

# Future Today

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## **HOW SWITZERLAND OVERCAME THE STEEPEST MOUNTAIN**

Standing on the terrace of Hotel Bellevue high on Mount Pilatus, Eduard Locher's head was literally in the clouds. The engineer gazed down on the Swiss city of Lucerne and the lake below; whilst in his mind he imagined a way that he could help bring more people to this beautiful spot to boost the fledgling tourism industry in central Switzerland. The hiking and summit routes were well-trodden and favoured amongst the adventurous, but if only it was more accessible and perhaps even a bit more glamorous.

The year was 1871 and Locher and his brother had recently taken over the construction business their father had founded. Locher had been relentlessly talking about his idea to transport people to the top of Mount Pilatus, but his brother was growing weary of these discussions – "It's not possible! The mountain side is too steep", he would say. Locher never lost determination after these debates, but he soon realised that his experience and knowledge weren't enough. His brother was right; the mountain was too steep and the engineering and construction required would be unprecedented. So, at the age of 32, Locher went back to school to study bridge and railway construction at the newly founded University of Science and Technology in Zurich (ETH Zurich).

As he progressed through his studies, it became apparent he required help in the design and execution of his plan to bring Switzerland to the top of Mount Pilatus. In particular, he would need someone who could sell the idea to the decision-makers. Seeing as he couldn't even convince his brother, he would have to look elsewhere.

Soon afterwards he was introduced by friends to Eduard Guyer-Freuler and they were automatically drawn to each other's ideas. Guyer-Freuler was fascinated with Locher's vision and ambitious engineering goals. The idea was ripe, but it lacked a concrete strategy. Locher realised that Guyer-Freuler was exactly the type of person he was looking for; a colleague who could bring his idea to reality by executing a strategic plan and using calculations to innovate rather than relying on an overactive imagination. Locher and Guyer-Freuler also had what any innovator or entrepreneur need: the ability to work together in a structured way and the willingness to take risks.

Convinced of what they could accomplish together, the two began working closely to breathe life into their ideas. Locher set to work sketching plans for a high-tech creation the likes of which the world had not seen before. Whatever he created, it needed to travel over four kilometres up and down **a steep mountain side with a gradient of 48%** safely transporting passengers to and from Hotel Bellevue. All of his designs worked well... on paper! Guyer-Freuler was always quick to point out snags in Locher's creations, but never without a helpful suggestion of his own.

When the design was approved, the challenges did not end. The innovators soon had to overcome problems that were not visible in the drawings, not to mention the doubts and jokes of people around them who constantly reminded them that the risks were too great and that they were crazy to even try to build the contraption.

In addition to the mocking, logistical questions also arose. Contrary to the doubts of others, these questions led to answers that guided them to a unique solution:



**Two rails with a horizontal rack between them; the rack had teeth on each side, into which fitted the vertically aligned cogwheels.**

The design was very different from the conventional construction. This, Locher declared, would make it possible to master the steep gradient of the mountain while also preventing the car from toppling over! But what about the coal-powered train? How would the brakes work? One issue after another arose and Locher and Guyer-Freuler were faced with the reality of what it means to come up with something truly original.

Thanks to efficient teamwork, Locher and Guyer-Freuler had no shortage of optimism and met each challenge with an open mind to come up with solution after solution. But the conditions of the investors were at least as hard as technical on the mountain. If the work could not be completed by 15 June 1889, the two young entrepreneurs agreed to cover the entire cost themselves and for any additional day a fine of CHF 1'000 would also be due. An enormous risk given the unpredictability of the mountain and its treacherous weather.

On 29 March 1886 work began. Determination, optimism, a belief in accomplishing the unthinkable, and the daunting repercussions of the penalty drove them forward. And to everybody's astonishment, just 400 days later and 10 months before the deadline, the railway

track was complete! On August 17<sup>th</sup>, 1888, the Pilatus Train brought its first passengers up to the mountain. Locher and Guyer-Freuler – engineers and entrepreneurs – designed and built an innovation that remains in use today: the steepest cogwheel railway in the world with a gradient of up to 48% connecting Alpnachstad to the Pilatus Kulm in Switzerland.

Locher passed away in 1910, so he wasn't alive to see the transition from steam to electricity, but there is no doubt he would be proud of his creation's world-renowned reputation. We think his feelings about solid foundations would be in line with our own.

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