

Sōdayū Mining Tunnel

The Sado Island Gold Mine was once the largest gold mine in Japan. Over a span of nearly 400 years, the mine produced 78 metric tons of gold, an amount worth billions of US dollars today. By the time operations were halted in 1989, it had 400 kilometers of mine tunnels—enough to stretch from Sado to Tokyo.

The Sōdayū Mining Tunnel is one of the oldest parts of the mine. A 2-kilometer-long gold vein was discovered in Aikawa in 1596, triggering a gold rush that drew tens of thousands of miners and other workers to the island. Today, the mine tunnel has dioramas showing how the miners worked and lived.

Flood Prevention with Archimedean Screw Pumps

Keeping water out of the mine was a constant struggle. Workers extracted groundwater from the tunnels using screw pumps (also called “Archimedes screws”). The Greek philosopher Archimedes is credited with the invention of these pumps, and this crucial technology is thought to have been imported from Europe. The pumps were used at Sado Island Gold Mine starting in the mid-seventeenth century.

Screw pump operators were well paid, and many were recruited at a young age from surrounding farms. Although the large pumps improved the process of draining the tunnels, they could not be used in all parts of the mine. The mechanism behind the Archimedes screw did not function at extreme vertical angles, so in tight tunnels, flood fighters had to make do with buckets and pulleys.

Timberers: Holding Up the Mountain

Timberers performed a vital role. In addition to making supports to shore up the tunnels, they built wooden platforms, assembled water troughs, and created stepped inclines. They also built the simple wooden stepladders that were used to climb in and out of the mines. These ladders were made by cutting wedge-shaped steps into single logs.

The job of timbering was called *yamadome*, meaning “holding up the mountain.” Timberers had to be highly skilled to create sturdy supports that fit the rocky, uneven walls of the mine. Notice the helmets made from tightly twisted paper. This protective headgear was given to technical specialists such as timberers, but other workers had to go bareheaded.

Mine Management

Tasks such as carrying ore and tools, assisting senior miners, and filling oil lamps were carried out by apprentices. Still others worked under blacksmiths or assisted in shoring up the mine. Boys could become mine apprentices starting at age 15, and a special foreman was assigned to manage them. Other foremen were stationed at the mine entrances to monitor workers as they came and went. Their watchful eyes kept anyone from walking off with tools or gold, and their records served as the basis for calculating wages.

Ventilation and Lighting

Until the adoption of electric lighting, miners worked by the light of lamps, candles, or torches. The smoke and soot in the air often mixed with stone dust, making it difficult to breathe. To counteract this, a ventilation tunnel was added to circulate fresh air. Some tunnels were even fitted with hand-cranked extraction fans modeled after the rotary blades in rice-threshing machines.

A range of different fuels were used over the mine's centuries of history, including pine resin, vegetable oil, and fish oil. The fuel was burned in iron-handled lamps that could be carried or hung from hooks on the walls. In other cases, miners carried torches wrapped in thinly shaved cypress bark and soaked in oil.

Mining Specialists: Work and Play

The gold ore was excavated by skilled specialists called *kanahori-daiku*. They worked short, four-hour shifts in groups of two or three and took meal breaks in the tunnels. These important workers were paid especially well, and they were known as big spenders who wore the latest fashions and hair styles from the faraway capital of Edo.

It is said that the *kanahori-daiku* contributed to the origin of a local folk dance called *ondeko*, or "deity drumming." Nineteenth-century records of the Aikawa festival recount that the miners donned masks and beat their *taiko* drums as if they were striking their chisels with hammers. A version of this performance is held each year in mid-October.

Drainage Workers

By the mid-eighteenth century, the mine tunnels stretched deep into the earth. The scale of the operation made screw pumps prohibitively expensive, so groundwater had to be removed using buckets. Beginning around 1778, the government in Edo began rounding up refugees and vagrants in urban areas and sending them to perform this drainage work. They were

provided with wages as well as food, clothing, and lodging, and after a set period, they were allowed to return home or settle permanently on the island.

In total, some 1,900 people were sent to Sado to work draining the mine tunnels. Of these, 28 were killed in 1853, when a fire broke out in the mine. A memorial service for them is held each April.