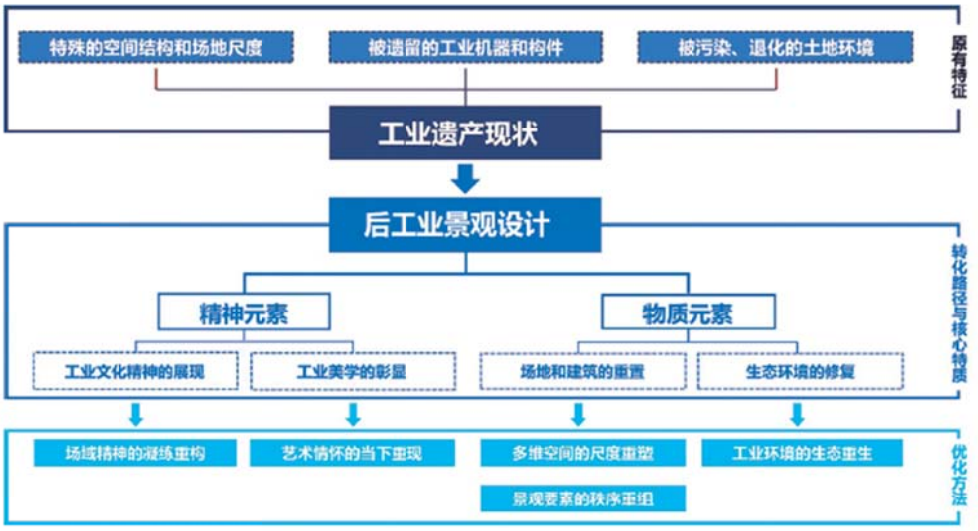
## 2. 后工业景观的发展动力

由于时代主题和产业功能的不断丰富和转变，后工业景观涵盖的范畴也不 断延伸。在后工业时代初期，“后工业景观”被定义为“在秉承工业景观的基 础上，将衰败的工业废弃地，改造成为具有多重含义的景观。”[1] 在与多元产 业不断融合的过程中，其概念逐渐演变成“在工业生产活动停止后，对工业遗 址上的各种工业设施、地表痕迹、废弃物等加以保留、改造、更新利用，并作 为主要的景观元素进行设计和营造，使其成为具有全新功能与多重含义的新景 观。”[2] 后工业景观定义的变化也反映出时代发展的现实要求。工业遗产成为城市工业发展的独特文化载体，是特定的时代坐标和文化符号。大量的物质载 体，如大跨度的厂房、机械加工设备等都体现着工业文明的印迹和独特的场所 精神 [3]。在此背景下，工业遗产亟待活化和利用，要利用景观设计的方法对工 业遗产进行改造，在保留其原有历史印迹、突显其独特价值的前提下 [4]，与新 植入的业态功能相结合，满足多元产业发展的需求，实现产业重心由传统工业制造向社会服务的转移，展现工业遗产的时代特征。城市更新 的发展和文化产业的兴起，为工业遗产的转型提供了更多可 能，其转型模式大体可以分为公共休闲空间、文化创意产业园 区、配合重大活动使用的城市韧性空间等。

公共休闲空间作为城市中开放、包容的空间，通过打破 原有空间与城市之间的桎梏，被赋予休闲、娱乐、运动、科 教等多种功能。例如，上海杨浦滨江公共空间示范段保留了原 有的工业构筑物和城市肌理，通过景观化的艺术再造和功能梳 理，建立后工业景观与城市更新的有机联系，延续工业历史文 脉、丰富城市生活趣味（图 1）；南京汤山矿坑公园则是在原 有废弃矿坑龙泉采石场的基础上，通过景观设计的手法改善场 地内的生态环境，挖掘和利用矿坑遗存的景观价值和历史价值 （图 2）[5]。


2
南京汤山矿坑公园景观改造
Landscape Reconstruction of Nanjing Tangshan Mine Park

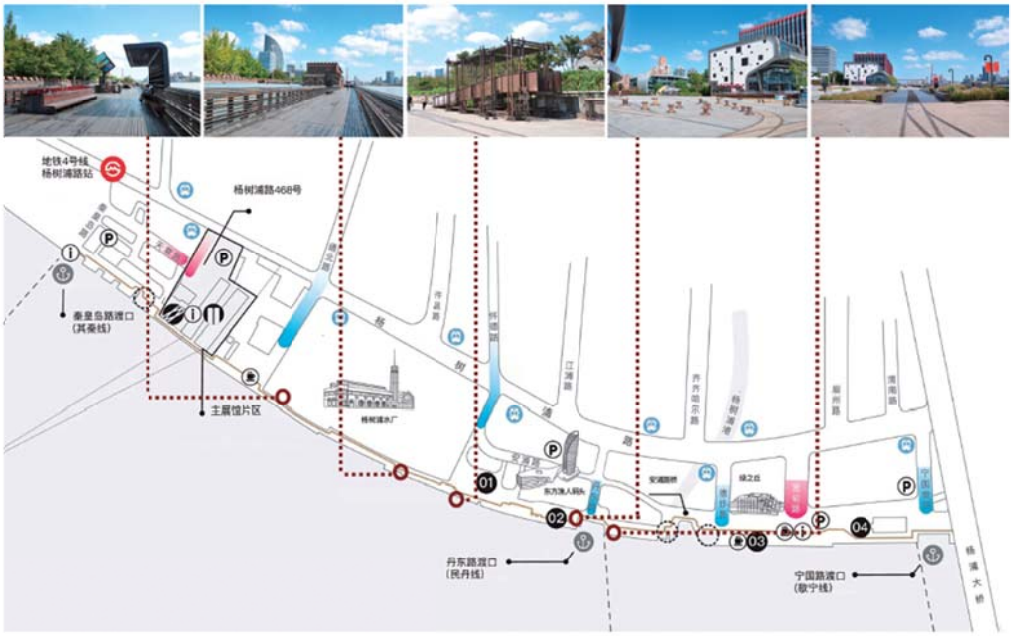
3
景德镇陶溪川通过打造开放性景观满足新业态的空间需求
Jingdezhen Taoxichuan Meets the Spatial Needs of New Business Formats by Creating Open Landscape




4

后工业景观设计优化路径逻辑分析

Logical Analysis of Optimized Path of Post-industrial Landscape Design




1

上海杨浦滨江公共空间示范段滨水空间

Waterfront Space in Yangpu Riverside Public Space Demonstration Section, Shanghai

文化创意产业园区一般是指文化、艺术、影视、设计类 个人或团体从事文化产业的基地，根据使用功能的不同，可以 划分为艺术创意类园区和文化服务类园区。例如，高雄驳二 创意园区在保留原有工业元素的基础上，增加艺术表演、创作展示、艺术家驻村等功能，并设有与功能主题相符的艺术装置；景德镇陶溪创意园区整合新旧建筑的材质和结构，创造

出新与旧、现代与历史的碰撞， 并引入创意市集、艺术家工作室等功能，打造多元化、高融合的商贸服务园区 （图 3）[6]。


2
南京汤山矿坑公园景观改造
Landscape Reconstruction of Nanjing Tangshan Mine Park

配合重大活动使用的城市韧性空间是结合当下的国家政策或城市规划，根 据其场地原有设施内容，在利用价值较高的建筑物或构筑物的基础上建设而成 的。例如，2022 年冬奥会和冬残奥会组织委员会入驻首钢老工业区西十筒仓办 公区，场地中的大多数工业建筑都需要根据国家政策和北京城市发展规划来转换 其功能，在原有的建筑上赋予其文化、体育、教育等功能 [7]。

## 3. 后工业景观的优化路径

后工业景观的优化路径实则是源于对工业遗产用地现状的解析，其特征体 现在自身特殊的空间结构和场地尺度、被遗留的工业机器和构件以及被污染、 退化的土地环境方面。而后工业景观设计将展现工业文化精神、彰显工业美学以及重置场地和建筑、修复生态环境作为设计指导宗旨，提出以下具体优化路 径：场域精神的凝练重构，指强化场地内承载工业文化特点的要素；艺术情怀 的当下重现，指借助工业元素的重组和结合时代美学来展现工业时期的美学特 征；多维空间的尺度重塑和景观要素的秩序重组，指对工业遗产场地内的建筑 结构和空间布局进行重新规划，以满足当下城市和大众的需求；工业环境的生 态重生，指对生态环境的修复，从而促使工业遗产的美学价值逐渐被大众接受 和认可（图 4）。

### 3.1 场域精神的凝练重构

工业遗产所蕴含的核心价值和现实意义包括工业生产时期的时代记忆和文 化烙印、与周边地域发展融合所形成的特色文脉以及公众的情感认同与寄托， 即在改造利用时要强化的场域特质。因此，在对其进行景观设计的过程中，要 找出场地内具有明显特征且令人印象深刻的构成元素，在工业遗产转化的过程 中，通过对这些元素的保留、再利用达到凝练重构场域精神的目的。在保留承 载场域精神的物质载体的基础上，借助灯光、植被、虚拟环境技术等营造氛围 感，动态地展现工业时期的文化精神，唤醒大众对工业时期和工业生产活动的 记忆，引起情感共鸣。例如，唐山启新水泥厂在改造过程中，保留了代表着启 新水泥厂特征的水泥悬窑，它承载着水泥厂的百年历史，是典型的功能元素， 能唤起大众的记忆 [8]。因此，在转化过程中，在水泥悬窑附近设置红色和黄色 的灯光来模拟水泥烧制过程中火焰灼热发光的景象，通过强烈的视觉冲击向大 众还原水泥悬窑的生产情景（图 5）。

3.2 艺术情怀的当下重现

工业遗产是工业时期历史文化的物化体现，它展现的是特定历史时期的美 学特征。因此，工业遗产的转型，要在保留原有美学特征的同时，根据当下社 会和大众的功能需要和审美需求，结合景观设计手法，展现时代美学和艺术情 怀。工业遗产中保留了大量无法再次使用的生产设备，由于特殊的尺寸和独特 的造型，对其设计方式也是多种多样：一是，通过解构、重构等艺术手法将其 打造为景观雕塑或景观装置，再赋予其新色彩，形成一定的视觉冲击；二是， 赋予其新的使用功能，将其作为新景观空间中基础设施、娱乐设施的创新性组 成部分；三是，与当代艺术结合，不对原有生产设备进行过多的改造，而是将其作为艺术作品中的组成部分或创作元素，最大限度地保留其 原有样式，较为完整地展现工业时期的美学特征（图 6）。

3.3 多维空间的尺度重塑

工业遗产原有的主要功能是服务于工业生产，其规划与 设计都是为工业生产提供便利，但后工业时代中对于场地的要 求不仅是满足工业生产的需要，而是转向当下城市所需的功能 以及使用人群对生活质量的要求、对景观美学的追求。因此需 要对场地内的空间尺度进行重新规划，对建筑、景观进行重新 塑造，以满足注入新功能的需求。在进行后工业景观设计时， 首先要明确划分区域，既要有大的场域来满足人群的聚集与疏 散，也要有灵活多样的小尺度空间用以满足人们休闲放松的需 求（图 7）。同时，在景观设计过程中调整建筑的色彩、更换 外立面的材质和种植多种类型的植被作为空间过渡，将原有的 硬质空间改造为适合放松的软性空间。

3.4 景观要素的秩序重组

原有工业遗产中的场地可以呈现出大量的历史信息、工 业记忆和文化内涵，在进行后工业景观设计的过程中，原有 场地秩序与新功能之间存在着诸多矛盾。不管是工业遗产中的 大型工业厂房和生产机器、遗留的货物，还是繁茂的荒草、无 序的路网、混乱的硬质铺装都不适合面向文化产业新功能的环 境，因此，在景观设计中需要对空间的场地秩序进行重新规 划，达到承载过去、适合当下的目的。例如，在对位于广东的 中山岐江公园景观进行更新设计时，通过格网状的景观布局方 法重建场地秩序，形成一个具有规律性、连续性和稳定性的空 间体系 [9]。在格网状布局中利用点、线的构成关系重新配置各 种景观要素。具体做法是采用由 5 m x 5 m 的树篱作为点， 构成局部模数化格网，由于场地内留存铁路轨道，在设计中采 用直线路网的形式，提高了道路的可达性和便捷性（图 8）。 通过景观要素的秩序重组既延续了工业场地的历史文化，又塑 造了适合都市人群活动的公共空间。

3.5 工业环境的生态重生

工业生产过程中产出的有害化学物质以及不当的资源开发 形式，对生态环境造成了严重损害。城市中大量的工业遗产由 于受到污染而被限制开发，没有得到合理有效的规划利用，浪 费了场地资源。因此，对工业厂区内的生态治理也成为后工业 景观设计方法中重要的一环。治理场地内被污染的土壤，要移 除区域内表面受到污染的土壤，对于深层被污染的土壤，在进 行土壤成分分析后，采用生物和化学的手法，借助酵素、淤泥 及其他有机物质，通过增加土壤中的细菌来分解污染物，从而 优化土壤质量 [10]；对于水生态的治理则是通过雨洪管理的方式 来达到污染控制、防洪排涝的目的，通过建立完整的雨水收集 和过滤系统修复水系统、净化水质，与此同时创建多功能水景 观；植被系统的治理建立在土壤污染的治理上，借助含有硅酸 钙、碳酸钙等的有机肥料，降低土壤 pH 值的同时增强土壤的 黏度、保水性和持水性，再进行草本植物、灌木等适生植物的 混种，从而更快地恢复植被系统。

## 4. 结语

随着后工业时代的来临，城市面临着更新发展和功能转 化。在对城市工业遗产进行后工业景观设计时，要保留场域 内具有代表性的建筑，并结合灯光、植被、虚拟环境技术等 进行场域精神的凝练；利用解构重构、功能调整以及结合当 代艺术，传递工业时期的美学特征；通过空间尺度的划分、 功能的改变、景观节点的营造，为城市更新提供便捷条件； 运用生态、工程、生物等技术手法修复土壤、水和植被系 统，复原生态环境。以上种种设计方法都促使工业遗产能够 满足当下的时代要求和新功能的注入，更好地推进工业遗产的改

造和转型，在保留其时代精神的基础上，赋予城市工业 遗产新的生命意义。

5
保留标志性的元素凝练场域精神
Retain the Iconic Elements to Condense the Spirit of Field

6
原有生产设备与当代艺术的结合
The Combination of Original Production Equipment and Contemporary Art

7
规划出适宜的空间尺度满足人流聚集疏散、休闲放松的需求
Plan a Suitable Spatial Scale to Meet the Needs of Crowds and Evacuation, Leisure and Relaxation

8
中山岐江公园直线路网与节点分析
Analysis of Straight Line Network and Joint of Framework in Zhongshan Qijiang Park

**1. Industrial Characteristics of Post-industrial Era**

During 1880s-1940s, the replacement of machine production for manual labor, the rise of heavy industry and chemical science and the massive development and utilization of energy witnessed the beginning of industrial era. With the development of economic globalization and extensive application of information technology in the 1980s, the main energy of social development has shifted from industrial production and machinery to theoretical knowledge and social elites, and the industrial structure has changed greatly, which promoted a new round of industrial division of labor, marking the beginning of post-industrial era. In 2010, major cities in China also gradually began to enter post-industrial era. The layout of the manufacturing industry gradually transferred to urban marginal areas, and the emerging industries marked by the Internet began to develop rapidly.

The post-industrial era marks the high integration of advanced manufacturing and cutting-edge

information technology, which promotes the continuous improvement of creativity, the wide use of new technologies, new materials and new energy, so as to promote the renewal and development of urban functions, so that cities can gradually turn to be ecological, diversified and intelligent. For the industrial manufacturing, with the process of urban renewal accelerating, the main functions and nature of industries have changed fundamentally. Much of the previous space for production was gradually eliminated by modern processing and manufacturing technology due to the lag of technical equipment and production mode, which produced a large amount of industrial heritage. This industrial heritage has a great significance and value in the history of modern industrial development, which not only carries the history of industrial civilization, but also provides an opportunity for the deep integration of industrial heritage and cultural industry. On the other hand, the public lifestyle has changed with the advent of postindustrial era, and people began to pursue higher spiritual enjoyment and emotional value, which is mainly manifested that the life structure of the public has changed, and multicultural and diversified consumption has appeared. The unique spatial form, field characteristics and cultural and creative industries of the industrial heritage are naturally combined together, to provide a space for derivative development. The function of industrial heritage has also been transformed from processing and manufacturing to a cultural creativity and culture and tour consumption dominated by the tertiary industry. Due to the leading object of industrial heritage transforming from production to life, the landscape requirement in the field has also been promoted to change fundamentally, and gradually formed mature post-industrial landscape design methods.

## 2. Driving Force for the Development of Post-industrial Landscape

Due to the continuous enrichment and transformation of the era's theme and industrial functions, the scope that the post-industrial landscape covers is also constantly extended. In the early stage of post-industrial era, "post-industrial landscape" is defined as "transforming the decaying industrial wasteland into a landscape with multiple meanings on the basis of adhering to the industrial landscape." [1] In the process of continuous integration with multiple industries, its concept gradually evolved into "after the cessation of industrial production activities, various industrial facilities, surface traces and wastes on the industrial fields shall be retained, transformed, renewed and utilized, and designed and built as the main landscape elements, so that it can become a new

landscape with new functions and multiple meanings." [2] The change in the definition of the postindustrial landscape also reflects the realistic requirements of the development of era. Industrial heritage has become the unique cultural carrier of urban industrial development, which is a specific coordinate and cultural symbol of era. A large number of material carriers, such as large-span factory buildings and mechanical processing equipment, reflect the mark of industrial civilization and the unique field spirit[3]. In this context, industrial heritage is urgent to be activated and utilized, using the landscape design methods to transform the industrial heritage, fitting with newly implanted business functions on the premise of retaining its original historical traces and highlighting its unique value[4], to meet the needs of diversified industry development, so as to realize the transformation of industrial focus from traditional industrial manufacturing to social service, and show the era's characteristics of industrial heritage. The development of urban renewal and the rise of cultural industry provide more possibilities for the transformation of industrial heritage. The mode can be generally divided into public leisure space, cultural and creative industrial parks and urban resilience space for important events.

As an open and inclusive space in the city, public leisure space endows itself with various functions such as leisure, entertainment, sports, science and education by breaking the shackles between original space and city. For example, in Yangpu Riverside Public Space Demonstration Section, Shanghai, the original industrial structures and urban texture are retained, the organic connection between post-industrial landscape and urban renewal is established through the artistic reconstruction and functional combing of landscape, to continue the industrial historical context and enrich the interests of urban life (figure 1). In Nanjing Tangshan Mine Park, the ecological environment in the site is improved through landscape design based on the original abandoned Longquan Quarry, to excavate and utilize the landscape and historical values of mine remains (figure 2)[5].

Cultural and creative industrial parks generally refer to the bases for individuals or groups of culture, art, film and television, and design to engage in the cultural industry, which can also be divided into art and creative parks and cultural service parks according to their different using functions. For example, in Bo'er Creative Park in Kaohsiung, artistic performance, creative exhibition, artist residence in the village and other functions are added, and art devices consistent with functional themes are set with retaining the original industrial elements. In Jingdezhen

Taoxichuan Creative Park, old and new buildings are combined through different materials and structures, to make a collision between new and old, modern and history, and creative market, artist studio and other functions are introduced, to create a diversified and highly integrated business service park (figure 3)[6]. Urban resilience space for important events is built on buildings or structures with high utilization value according to the original facility contents in the site, combined with current national policies or urban planning, the Organizing Committee of 2022 Winter Olympics is settled in Xishitong Warehouse Office Area in the Shougang Old Industrial Zone. Most of the industrial buildings in the site need to be transformed for their functions according to national policies and Beijing urban development plan, endowing with the significance of using functions such as culture, sports, education, etc. on the old buildings[7].

## 3. Optimized Path of Post-industrial Landscape

The optimized path of post-industrial landscape is actually derived from the analysis on the current situation of land use for industrial heritage, and its characteristics are reflected in its special spatial structure and site scale, left industrial machines and components, as well as the polluted and degraded land environment. While the post-industrial landscape design aims to display the industrial culture spirit, demonstrate industrial aesthetics and replace the site and buildings and restore the ecological environment, and puts forward the following specific optimized paths. The concision and reconstruction of field spirit refers to the strengthening of the elements bearing the characteristics of industrial culture in the site. The current reappearance of artistic feelings is to show the aesthetic characteristics of the industrial period with the reorganization of industrial elements and the combination of contemporary art. The scale reconstruction of multidimensional space and the order reorganization of landscape elements are the replanning of the building structure and spatial layout in industrial heritage field, to meet the current needs of cities and the public. The ecological rebirth of industrial environment is the restoration of the ecological environment, which promotes the public to gradually accept and recognize the aesthetic value of industrial heritage (figure 4).

### 3.1 Concision and Reconstruction of Field Spirit

The core value and practical significance contained in the industrial heritage includes the era’s memory and cultural imprint in the industrial production period, the characteristic context formed

by the integration with the development of surrounding regions, and the emotional identity and sustenance of the public, that is, the field characteristics to be strengthened in transformation and utilization. Therefore, it is necessary to find out the obvious characteristics and impressive constituent elements in the site during the process of landscape design, achieving the purpose of reconstructing the industrial spirit by retaining and reusing in the process of industrial heritage transformation. On the basis of retaining the material carriers of the industrial spirit, it is to create an atmosphere with the help of light, plants, virtual environment technologies and so on, to dynamically show the cultural spirit of the industrial period, awaken the public's memory of the industrial period or industrial production activities, and cause emotional resonance. For example, in the process of the transformation for Tangshan Qixin Cement Plant, the cement suspension kiln that represents the characteristics of Qixin Cement Plant is retained, which carries the century-old history of the cement plant, as a typical functional element, and can arouse the memory of the public[8]. Therefore, in the transformation, red and yellow lights are set near the cement kiln, to simulate the burning of the flame during the cement firing process, to restore the production scene of the cement kiln to the public through a strong visual impact (figure 5).

### 3.2 Current Reappearance of Artistic Feelings

Industrial heritage is the materialization of industrial history and culture, showing the aesthetic characteristics of particular historical period. So it is to show the aesthetics and artistic feelings of the era with landscape design methods while retaining the original aesthetic characteristics during the transformation of industrial heritage according to the functional needs and aesthetic requirement of the current society and the public. Industrial heritage retains a large amount of production equipment that cannot be used. Due to the special size and unique model, its design methods are also diverse. First, build it into landscape sculpture or landscape installation through artistic technique such as deconstruction or reconstruction, and give it a new color, to make a certain visual impact. Second, give it new using functions, and take it as an innovative part of infrastructure and entertainment facilities in the new landscape space. Third, combine with contemporary art, do not transform too much to the original production equipment, but use it as a component or creative element in a work of art, to retain its original style to the greatest extent and more completely show the aesthetic characteristics of the industrial period (figure 6).

### 3.3 Scale Reconstruction of Multidimensional Space

The original main function of industrial heritage is to serve the industrial production, whose planning and design are to provide convenience for the industrial production. While in post-industrial era, the requirement for the site is not only to meet the needs of industrial production, but also for the functions that cities currently need and users' requirement for quality of life and pursuit of landscape aesthetics. Therefore, it is necessary to replan the spatial scale in the site, and remodel buildings and landscape, so as to meet the needs of injecting new functions. In the post-industrial landscape design, it is first to clearly divide areas. There should be large fields to meet the crowd gathering and evacuation, and flexible and diverse small space to meet people's needs for leisure relaxation (figure 7). Meanwhile, in the process of landscape design, designers adjust the color of buildings, replace the materials for facades and transit the space with various types of plants, to transform the original hard space into a soft space suitable for relaxation.

### 3.4 Order Reorganization of Landscape Elements

Original sites in industrial heritage can present a large amount of historical information, industrial memory and cultural connotation. In the process of postindustrial landscape design, there are many contradictions between the original field order and new functions. Whether large industrial workshops, machines for production, left goods, or lush grass, disordered road networks, chaotic hard pavements in the industrial heritage, are not suitable for the environment facing new functions of the cultural industry, so it is necessary to replan the field order of the space in the landscape design, in order to achieve the goal of carrying the past and suiting to the present. For example, when updating the landscape design of Zhongshan Qijiang Park in Guangdong, the field order is reconstructed through the grid-shaped landscape layout method, to form a spatial system with regularity, continuity and stability[9]. Various landscape elements are reconfigured by the composition relationship of points and lines in the grid layout, in which, a 5 m x 5 m hedge of trees is planted to form a local modular grid. Due to the retained rail trails in the site, the accessibility and convenience of roads are improved by the linear network in the design (figure 8). The order reorganization of landscape elements not only continues the history and culture of industrial fields, but also shapes the public space suitable for urban crowd activities.

### 3.5 Ecological Rebirth of Industrial Environment

Harmful chemicals produced in the industrial production and improper forms of resource

development have caused serious damage to the ecological environment. Much of the industrial heritage in cities has been restricted from development due to the pollution, which hasn't been reasonably and effectively planned and utilized, and led to the waste of field resources. Therefore, the ecological management in industrial factories has also become an important part in the post-industrial landscape design methods. For the polluted soil in the site, designers first remove the polluted soil on the surface of the area. For the polluted soil in deep, designers use biological and chemical methods to add bacteria in the soil to decompose the pollutants in the soil through enzymes, sludge and other organic substances after analyzing the soil composition, so as to optimize the soil quality[10]. For the management of water ecology, it is necessary to achieve the purpose of pollution control, flood control and drainage through stormwater management, rehabilitate the water system, purify water quality and create a multi-functional water landscape by setting up a complete rainwater collection and filtration system. The management of plant system is established on the management of soil pollution, which lower the pH of soil while strengthening the viscosity of soil, water retaining capacity and water holding capacity with the help of organic fertilizers containing calcium silicate and calcium carbonate, as well as mixed planting of herbs, shrubs and other suitable plants, to restore the plant system faster.

## 4. Conclusion

With the advent of post-industrial era, cities are facing renewal, development and functional transformation, and the post-industrial landscape design is needed for the urban industrial heritage, aiming to heal the urban landscape environment, retaining the representative buildings in the field, to refine the industrial spirit combined with light, plants and virtual environment technologies. Transfer the aesthetic characteristics of the industrial period by deconstruction and reconstruction, functional adjustment, and combining contemporary art. Provide convenient conditions for urban renewal through the division of spatial scale, function changes and the construction of landscape nodes. Restore the soil, water and plant systems, and restore the ecological environment with ecological, engineering, biological and other technical methods. All of these design methods promote the industrial heritage to meet the requirement of the era and the injection of new functions, which can promote the transformation of industrial heritage better, and give a new meaning of life on the basis of retaining its spirit of the era.

**参考文献（References)：**

[1] 胡燕. 后工业景观场地秩序重建[C]. 刘伯英. 中国工业遗产调查、研究与保护——2017年中国第八届工业遗产学术研讨会论文集. 北京：清华大学出版社，2017：523-528.

HU Yan.Order Reconstruction of Post-industrial Landscape Site [C].LIU Boying.Investigation, Research and Protection of Industrial Heritage in China— Proceedings of the Eighth China Industrial Heritage Conference in 2017. Beijing:Tsinghua University Press,2017:523-528.

[2] 张静，丁奇. 后工业景观内涵的比较与思考[J]. 南京林业大学学报(人文社会科学版)，2007(02)：96-100.

ZHANG Jing,DING Qi.Comparison and Thinking of the Connotation of Postindustrial Landscape[J].Journal of Nanjing Forestry University (Humanities and Social Sciences), 2007(02):96-100.

[3] 刘芳竹，金承协，张明. 美学视角下旧工业建筑改造中的异时同构[C]. 刘伯英. 中国工业遗产调查、研究与保护——2017年中国第八届工业遗产学术研讨会论文集. 北京：清华大学出版社，2017：32-42.

LIU Fangzhu, JIN Chengxie, ZHANG Ming. Same Structure of Different Time in the Reconstruction of Old Industrial Buildings from the Perspective of Aesthetics[C].

LIU Boying.Investigation, Research and Protection of Industrial Heritage in China—Proceedings of the Eighth China Industrial Heritage Conference in 2017. Beijing:Tsinghua University Press,2017:32-42.

[4] 李晨晨，张超荣. 后工业时代背景下景观设计的文化表达[J]. 华中建筑，2011，29(08)：100-102.

LI Chenchen,ZHANG Chaorong.Cultural Expression of Landscape Design under the Background of Post-industrial Era[J].Huazhong Architecture,2011,29(08):100-102.

[5] 马斌，徐苏斌，杜雨晴. 中国矿山公园工业遗产的价值解读[J]. 景观设计，2021，104(02)：16-21.

MA Bin,XU Subin,DU Yuqing.Interpretation of Industrial Heritage of Mine Parks' Value in China[J].Landscape Design,2021, 104(02):16-21.

[6] 毕经国，江海涛. 工业遗产保护与再利用浅析——以陶溪川·CHINA坊产业园区改造为例[C]. 刘伯英. 中国工业遗产调查、研究与保护——2018年中国第九届工业遗产学术研讨会论文集. 北京：清华大学出版社，2018：666-676.

BI Jingguo,JIANG Haitao.Analysis on the Protection and Reuse of Industrial Heritage—Taking Taoxichuan·CHINA Fang Industrial Park Reconstruction as an Example[C].LIU Boying. Investigation, Research and Protection of Industrial Heritage in China—Proceedings of the Ninth China Industrial Heritage Conference in 2018.Beijing:Tsinghua University Press,2018:666-676.

[7] 周婷. 首钢老工业区改造规划的历程与经验[C]. 刘伯英. 中国工业遗产调查、研究与保护——2018年中国第九届工业遗产学术研讨会论文集. 北京：清华大学出版社，2018：636-645.

ZHOU Ting.The Course and Experience of the Reconstruction Plan of Shougang Old Industrial Zone[C].LIU Boying.Investigation, Research and Protection of Industrial Heritage in China—Proceedings of the Ninth China Industrial Heritage Conference in 2018.Beijing:Tsinghua University Press,2018:636-645.

[8] 刘宇. 后工业时代我国工业建筑遗产保护与再利用策略研究[D]. 天津：天津大学，2015.

LIU Yu.Research on the Protection and Utilization Strategy of China’s Industrial Architectural Heritage in Post-industrial Era[D].Tianjin:Tianjin University,2015.

[9] Mary G.Padua，刘君. 工业的力量——中山岐江公园：一个打破常规的公园设计[J]. 中国园林，2003(09)：6-12.

Mary G.Padua,LIU Jun. Power of Industry—Zhongshan Qijiang Park: A Park Design Breaking the Rules[J].Chinese Landscape Architecture,2003(09):6-12.

[10] 于清静. 棕地改造中废弃物的景观化利用研究[D]. 西安：西安建筑科技大学，2016.

YU Qingjing.Study on the Landscape Utilization of Wastes in Brownfield Reconstruction[D]. Xi’an:Xi’an University of Architecture and Technology,2016.

（整理：苗慧珠、邱丰 翻译：李小白）