

A Podcast Guided Tour of Shanghai Tunnel Science & Technology Museum

Leave the traditional guided tours behind and strike out at your own pace with an audio guide. This bilingual podcast is presented by Shanghai Daily and supervised by the Shanghai Science and Technology Committee.

For thousands of years humans have been changing the face of the earth, not only building upward, but burrowing into the ground to build tunnels for travel. These feats of subterranean engineering usually pass under rivers and crowded roads. In Shanghai, tunnels greatly ease traffic by providing alternate routes and subways help millions get to and from work.

Tunnels, the digger's art, are extraordinary examples of engineering, modern technology and plain old digging. We take them for granted but you might wonder how these miraculous underground passages were built.

Let's enter the Tunnel Science & Technology Museum to get some answers.

Only the museum's third, fourth and fifth floors are open to the public. Let's take the elevator to the fifth floor.

To begin our journey, let's walk through the section called "time tunnel." This shows the city's tunnel construction history since the 1970s. Here are pictures of tunnels, including the Dapu Road Tunnel (China's first underwater road tunnel), the Combined Sewerage Project, Metro Lines No. 1 and No. 2, and the Bund Sightseeing Tunnel.

The pace of tunnel construction has accelerated in the past 10 years. Shanghai now has six major tunnels running underwater. More tunnels are underway or being planned. The crowning glories are the East Fuxing Road Tunnel (the world's first double-decker cross-river tunnel) and the Shangzhong Road Tunnel, now under construction. It will be one of the world's largest tunnels in diameter (about 14.8 meters). Construction uses a tunneling shield.

At the end of this section is a map of the city's tunnel network.

Leaving the "time tunnel," we stroll along a corridor. Four models of tunneling machines are on your left. On your right are materials used in construction to prevent water seepage, and some old coins found at a tunnel site.

To the left of the corridor is a terrace where you can sit and relax.

At the far end of the corridor, a door on the right leads you to the next section.

Since you're here, how about a walk in a tunnel? You're now in an exact replica of the

East Fuxing Road Tunnel, the world's first double-decker and cross-river tunnel. The replica occupies two floors and you're on its upper level, the roadway for cars and small vehicles. We'll visit the second level later.

Walking past an automatic door, you come upon a huge wheel two stories high. It's an exact replica of a tunnel boring machine. It has rotating cutting-heads at the front that can bore through rock. As the machine moves forward, huge ring-shaped segments are put in place to form and support the tunnel wall.

A tunnel built with this method is composed of many wall rings. For example, the 2,785-meter-long East Fuxing Road Tunnel -- that's 2.785 kilometers -- has 1,620 rings.

Walk down the iron staircase beside the replica to the fourth floor. You're now on the second level of the East Fuxing Road Tunnel, which is reserved for large, heavy vehicles.

Notice the control cabin? It's where workers operate the boring machine. The vehicle alongside the cabin is used to transport building materials, such as segments within the tunnel.

Next, let's go to the section on tunneling methods.

On your right are four models depicting different tunneling methods:

- Double-O-Tube Tunneling
- Slurry Pressure Balance Tunneling
- Immersed-Tube Tunneling
- and Rectangular Pipe-Jacking

With a cross-section that looks like binoculars, the Double-O-Tube tunnel machine can bore two tunnels simultaneously -- one per metro train, thus saving time. Metro line No. 8, now under construction, is using this ingenious approach.

Behind the cutting head of the slurry pressure balance boring machine, there's a chamber where excavated soil is mixed with water, and a system to transport it above ground. The method is suited for soft ground, like Shanghai's. The East Yan'an Road Tunnel, Dalian Road Tunnel and Xiangyin Road Tunnel were all built using this method.

The city's Outer Ring Road Tunnel on the Huangpu River is the largest immersed tube tunnel in Asia. The immersed-tube method involves prefabricating long tube sections, floating them to the site, sinking each in a previously dredged trench, and then covering them with backfill.

The rectangular pipe-jacking method is mainly used for local pedestrian underpasses, such as the fifth exit of Lujiazui station in Pudong on Metro Line No. 2.

Feeling confused? Let's go to the far right corner of the room. Here you can take an 8-minute multi-media virtual tour of a tunnel construction site and learn more about boring machines.

Take a rest and then we'll walk down to the third floor.

To the left side of the exhibition room is the real central control room for the East Fuxing Road Tunnel. That is just a short distance away from the building. This building houses both the museum and the tunnel control room. As we look through the glass, we can see exactly what the staff does. They keep a close 24-hour watch on the tunnel via video monitors.

The most eye-catching display in the exhibition room is a one-tenth scale model of the East Fuxin Road Tunnel. Alongside the model is a touch-screen computer that will show you how to escape the tunnel if it catches fire, explaining it with a short animated cartoon.

The tunnel's security alert system has the latest emergency warning equipment. In case of a fire, heat sensors send an alert to the control room and automatic sprinklers turn on. In addition, there are emergency exits at regular 60-meter intervals.

Also displayed are mini-models of vehicles used in tunnel construction.

The wall on the far left side has the portraits of three leading Chinese experts of tunnel and underground engineering: Sun Jun, Qian Qihu, and Liu Jianhang.

A few steps away is the final section -- tunnels of the future.

Now you're standing at a passage that follows the path of one of the city's most famous landmarks -- the Huangpu River. Here you can enjoy the miniature but magnificent view of the city at night, with the miniature Puxi and Pudong areas lighted by myriad twinkling lights. Can you see the astonishing Oriental Pearl TV Tower? It's on your right.

The tunnels and bridges that cross the river are also marked below the transparent passage. The city now has 10 tunnels and bridges across the Huangpu River and the number will rise to 17 by 2010.

Straight ahead are pictures depicting grand plans for future tunnels, including a maglev tunnel, a desert tunnel, a Trans-Atlantic Sightseeing Tunnel, a tunnel under the Alps and a tunnel that passes through the Earth's core.

We hope you enjoyed your visit to the Shanghai Tunnel Science & Technology Museum.

Museum address: 268 Zhonghua Road, Huangpu District

Opening times:

(Group visits need to give advanced notice)

Monday to Friday: 9:00 am-11:00am; 1:30pm-4:00pm.

(For individual visits)

Tuesday and Friday: 1:30pm-4:00pm; Saturday: 9:00am-11:00am; 1:30pm-4:00pm.

Bus routes to the museum: No. 11, 24, 64, 715, or 920.

For more details contact the museum at: 6333-1160 or 6333-0090-60.