

## 400 years of the Ashio Copper Mine

—Recommendation for preservation of industrial heritage and tourism for visiting ruins—

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It seems that scrap-and-build is the method and approach that Japanese people do best. This was the driving force for economic growth in Japan. However, this does not mean that we can completely knock down the positive and negative heritage of the past and forget about it all together. The present world is built on the past, and the future is built on the present. Civilizations and cultures which neglect history and only think about current benefits will not be respected by other nations.

Therefore, we the Japanese people should give more serious consideration to the preservation of our industrial heritage.

### The driving force for the promotion of new industry

Driving to the South from Kiyotaki in Nikko, then going through the Nissoku Tunnel which has a total length of 2,765 meters and then driving down a bendy and steep slope takes you to Ashio-machi. The largest copper mining district in Japan used to flourish around the Ashio Copper Mine in this town. Over 40,000 people used to live in the district at the height of its prosperity. The population is now down to 3,000. Only deserted streets and the wreckage of the facilities remain now.

The smelter, which ordinary people consider the symbol of copper production, was being demolished. Standing on a road along the Watarase River, one can see on the other side of the river the demolition work which is taking place over several hundred meters along the river.

Roofs and walls of large and small buildings are torn, peeled off and large holes are showing. Exposed steel frames, spherical tanks and many thick pipes for channeling exhaust have all become weathered and rusty with the paint peeling off. A tall brick stack is standing at the end of the compound. Although they are ruins, they look as if they are alive.

The Ashio Copper Mine was discovered 400 years ago (1610). 1,300-1,500 tons of copper were produced annually until the beginning of the 1700s, with one fifth of the production being exported from Nagasaki. However, production dropped to about 100 tons per year at the end of the Edo Period (1603-1868). It was after 1877 when Ichibee Furukawa started to manage the mine with the help of Eiichi Shibusawa and others that the mine flourished again. Immense veins were discovered four years after Furukawa had launched his business.

Since then, the Ashio Copper Mine has played a central role in the rapid economic growth under capitalism in Japan. It was a driving force in the New Industry Development (“Shokusan Kogyo”) promoted by the Meiji Government.

Production increased steadily and the annual production reached over 6,000 tons from 1887 onwards.

World demand for copper was growing rapidly. Copper was traded at high prices for the electric, communications and arms

industries (copper alloys were essential for shell heads). It may be hard to believe now, but copper was the second largest export from Japan after raw silk and silk products and it was a precious and major source of foreign currency. In the 1890s, the copper which was produced in the Ashio Copper Mine (the top producer in the country) as well as the Besshi and Hitachi Copper Mines accounted for 5-7% of the total exports of copper in the world.

### The introduction of cutting-edge technology

Cutting-edge technology for mine development supported the growth of Ashio. Typical facilities, equipment and tools which remind us of the past prosperity still remain, including the following.

Firstly, there is a rock drill which drilled holes for setting dynamite along the veins and blasted them. It was an essential tool for improving mining efficiency. The tool was introduced in 1884, but imported rock drills were expensive, large and heavy. Therefore, Michinosuke Kawarazaki, head of the operation division at Ashio, developed a small and light rock drill suitable for Japanese people's body sizes. The imported tool was improved and modified domestically. The improved rock drill was popularized in Japan and also exported overseas. The Japanese manufacturing culture was established in this period.

Secondly, a hydroelectric power plant was constructed for the first time in Japan. The plant was completed in 1890. Power was generated using four 100-horsepower Pelton wheels and the electricity was used for powering pumps for removing water from the mine, ventilators for the smelter, the dressing plant, trains, electric lamps, etc. The technology shifted from man power to steam generated by wood-fired boilers and from steam to electricity generated by a hydroelectric power plant. The hydroelectric power plant was introduced at the mine only eight years after the world's first hydroelectric power plant was constructed in the US. The electrification of Ashio progressed rapidly after the construction of the plant and by 1897, 1,723 electric lamps and 35 arc lamps illuminated the Ashio night. Electric railways were extended to 12 km and the total length of telephone lines reached 175 km.

Hydroelectric power generation offered an incubator for new human resources and new companies. The market for electrical machinery, electric power and communications expanded. Many companies in this field were established in association with Furukawa Mining Company, including Furukawa Electric Co., Ltd., Fuji Electric Manufacturing Co., Ltd. and Fuji Tsushinki Manufacturing Co., Ltd, and they then produced a large number of human resources who later played important roles in Fujitsu, Toshiba, Hitachi and Sony.

Thirdly, mechanical dressing was introduced at Ashio. Flota-



The smelter being demolished, viewed from the Ryuzoji Temple on the other side of the Watarase River (Autumn 2009). Many of the people involved with Ashio are laid to rest in the graveyard at the Ryuzoji Temple. And now, June in 2010, the demolition is almost over.

tion was used at the still-existing Tsudo dressing plant from around 1920. In the flotation process, ore is pulverized to fine powder, mixed with oil and capturing agents and air is blown in to create foam. Refined copper ore is absorbed on the surface of the foam and it is then collected. Flotation, which is still the most advanced technology for ore dressing today, spread from the Ashio Copper Mine to the rest of Japan.

Fourthly, there is a Bessemer converter. This is a key technology in the smelting process, which was introduced at Ashio in 1893 obviously for the first time in Japan.

Monnosuke Shiono, who learned about smelting in France, was dispatched to the US to purchase the first Bessemer converter unit. High pressure air is blown into a revolving furnace to remove impurities and obtain the refined copper. The process which originally took 32 days was shortened to just two days. The performance of the converter was revolutionary.

There was also a negative side to the prosperity at Ashio: mineral pollution which affected 300,000 farmers downstream of the Watarase River. The Watarase Retarding Basin located some 100 km downstream of Ashio used to be Yanaka-mura village, where a farmers' fierce opposition campaign led by Shozo Tanaka took place. The campaign was oppressed by the government, the people were forcibly removed and the village became deserted. Only traces of the negative incident can be found today. However, the impact of environmental destruction caused by the Ashio Copper Mine deforestation activities and the smoke pollution from the mine still exists as if it was recent devastation.

In 1897, large-scale construction work for pollution prevention took place in Ashio. The project was completed in about 150 days by throwing a large number of human resources into the work, which included the construction of a settling basin for removing poisonous metals from wastewater, an erosion control dam for preventing tailing piles from collapsing and a desulfurization tower for removing sulfur dioxide from flue gases. The desulfurization system had no effect whatsoever due to the immature technology, but other measures were effective to a certain extent. The remains of the large-scale construction work for pollution prevention still exist in good condition.

### The demolition of the Ashio smelter

After the Second World War, in 1973, the Ashio Copper Mine closed down due to the exhaustion of the copper ore deposits. The smelter stopped operating in 1989. Since then, the facilities including the smelter were left derelict for 20 years, but the demolition finally started.

The Ashio Copper Mine has a negative history as well as a positive history. This is why this cultural heritage is worth protecting and passing down to future generations. It is important to pass down cultural heritage, but more than that, they are surely useful.

One cannot put back the clock. Demolished heritage cannot be restored. Once it has vanished, it is all over. Even if a building can be reconstructed, or part of a converter can be preserved, they would be the same as objects in a museum display case. They are no longer heritage. Heritage should be preserved in totality and not in parts.

Why can precious industrial heritage not be preserved?

Under the current rules, the preservation of the Ashio Copper Mine as a heritage site means that Furukawa Co., Ltd., which took over the copper mine management, would be responsible for the task. Therefore, the company would need to pay for the preservation and safety controls for years to come. It would be reasonable to say that leaving the task of preserving cultural heritage to one company is rather unrealistic.

Under the Mining Act, businesses are required to restore the natural environment after the closing down of a mine. Municipalities downstream are also strongly requesting the dismantling of the facilities as soon as possible. It is understandable that they want to see the final closure of the former pollution source. New pollution disasters are also being pointed out. There is also a concern that metals and dioxins which are likely to exist in the compound may flow into the Watarase River and affect water usage downstream. It is perhaps impossible to leave the responsibility to a company in the case of such an emergency. In short, rules for preserving industrial heritage do not exist in Japan.

It is a pity that we let the heritage of the Ashio Copper Mine disappear. The national government, a local government, an NPO or the superrich would come forward and protect such heritage in a developed country. The protection of industrial heritage should have a positive contribution to the revitalization of local economies including tourism for visiting ruins, as well as helping people to learn lessons.

It is mortifying that there is nothing we can do to stop the dismantling of the heritage. This situation should not go on unchanged by any possibility.

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