

Around the World in 7 Great Engineering Feats

Palms Islands, Dubai



Visible from space, these three (one is still under construction) palm-tree-shaped landmasses located off the coast of the United Arab Emirates are the largest man-made islands on Earth.

The islands are made of limestone and sand dredged from the bottom of the Persian Gulf by ships. The ships then spray the sand on emerging artificial land surfaces using a technique called “rainbowing” (due to the rainbows formed during the process).

The project has been criticized for damaging the ocean ecosystem and for its unsustainability, factors that engineers increasingly need to take into account in their work.¹

Still, when complete, the Palm Islands will add 323 miles of beaches to Dubai’s coastline, house thousands of people and be home to high-end hotels, theme parks and shopping malls.²

Taipei 101, Taiwan



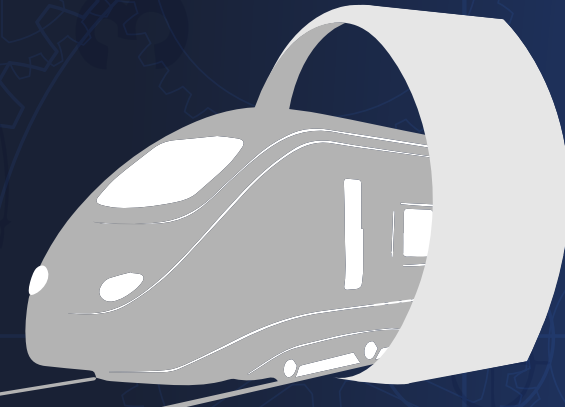
The first building in the world to break the 500-meter-high mark, Taiwan’s Taipei 101 is a marvel of engineering and the symbol of modern Taipei. With 101 floors, it’s the world’s largest and most-used green-certified building, specially designed to withstand earthquakes and Taiwan’s typhoon winds.

To minimize the impact from extreme motion and to achieve greater stability, engineers designed a gigantic tuned mass damper.

Functioning like a giant pendulum, the damper is a steel sphere weighing 728 tons suspended in the upper-third of the building. In strong wind, the damper sways, counteracting and reducing the overall movement of the building by up to 40 percent.³

An engineering marvel, the building remains one of the world’s strongest and most stable buildings.

Channel Tunnel (Chunnel), Dover Strait



The Channel Tunnel, or “Chunnel” as it is nicknamed, seems almost miraculous. This 31-mile-long underwater rail tunnel connects England and France beneath the English Channel. The tunnels were constructed using specialized drilling machines, which bored into chalk marl at the bottom of the sea.

With train speeds reaching 100 mph and 7 million passengers riding each year, the tunnel cuts train travel time between the two countries down to an hour. It’s been recognized as one of the “Seven Wonders of the Modern World” by the American Society of Civil Engineers.⁴

Hoover Dam, Nevada



Construction of the massive Hoover Dam, which is set on the Colorado River on the border of Nevada and Arizona, began in 1931 and finished in 1935. The impressive structure is a concrete arch-gravity dam, which means it relies on gravity to keep its foundations from collapsing.

Designed to control flooding and provide hydroelectric power and irrigated water, the Hoover Dam project was (and remains) a total success, resulting in the formation of Lake Mead, the largest man-made lake in the Western Hemisphere. It still remains the second-tallest dam in the world and the tallest concrete dam.⁵

Akashi Kaikyō Bridge, Akashi Strait, Japan

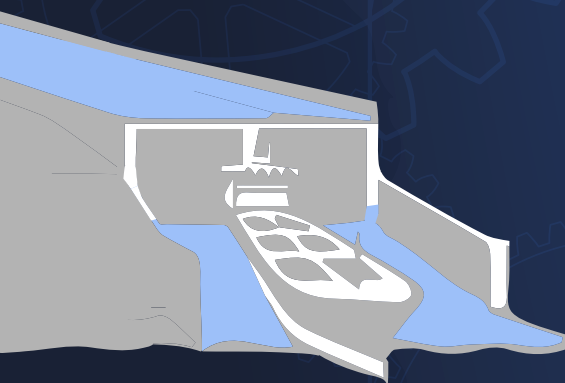


Measuring 12,828 feet long, the Akashi Kaikyō Bridge is the longest suspension bridge in the world—it’s just under 10,000 feet longer than the Brooklyn Bridge. It links the city of Kobe on Japan’s mainland to Awaji Island.

Before the bridge was completed in 1998, the only way to access the island was by a ferry ride through a dangerous waterway.

Two million workers constructed this modern marvel in over 10 years, and the resulting bridge is both beautiful and the longest and strongest suspension bridge ever built.⁶ It’s capable of withstanding winds up to 178 mph and earthquakes measuring up to magnitude 8.5.

Panama Canal, Panama



The Panama Canal, a man-made, 48-mile-long waterway that links the Atlantic and Pacific Oceans, is especially impressive when you consider that construction began on the project in 1905.⁷

One of the American Society of Civil Engineers’ “Seven Wonders of the Modern World,” the canal uses a series of moveable locks to allow ships to pass through its waters, and more than 15,000 ships sail through each year.

Brace yourself: The amount of earth dug out for the project’s construction could have buried the entire city of Manhattan, and the resulting canal, which opened in 1914, is one of the busiest waterways on Earth.

Mars Curiosity Rover



If the Curiosity doesn’t impress you, what will? Launched by NASA in 2012, this car-sized mobile robot traveled 350 million miles into space to land just 1.5 miles from NASA’s target landing site on Mars.

Currently exploring the Martian climate and geography, Curiosity is powered by its own radioisotope thermoelectric generator, can withstand extreme heat and cold, and transmits information to Earth via satellite.⁸

If humans ever set foot on Mars, we’ll have Curiosity to thank for going there first.

1. Retrieved on September 20, 2017, from cntraveler.com/stories/2015-11-23/the-real-story-behind-dubai-palm-islands
2. Retrieved on September 20, 2017, from dredgebrokers.com/html/dredging/Palm-Islands-Dubai.html
3. Retrieved on September 20, 2017, from amusingplanet.com/2014/08/the-728-ton-tuned-mass-damper-of-taipei.html
4. Retrieved on September 20, 2017, from thoughtco.com/seven-wonders-of-the-modern-world-1434539#step7
5. Retrieved on September 20, 2017, from popularmechanics.com/technology/infrastructure/g283777-most-serious-dams-us/
6. Retrieved on September 20, 2017, from pbs.org/wgbh/buildingbig/wonder/structure/akashi_kaiyo.html
7. Retrieved on September 20, 2017, from history.com/topics/panama-canal
8. Retrieved on September 20, 2017, from solarsystem.nasa.gov/rps/rtg.cfm



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