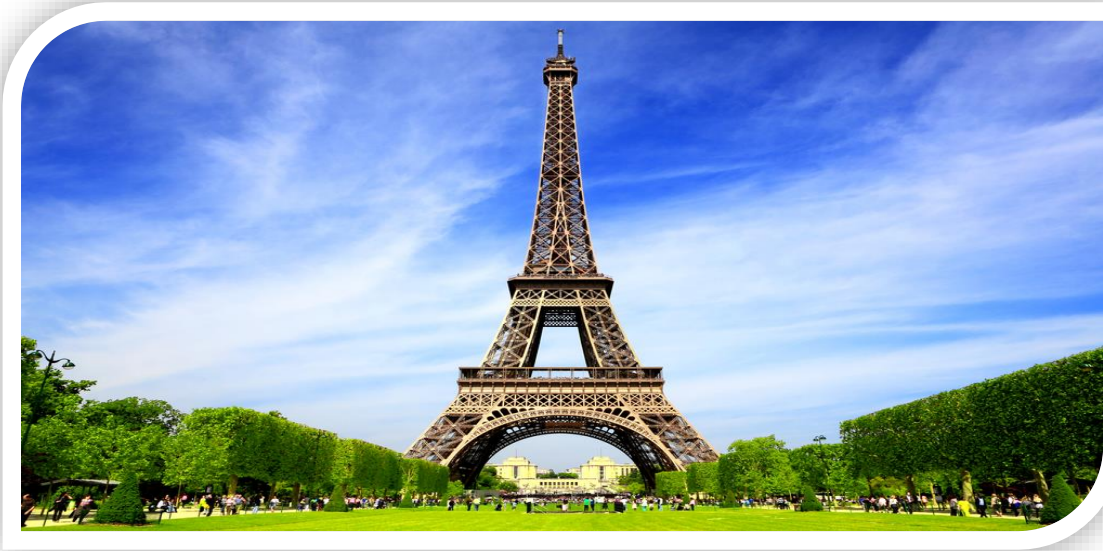


# Eiffel Tower



The Eiffel Tower (/ˈaɪfəl/ EYE-fəl; French: Tour Eiffel [tuʁ ɛfɛl] ⓘ) is a wrought-iron lattice tower on the Champ de Mars in Paris, France. It is named after the engineer Gustave Eiffel, whose company designed and built the tower from 1887 to 1889.

Locally nicknamed "La dame de fer" (French for "Iron Lady"), it was constructed as the centerpiece of the 1889 World's Fair, and to crown the centennial anniversary of the French Revolution. Although initially criticised by some of France's leading artists and intellectuals for its design, it has since become a global cultural icon of France and one of the most recognisable structures in the world.[5] The tower received 5,889,000 visitors in 2022.[6] The Eiffel Tower is the most visited monument with an entrance fee in the world:[7] 6.91 million people ascended it in 2015. It was designated a monument historique in 1964, and was named part of a UNESCO World Heritage Site ("Paris, Banks of the Seine") in 1991.[8]

## HISTORY, ORIGIN

### History

The design of the Eiffel Tower is attributed to Maurice Koechlin and Émile Nouguier, two senior engineers working for the Compagnie des Établissements Eiffel. It was envisioned after discussion about a suitable centerpiece for the proposed 1889 Exposition Universelle, a world's fair to celebrate the centennial of the French Revolution. In May 1884, working at home, Koechlin made a sketch of their idea, described by him as "a great pylon, consisting of four lattice girders standing apart at the base and coming together at the top, joined together by

metal trusses at regular intervals".[10] Eiffel initially showed little enthusiasm, but he did approve further study, and the two engineers then asked Stephen Sauvestre, the head of the company's architectural department, to contribute to the design. Sauvestre added decorative arches to the base of the tower, a glass pavilion to the first level, and other embellishments.

The new version gained Eiffel's support: he bought the rights to the patent on the design which Koechlin, Nougier, and Sauvestre had taken out, and the design was put on display at the Exhibition of Decorative Arts in the autumn of 1884 under the company name. On 30 March 1885, Eiffel presented his plans to the Société des Ingénieurs Civils; after discussing the technical problems and emphasising the practical uses of the tower, he finished his talk by saying the tower would symbolize

## Artists' protest

The proposed tower had been a subject of controversy, drawing criticism from those who did not believe it was feasible and those who objected on artistic grounds. Prior to the Eiffel Tower's construction, no structure had ever been constructed to a height of 300 m, or even 200 m for that matter,[14] and many people believed it was impossible. These objections were an expression of a long-standing debate in France about the relationship between architecture and engineering. It came to a head as work began at the Champ de Mars: a "Committee of Three Hundred" (one member for each metre of the tower's height) was formed, led by the prominent architect Charles Garnier and including some of the most important figures of the arts, such as William-Adolphe Bouguereau, Guy de Maupassant, Charles Gounod and Jules Massenet. A petition called "Artists against the Eiffel Tower" was sent to the Minister of Works and Commissioner for the Exposition, Adolphe Alphand, and it was published by Le Temps on 14 February 1887:

We, writers, painters, sculptors, architects and passionate devotees of the hitherto untouched beauty of Paris, protest with all our strength, with all our indignation in the name of slighted French taste, against the erection ... of this useless and monstrous Eiffel Tower ... To bring our arguments home, imagine for a moment a giddy, ridiculous tower dominating Paris like a gigantic black smokestack, crushing under its barbaric bulk Notre Dame, the Tour Saint-Jacques, the Louvre, the Dome of les Invalides, the Arc de Triomphe, all of our humiliated monuments will disappear in this ghastly dream. And for twenty years ... we shall see stretching like a blot of ink the hateful shadow of the hateful column of bolted sheet metal.[15]

## CONSTRUCTION OF EFFIEL TOWER

### Construction

Work on the foundations started on 28 January 1887.[22] Those for the east and south legs were straightforward, with each leg resting on four 2 m (6.6 ft) concrete slabs, one for each of

the principal girders of each leg. The west and north legs, being closer to the river Seine, were more complicated: each slab needed two piles installed by using compressed-air caissons 15 m (49 ft) long and 6 m (20 ft) in diameter driven to a depth of 22 m (72 ft)[23] to support the concrete slabs, which were 6 m (20 ft) thick. Each of these slabs supported a block of limestone with an inclined top to bear a supporting shoe for the ironwork.

Each shoe was anchored to the stonework by a pair of bolts 10 cm (4 in) in diameter and 7.5 m (25 ft) long. The foundations were completed on 30 June, and the erection of the ironwork began. The visible work on-site was complemented by the enormous amount of exacting preparatory work that took place behind the scenes: the drawing office produced 1,700 general drawings and 3,629 detailed drawings of the 18,038 different parts needed.[24] The task of drawing the components was complicated by the complex angles involved in the design and the degree of precision required: the position of rivet holes was specified to within 1 mm (0.04 in) and angles worked out to one second of arc.[25] The finished components, some already riveted together into sub-assemblies, arrived on horse-drawn carts from a factory in the nearby Parisian suburb of Levallois-Perret and were first bolted together, with the bolts being replaced with rivets as construction progressed. No drilling or shaping was done on site: if any part did not fit, it was sent back to the factory for alteration. In all, 18,038 pieces were joined using 2.5 million rivets.[22]

## SUBSEQUENT

# Events

Eiffel had a permit for the tower to stand for 20 years. It was to be dismantled in 1909, when its ownership would revert to the City of Paris. The city had planned to tear it down (part of the original contest rules for designing a tower was that it should be easy to dismantle) but as the tower proved to be valuable for many innovations in the early 20th century, particularly radio telegraphy, it was allowed to remain after the expiry of the permit, and from 1910 it also became part of the International Time Service.[35]

For the 1900 Exposition Universelle, the lifts in the east and west legs were replaced by lifts running as far as the second level constructed by the French firm Fives-Lille. These had a compensating mechanism to keep the floor level as the angle of ascent changed at the first level,