



INNOVATION OF COMPREHENSIVE TRANSPORT HUB PASSENGER STATION DESIGN OF CHINA RAILWAY IN LOW-CARBON ERA

From copenhagen to davos, from political game to global competition of economic interests the low-carbon economy and green development has become the focus around the world.

17-18 October 2013

Hong, Gao 2292707916@QQ.COM
Position, The Third Railway Survey And Design Institute Group Corporation, China
Number and session name

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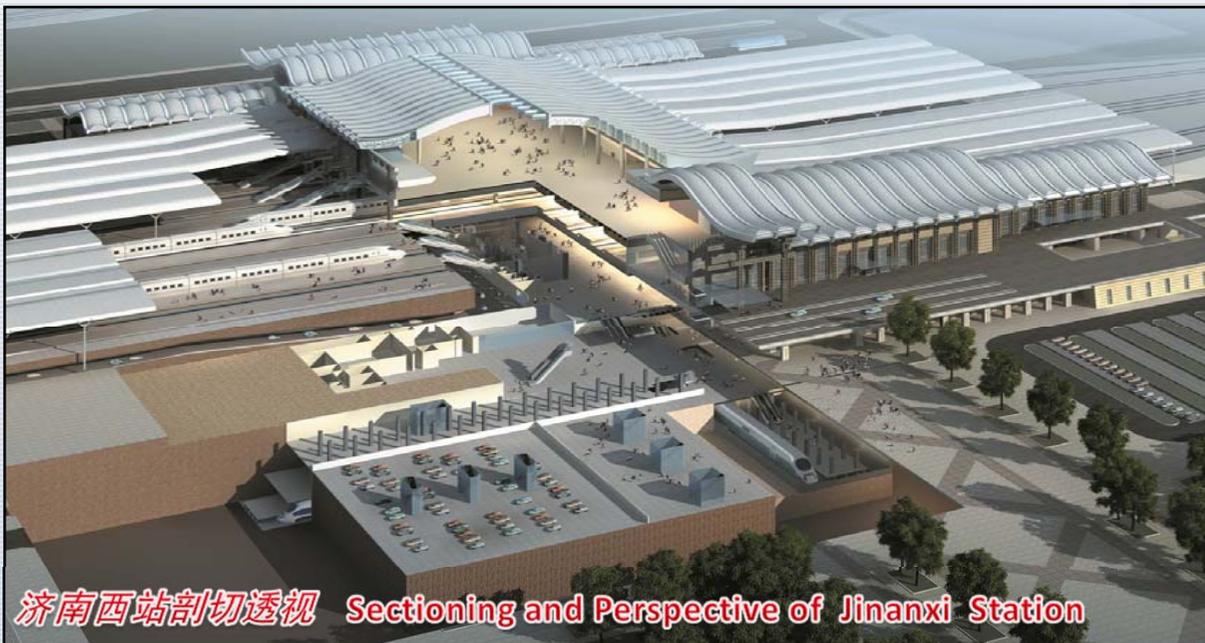


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- ❑ Techniques to improve acoustic environment
- ❑ Techniques to reduce vibration and noise
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- ❑ Low carbon energy saving technique for heating and ventilation

General

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- Basic figures of a comprehensive traffic hub: **functional diversification, spatial intensification.**
- As the **integration of multiple traffic modes**, a comprehensive transport hub integrates railway, bus, subway, light rail transit, taxi and private cars, into a system that interlinks closely and functions efficiently.
- The construction of comprehensive traffic hubs with **seamless or short-distance transfer** indicates that the low-carbon era has come on China Railway.



济南西站剖切透视 Sectioning and Perspective of Jinanxi Station

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System integration Techniques

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Passenger stations should blend in with the overall planning of cities, and meet the requirements of the functional layout, railway network and landscape of cities.

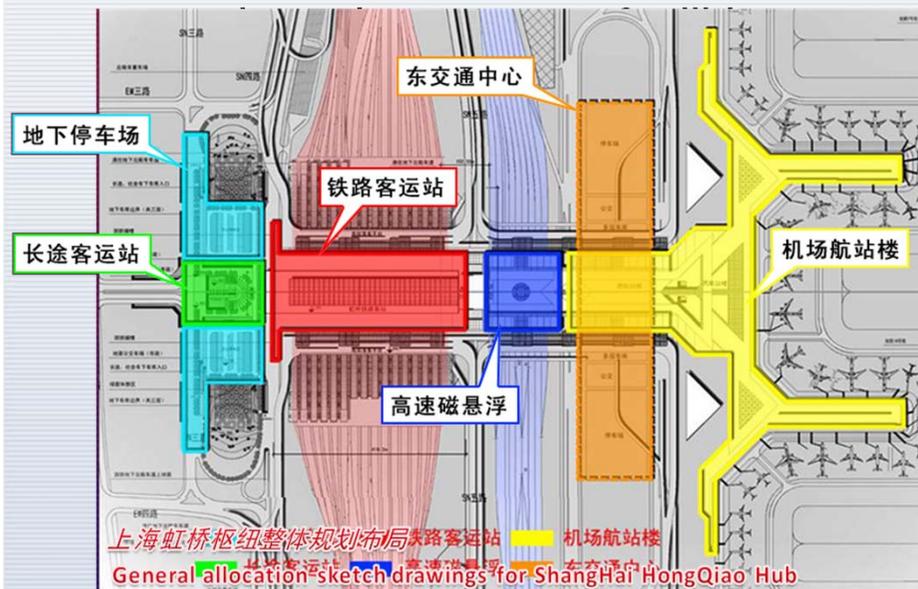


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System integration Techniques

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- An **integrated solution** is proposed, based on the city's overall planning, railway network, road network, railway yard arrangement and traffic flow inside the station.
- Considerations are given to the **integration of the interfaces** within and among the subsystems of the station, i.e. the station square, station buildings, station



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System integration Techniques

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- Technologies and measures utilized to realize intensification of the architecture space of large-scale comprehensive transport hub:
- Planning techniques
- Passenger flow organizing techniques
- Integrated building-bridge structure
- Design techniques for extra-large structures
- Design techniques for performance-based fire protection, etc.

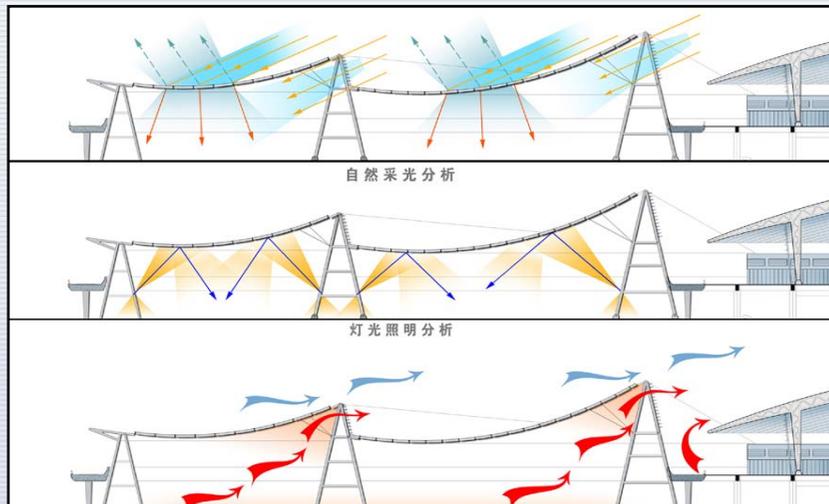
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Design Techniques of Indoor and Outdoor Space

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- To improve the comfort of public space, sufficient sunlight, fresh air and plants are introduced inside the station.
- The design of canopies and elevated waiting hall in Beijing South Railway Station brings natural sunlight into the interior of station, the platform and the underground space.



北京南站站台雨篷的通风采光



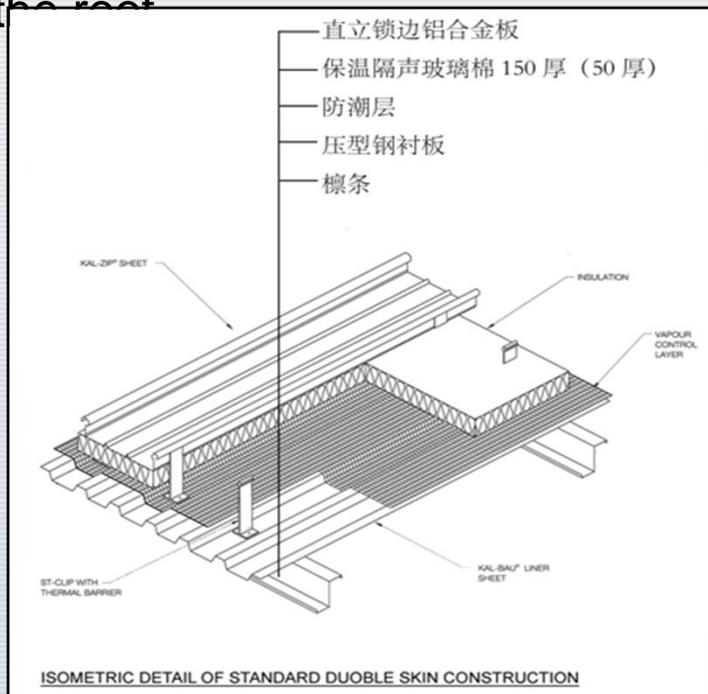
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Energy saving techniques for enclosure structures of building

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- **Curtain wall:** Low-e hollow glass curtain wall, sun shading louver
- **Roofing system:** Beijing South Railway Station, 70,000 m² and roofing of standing seam system. Glass fiber of 150 thick is applied to the heat insulation layer, with profile steel sheet underlaying. Slabs of the aluminium-magnesium-manganese alloy roofing lock each other securely with no screws exposed on the roof



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Techniques to improve acoustic environment

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- The research on acoustic design of Beijing South Railway Station mainly includes:
- Sound insulation of exterior wall and curtain wall;
- Sound insulation performance of the roof and skylight;
- Reverberation time control in the elevated waiting hall floor and the platform floor;
- Noise propagation at the platform floor;
- Noise and vibration control of electrical and mechanical devices;
- Separation of noise propagation at the station platform level and elevated waiting hall daylighting glass;

- Isolation of noise in the machine room and the sound insulation performance of the



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Techniques to reduce vibration and noise

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- Integrated building-bridge structure, vibration
- Example: Shanghai Hongqiao Railway Passenger Station is separated from the top downward into elevated commercial development level, elevated station hall level, platform level, underground station hall level and subway level with trains operating on the platform level. Corresponding vibration and noise reduction measures should be applied to the track level.



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BIPV (building integrated photovoltaics) techniques

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- Two different photovoltaic systems have been applied to Shanghai Hongqiao Railway Station and Beijingnan Railway Station based on different installation locations.

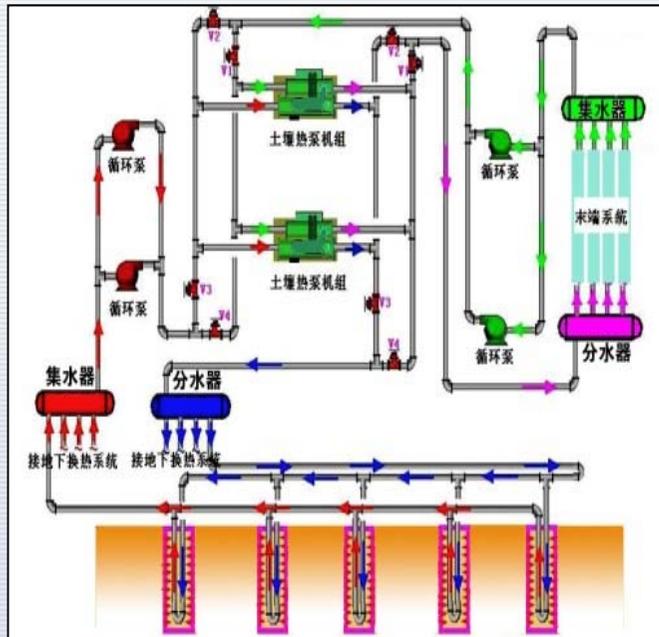


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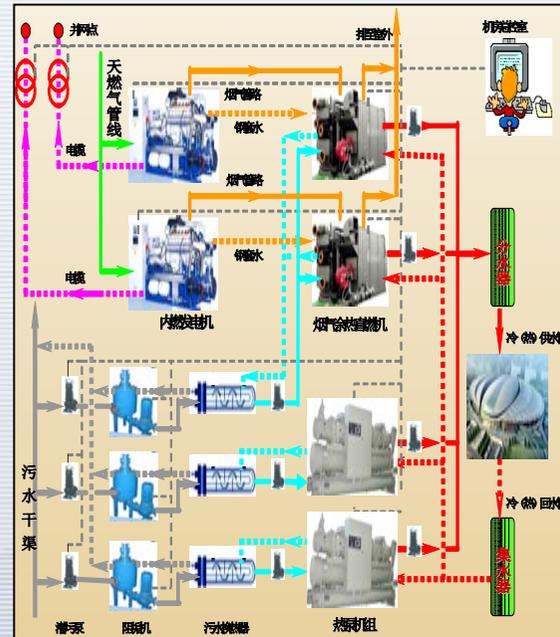
Low carbon energy saving techniques for heating and ventilation

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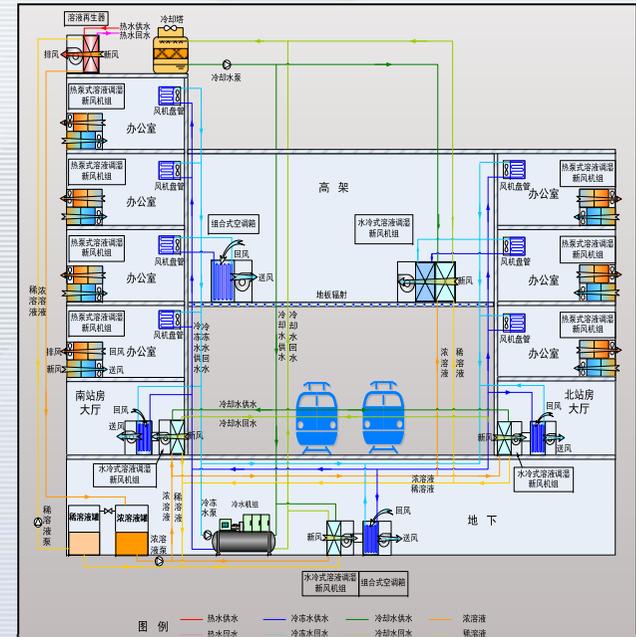
- Ground Source Heat Pump (GSHP)
- Combined Cooling Heating and Power Techniques (CCHP)
- Air-conditioning System with Independent Control of Temperature & Humidity



地源热泵原理图 Schematic Diagram of GSHP



热电冷三联供+污水源热泵系统原理图



天津站温湿度独立控制空调系统夏季运行工况
Operational state of air-conditioning system with independent control of temperature & humidity at Tianjin Railway Station in summer

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Epilogue

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