



## Historical and Modern Structures at the Railway Stations

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### Summary

Since 1980s, railway architecture has been experiencing “station renaissance”. Along with this trend, many large historical stations have been refurbished, upgraded and developed. Modern extensions need to fit to historical settings and to add additional values of modernity and attractiveness to railway stations. This paper examines such stations on the example of Europe and Japan and concludes that these transport facilities with their re-born buildings improving travel by rail, are new-generation station and often urban landmarks.

**Keywords:** Railway station; station building; heritage architecture; structure, landmark.

### 1. Introduction

In Europe, where introduction of high-speed trains has popularized travel by rail and since 1980s, stations have experienced the most notable development since the introduction of railways in 19th century. Since then, in Europe and Japan, many existing stations have undergone general refitting and extension by new structures. Historical stations with new extensions are challenging, because they require unique structures that can accommodate various functions and blend in together.

This paper analyzes the aspects of coordination of historical and modern structures at the railway stations on examples of stations in Europe – Leipzig Hauptbahnhof, London Waterloo, Gare du Nord, London St Pancras and King’s Cross; and in Japan – Ueno Station and Tokyo Station City. The conclusion is that in Europe old buildings have been refurbished based on careful historical studies and new extensions have been added with respect and after many considerations. In Japan, due to different circumstances, basic style has more often been preserved and less often actual old structures. Refurbished stations have a high quality of structural art.

### 2. “Station renaissance”

“Station renaissance” has been a driving force resulting in total improvement of railway stations both in Europe and Japan. It was initiated for the first time by railway companies in Europe in 1980s, and later in Japan, as their response to various challenges of railway sector and respectively as a result of technological potential of high-speed trains, and as a factor of urban renewal, reflecting growing environmental concern. German *Deutsche Bahn Aktien Gesellschaft*, French *Société Nationale des Chemins de fer Français*, UK Network Rail, and East Japan Railway Company in Japan, put “renaissance” of stations along with technological improvements of trains and tracks, on the top of their policies. Current multi-modal stations, often resembling air terminals, realize the concept of “seamless journey”, according to which railway stations include all facilities arranged for ticketing, waiting, transfer, shopping and recreation. Promotion of railways incorporated activities and policies related to construction of new stations and to their renovation. Refurbished stations that combine historical architecture with new extensions face new challenges to adjust to a high level of architecture and engineering and to harmonize with the surrounding.

### 3. Factors of structural art and its realization in refurbished stations

#### 3.1 Structural art

Structural art is an art accomplished in the work of structure. Art forms have developed after the Industrial Revolution along with the introduction of new materials – iron, structural steel, reinforced concrete, prestressed concrete, and later - structural glass, composite timber, other composites and fiber reinforced plastic. New materials allowed for new structural forms, such as tensile structures, shells, grid shells, space frames, etc. These forms have determined the shape of engineering structures such as bridges and buildings. Structural art - as opposed to fine architecture which seeks the beauty of pleasing shapes independent of the structural skeleton of the building – is based on an engineering structure that is fully visible and aesthetically pleasing in its own right being the prime source of the beauty of the building. This may be observed in refurbished railway stations.

#### 3.2 Refurbished stations in Europe and Japan

Many of refurbished European stations are large terminals that consist of historical buildings and new extensions. Splendid new railway stations resembling air terminals, are often connected with airports, and serving high-speed trains. European stations have such a common feature, that modern developments are respectfully connected with preserved historical buildings into “integrated stations”. In Japan, two types of in recent stations - “station tower” and “station city” include renovated historical buildings - preserved or rebuilt, with consideration of their structure and the need to satisfy seismic standards. These stations express structural art of the past and present.

Leipzig Hauptbahnhof (1997) project successfully accommodates now a shopping center in the historical building. New structures at Waterloo Station (2003) and Gare du Nord (2001), Ueno Station (2002) are good combinations of historical and modern structures that make stations efficient and more attractive. St Pancras (2007; Fig. 1) was successfully refurbished in a way that modern interventions have been designed to be subservient to the original architecture whilst enhancing its grandeur. King’s Cross Station (2012) has an additional stunning new structure that while improving the station environment is, along with renovated historical building and train shed - a work of art. Tokyo Station City (2012; Fig. 2) consisting of rebuilt parts and new towers expresses the beauty of the past and contemporary architecture and engineering that form together a new-generation station-city.



Fig. 1: *St Pancras, London – “The Arcade”*



Fig. 2: *Tokyo Station – Marunouchi side*

### 4. Conclusions

A combination of rebuilt or refurbished historical buildings and modern structures has been the recent trend in the development of railway stations. Such approach needs aesthetic considerations before modern structure would become a part of historical station. Careful studies leading to suitable architecture can be rewarding. The new station can become architecturally rich and structurally innovative. Also insertion of new outstanding structures can transform a station into a better environment. Such recently renovated stations – elegant, with high quality buildings resembling air terminals, are the new-generation modern transport facilities. Due to their central locations and grand visual architecture, such stations are important urban landmarks.