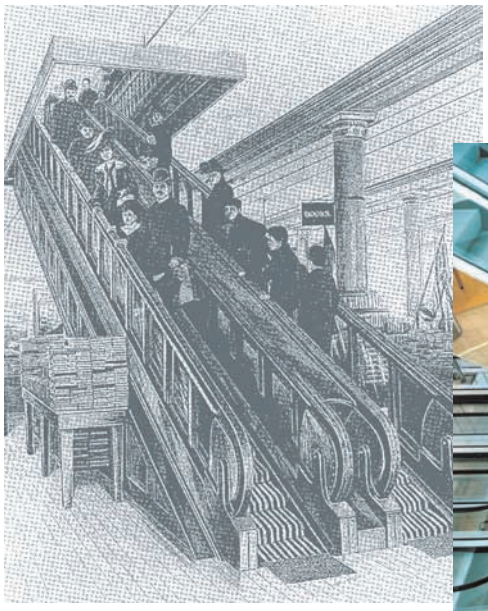
Part of the urban landscape

Visit any large department store, shopping mall, metro station, airport or stadium anywhere in the world and you are sure to find escalators carrying people quickly and safely to their destination. The escalator has become an integral part of the urban landscape. While passenger elevators were in common use since the 1870s, it was not until 1899 that the Otis Elevator Company introduced the world's first commercially successful moving stairs.

Otis Elevator Company has been safely and efficiently moving people for 150 years. Otis is the world's largest manufacturer of elevators, escalators, moving walks and people movers. With 1.2 million installations, 61,000 employees, and operations in more than 200 countries, it's safe to say that the world rides on Otis.

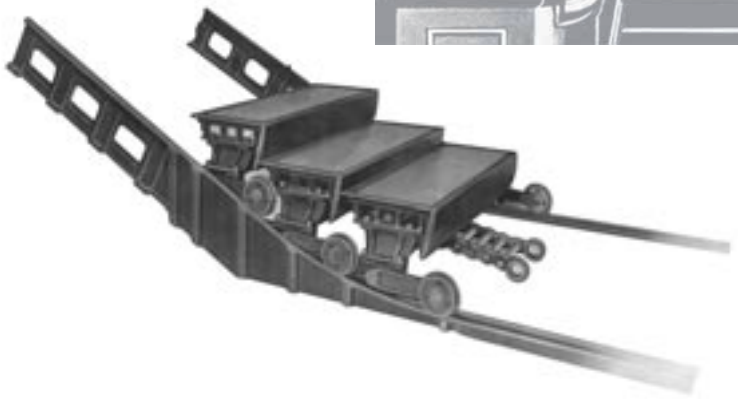


The rise of the modern escalator

Although there had been several attempts to design and build moving stairway systems prior to 1899, none proved safe or practical enough to come into general use. It was not until that year — when the Otis Elevator Company built the first step-type escalator — that the idea became commercially feasable. This original Otis design remains the basis for the escalator as we know it today.

The word escalator was coined by combining the Latin word for steps — "scala" — with the word "elevator." The term remained a registered trademark of the company until 1950, when the U.S. Patent Office ruled it was in the public domain since escalator had become the generic name for a moving stairway.

The Paris Exposition of 1900 featured the first step-type escalator for public use.



Early step-type tread at the beginning of the rise.

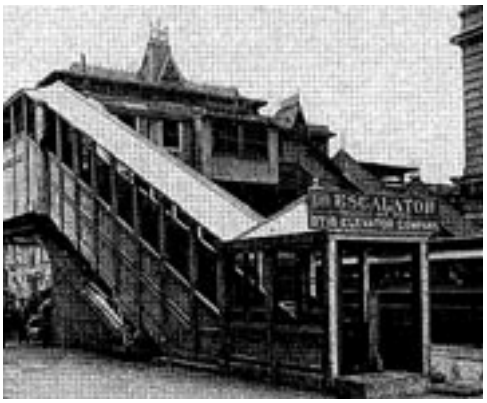
Finding a safer solution

Designing a safe transition point — where passengers step on and off the escalator — was one of the major problems in creating a successful moving stairway. A number of methods had been attempted before Otis solved the problem.

In one earlier design, as the moving steps reached the upper landing, they disappeared under a “V” shunt. The purpose of the shunt was to literally shove passengers off the stairs and onto the landing. This required them to take an awkward sidestep with one foot while the other foot was still traveling forward. This called for considerable concentration and coordination on the part of the passengers — a difficult enough feat at the best of times, much less when one was burdened with parcels or attending small children.

Another alternative was a system that employed a series of comb-like prongs that lifted the passengers’ feet off the treads when they reached the top. The prongs were designed to mesh with the tread cleats at the end of the ascending and descending runs. This was an improvement over the awkward “V” shunt system, but the 30–40 cm (12-16 in) prongs still posed a hazard. Passengers were tempted to leap over the approaching prongs rather than risk being scooped off. Neither the awkward “V” shunt system nor the pronged-comb solution was practical for the majority of users.

Otis solved the problem of the transition point by combining the moving tread with a much safer comb and cleat design that reduced the prongs to a safer, tapered length. At this point, escalator sales began their steady climb. In its first year with the newly designed escalator, Otis sold more units than it had in the previous 20 combined. Its time had finally come.



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1. Escalators came into use in the public transportation systems of both New York and London soon after their introduction.

2. V-shunt assembly

3. Early comb plate design

4. Top landing at R.H. Macy’s department store, New York City


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The pursuit of innovation

Otis, in its tradition of innovation, has continued to refine the escalator since it pioneered its introduction.

Handrails

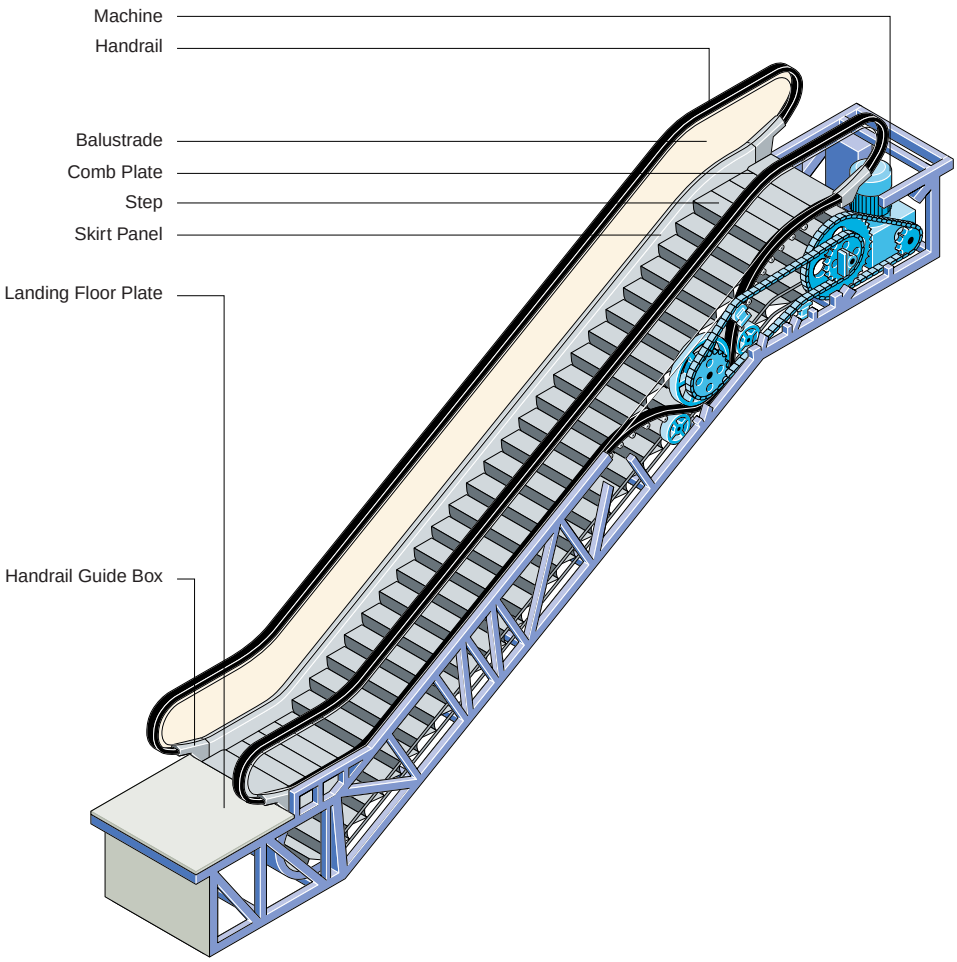
Early escalators had solid rubber handrails driven by metal chains. The chains traveled in a lubricated steel channel. The result was that passengers often wound up with oil-stained hands or gloves.

Otis replaced this design with a tension-driven rubber and canvas handrail that was guided in a simple unlubricated channel. Later, Otis refined this design by introducing pinch-resistant handrails to prevent the possibility of passengers' fingers from getting caught.

Another Otis innovation was to extend the handrails 40 cm (16 in) beyond the point where the steps disappear at the landings. This simple design improvement dramatically increased escalator safety.

The extended handrail permitted passengers to grasp the rail and steady themselves before stepping onto the moving stairs. It also aided them when stepping off. The extended design improved safety by making it difficult for hands to get caught at the point where the handrail disappears into the guide box.

Handrail ergonomics is an important measure of ride quality. Today, Otis employs rigorous engineering and quality control to ensure the precise synchronization of the step and handrail assemblies, improving both safety and comfort.



Steps and landings

Early escalators had wooden steps. Otis changed to cleat-type die-cast metal steps in the 1930s. Later, it introduced narrow-gauge step-type cleats. At the landing, the early comb prongs were 30–40 cm (12–16 in). Today, they are only 19 mm (3/4 in) long. Modern cleated risers are designed to prevent the pinching hazard when the steps move back into the platform at the top landings.

More recently, Otis introduced an innovative deflector device that features nylon bristles to gently guide passengers away from the gap between the skirt panel and the moving tread, adding a measurable degree of safety. Under-step lighting and directional markers were also added to the landings to alert passengers to the transition point.

Speeds

Many of the early escalator sales were made to major department stores, installed for the convenience of their customers. These escalators traveled at speeds that ranged from between 24–30 meters (80-100 ft) per minute. Otis standardized the rate to 27 meters (90 ft) per minute, fast enough to provide rapid travel from one level to another while still being leisurely enough for customers in a department store to survey the merchandise on the sales floor.

Today, most Otis escalators operate at a speed of 30 meters (100 ft) per minute. This is still slow enough to allow easy transition while serving the demand for rapid conveyance.

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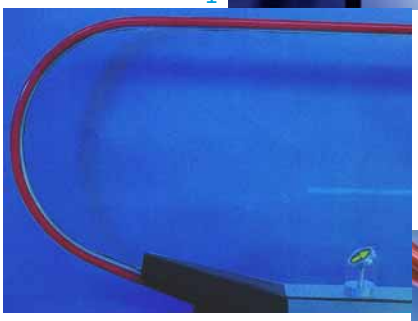

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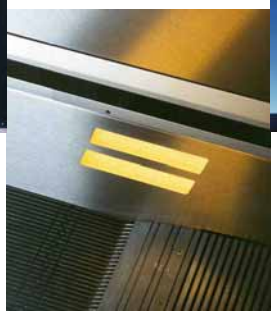

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1. Detail of modern handrail assembly
2. Glass balustrade showing extended handrail design
3. Tapered handrail entry box
4. Illuminated transition point
5. Lighted directional indicator
6. Deflector brushes

Safety, quality and reliability

Otis was founded on the principle of safety.

Today, Otis has one of the best safety records in the vertical transportation industry. The company works constantly to improve the safety of existing products and to implement new, safer technologies. Otis emphasizes a corporate policy of “safety first” and implements standardized procedures to ensure that every installation and service task is performed the safest way every time.

Otis products undergo stringent quality and safety testing to ensure the performance, safety and reliability of the entire line of products. We perform more than 20 advanced tests on every piece of Otis equipment, including tests that mimic worst-case operating conditions and ones that simulates the rough ride our products might have during the journey from Otis facilities to installation sites worldwide.

To ensure that its tradition of quality continues, Otis employs a rigorous Product Development Process (PDP) to guarantee that design and quality standards are met. Every new product receives its own “PASSPORT” to the marketplace. With PASSPORT, the entire team — from project managers to senior executives — signs off on product quality each step of the way. All major components are tested under the strict supervision of our engineers to ensure a 20-year life expectancy between overhauls. In most cases, each escalator is completely assembled and tested before it is permitted to leave the factory. PDP is another testament to our commitment to quality and safety.

Side view of escalator truss and step assembly

Handrail assembly procedure

The escalator today — an array of options

Otis wrote history with the introduction of the escalator in 1899. Today, it continues to improve the product through ongoing innovation.

Moving walks are widely used in integrated airport and metro transportation systems

Space-savings

Newer truss designs take up less space than previous systems. Increased standard rises of up to 10 meters (33 ft), versus an industry convention of 6 meters (20 ft), allow for multiple applications with the same look, without the need for costly custom design.

Modular design

A modular approach allows each installation to be tailored to meet specific architectural requirements. Balustrades and exterior cladding, ranging from conventionally painted metal to stainless steel and glass, can be fully customized to complement the design of any building. Lighting options provide a further means of expression to enhance the installation's overall look. The result is a streamlined appearance that can be incorporated more easily into a building's design scheme.

Ride quality

New handrail drive systems are aimed at providing a significant improvement in ride quality in terms of both vibration and noise. The relationship of handrail to tread speed is carefully calibrated to further improve ride quality. Noise and vibration levels are carefully monitored in a test chamber to ensure the smoothest, quietest ride possible. Enhanced noise reduction packages are used in extremely quiet applications.

Otis will continue to anticipate the future by focusing the resources of its worldwide research and development teams on the search for solutions as building technologies evolve and new issues emerge.

Escalator installation in X-configuration, particularly suited for mall and atrium settings