

Prologue

Akira Yamada, Founder of Daikin Industries

Daikin was established in 1924 in Osaka, one of Japan's oldest commercial centers. The company's Head Office is still located there today.

Osaka Castle was built in the center of Osaka in the late sixteenth century, and afterward traders steadily set up business quarters there. The city's early development was thus as a commercial center. By the mid-seventeenth century, however, after Japan emerged as the world's leading copper producer, Osaka became an industrial center. In line with the feudal Tokugawa government's policy, all the copper mined and refined in Japan was transported to Osaka for smelting and casting. Most of the finished copper was then shipped to Chinese and Dutch traders



*Akira Yamada as Young Engineer
in Osaka Artillery Arsenal*

in Nagasaki for export to China and Europe. In that process, Osaka became Japan's center for technology related to the smelting, casting, and processing of copper.

Daikin's founder, Akira Yamada, began his professional career as an engineer in the Osaka Artillery Arsenal (OAA). That was in 1870, just two years after the Meiji Restoration. The Japanese Army had established the Army Materiel Command (AMC) in Osaka because of the high level of metalworking technology available there. They later changed that name to the Osaka Artillery Arsenal (OAA). As a government-operated company, the OAA produced artillery shells, bullet casings, and other items for the Army. During the Sino-Japanese War of 1894-95, the OAA also began producing aluminum products, thus making it a pioneer in Japan's aluminum industry. The next opportunity for the Japanese military to improve its equipment substantially was during the Russo-Japanese War of 1904-05. One improvement was changing the color of field cookware from black to brown. Unknowingly, however, the brown paint used contained arsenic sulfide, a toxic substance, and after the oversight was pointed out, the military ordered the OAA to develop a non-toxic brown paint for the cookware. The OAA invested a full year of research into the project but still did not succeed in developing a usable paint.

After graduating in 1908 from the Technological School of

Kokura in Kyushu, Akira Yamada, the founder of Daikin, served a year in the Army before joining the OAA in 1909 as an engineer. He was 24 years old. At that point, about 18 months had passed since the OAA had begun research into a non-toxic brown paint for the Army cookware. Yamada's entry into the OAA thus coincided with that ongoing internal research. That particular research was outside Yamada's special field of metal engineering, but he became interested when he learned about the problem, and on his own he conducted research into paints that might be used with the cookware. He eventually located a non-toxic paint at a pharmaceutical wholesaler in Osaka that did not change color during the baking/coating process. After he told his manager about the paint he located, the company decided to use the paint for the cookware. Yamada's success at that time was due largely to his enthusiasm as an engineer in tackling a technical difficulty outside his special field of expertise. He faced the cookware problem head on and to solve it he conducted steady basic research apart from his special field. From that experience he learned that if a person conducts the necessary research with clear goals and a wide vision, it is possible to challenge problems successfully even in a new field and to gain increased personal confidence.

Yamada was later transferred to the Cartridge Case Factory inside the OAA. There he analyzed the production processes and established prices for components based on the number of processes it took to produce them. Concerning the drawing process of the cartridge cases as well, Yamada assembled data related to the tensile strength and expansion ratio of brass, and then personally designed the tools he would use. Japan at the time still did not use scientific process control and was incapable of engineering tool designs. Yamada thus introduced various innovations based on his original thinking. He changed the OAA's work processes, in-

roducing a more scientific approach to the areas the foremen were in charge of, thus greatly increasing workplace productivity. His superiors eventually recognized his abilities and in 1918, his ninth year in the OAA and while still only 33 years old, he was appointed the first civilian manager of the Cartridge Case Plant.

While working in the OAA, Yamada met General Manager Tsunesaburo Matsui a man destined to influence him immensely throughout his life. Matsui eventually left the OAA to participate in founding the wrought copper company Osaka Shindosho Limited Partnership. He also became one of its directors. Yamada, meanwhile, sensing his small chance of rising any higher in the OAA because he had not graduated from a prestigious university, decided to leave the OAA and join Osaka Shindosho. Not long afterward, Osaka Shindosho merged with Toyo Yasuri to form Toyo Yasuri Shindo (TYS) Co., Ltd. The new company was expanding its business when Yamada joined it in 1919. One year later he was appointed plant manager, his first major step to a higher level of responsibility. His new position let him once again work with Tsunesaburo Matsui, the person who knew Yamada best, starting from his years in the OAA, and who Yamada totally respected and trusted. Later in life, Yamada referred directly to Matsui when he said, "Life depends to a great extent on special persons you happen to meet." Throughout the rest of his life, Yamada referred to Matsui as the person to whom he owed the most.

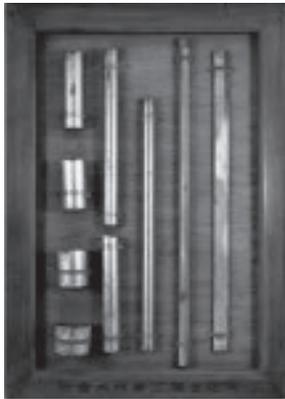
Three mottoes marked Akira Yamada's managerial philosophy: "make bold decisions", "identify clear solutions", and "act with all one's heart". Two of his bold decisions were his above-mentioned personal research into a lead chromate paint that did not change color in the baking/coating process, and his decision to leave the OAA and enter TYS. Those two decisions succeeded in opening a new path in life for Yamada, and showed how in his



Tsunesaburo Matsui

scientific approach toward managing work processes he identified clear solutions before initiating action.

Even afterward, Yamada continued making bold decisions. In 1923, for example, Nakajima Aircraft asked TYS to produce radiator tubes for use with aircraft. Japan was a member of the Entente (Allied) Powers during the First World War, and one of its most important national goals at the time was the domestic production of aircraft. Nakajima Aircraft was aware of TYS's copper processing technology for producing radiators to cool aircraft engines, and it wanted to have the radiators produced domestically. TYS faced a business crisis at the time, however, and hesitated to accept the order from Nakajima Aircraft because the radiator business would almost certainly end up in the red. Yamada had personal confidence in the company's technology, however, and in the end the company accepted the order from Nakajima Aircraft and Yamada accepted personal responsibility for the results. He then rented a vacant factory in the Namba section of Osaka and began preparing a prototype radiator using equipment he personally designed. Although he initially produced many defective products in the design process, and production costs soared, Yamada persisted, personally bearing losses in the process before completing the order. Years later he admitted that the losses reached 2.5 times his annual income. Despite the losses, however,



Radiator Tube Production Process

Yamada persisted in his development efforts together with seven employees. He thus acted “with his whole heart,” and in the development process he earned the solid trust of those around him.

In January 1924, on the occasion of winning a second order for radiator tubes from Nakajima Aircraft, Yamada left TYS. He independently established his own company, Osaka Kinzoku Kogyosho Limited Partnership (OKK) on October 25, 1924. He kept the company, the forerunner of today’s Daikin Industries, in Namba. It was capitalized at 15,000 yen and had 15 employees, including Yamada. Its business aims were the manufacture and sale of aircraft components, the pressing and drawing of metals, electroplating, and the machining of various types of precision metal parts. Although Namba is one of the largest entertainment areas in modern-day Osaka, in the 1920s it was still in the outskirts of the city and many small manufacturers had production facilities there. Yamada had his back to the wall, and decided to invest all his assets in his own business, an example of his ability to accept risk and act boldly.

The Treaty of Versailles, signed in June 1919, marked the official end of the First World War. From the following year, Japan

experienced a reactionary economic downturn. It faced intensified competition with Western companies as well, and generally suffered from chronic economic depression. A little over three years later, on September 1, 1923, the Great Kanto Earthquake struck Tokyo. Osaka was not directly affected by the earthquake, but suffered seriously from the economic aftereffects. Yamada established OKK in Osaka less than four months later, in January 1924. Although the earthquake mainly affected the Tokyo-Yokohama area, its negative effect on the general Japanese economy caused Yamada’s business to be in continuous deficit. Reduced naval spending related to the Washington Treaty also negatively affected his business. The general environment for increased military spending, therefore, was not favorable. Yamada made it safely through this difficult period mainly because he benefitted from the enthusiastic support of persons he had known since his days with TYS. At the time, moreover, radiator tubes were increasingly used in aircraft, and were considered to be one of the world’s most technically advanced military products. From those beginnings, and except for occasional business slumps, Yamada’s company continually received orders from aircraft manufacturers for radiator tubes for 21 years, until the end of the Second World War in August 1945. Those orders contributed greatly toward bolstering OKK’s managerial foundation.

After Tsunesaburo Matsui, who had done so much for Yamada, retired from TYS, he worked in China to oversee construction of the Mukden (today’s Shenyang) Military Arsenal. Based on Matsui’s recommendation, the Arsenal requested OKK to develop a quick-igniting fuse. Yamada accepted the order, and OKK’s resultant product was highly praised, reflecting well on the company and leading to increased business. Orders from the military were uneven, however, making it difficult to predict changes in

work volumes. For that reason, Yamada introduced steps to increase orders for drawing products from the civilian sector. And to process those products, he introduced stamp forging technology in OAA to manufacture cartridge cases. It was unusual at the time for a private company to be utilizing such advanced technology. Using the same technology, OKK also received orders from the private sector for items such as plugs for oxygen and nitrogen tanks, and from the Japanese Navy for high-pressure processed parts used aboard ships. The company also received orders for processing a wide variety of drawing products, while concurrently improving its profitability.

After Yamada heard that the Japanese military was placing orders for weapons production with private-sector companies, he had OKK also begin producing weapons from 1929. Yamada was highly trusted personally inside the OAA, and OKK had earned a fine reputation for its advanced technology. Therefore, although OKK was a private company, it succeeded in winning an order from the Army Arsenal for cartridge cases. From late 1929, meanwhile, a severe economic depression—later called the Great Depression—struck the U.S. first and then other countries around the world. It lasted for ten years. The Japanese economy began feeling its effects from early 1930. Just prior to those events OKK was fortunate in having obtained a steady flow of new work through a dependable military route that contributed greatly to the company's growth.

That new work included increased orders from the Navy. In 1929, meanwhile, OKK successfully reproduced an automatic fuel delivery system originally made by Bosch of Germany for ship engines. OKK called the product a "Rational Lubricator(s)." By that time Osaka had developed industrially and was being called the "Manchester of the Orient." A wide variety of small and



"Rational Lubricator(s)"

medium-size companies located their facilities there, including companies in the metal and machine processing industries. OKK collaborated with some of those companies by having them specialize in processing parts while OKK itself assembled products and conducted final inspections. In those ways, OKK expanded and developed its business further.

By 1928, OKK had doubled in size to 30 employees. In the process of growth the Namba Factory had served the company well but it had no room for expansion. At that point, in May 1928, Yamada moved all the company's facilities and equipment to the new Imamiya Factory, which had ten times the space of the Namba Factory. OKK received the order from the Army Arsenal for cartridge cases a year later, in 1929, and progressively monopolized all Army orders for those cartridge cases. As order volumes increased, moreover, the company raised its prices, and the profitability of that business improved substantially. The company steadily enhanced its equipment and was gradually able to supply the Army with highly precise fuses. OKK later used the superior technology it accumulated related to developing those fuses to provide similar products to the U.S. military forces stationed in postwar Japan.

From around this same time, companies in the private sector in Japan began requesting OKK to develop various new products.



No. 1 Imamiya Factory

They included newspaper companies, printing plants, and paint factories, where much oil mist is generated. OKK developed and sold the SS-type fire extinguisher and carbon dioxide fire extinguishers. After that business expanded, however, the person in OKK most responsible for developing the carbon dioxide extinguishers broke faith with Yamada. He and some followers left OKK to sell the products independently, taking away OKK customers. Yamada and several of OKK's directors visited all the customers who purchased the fire extinguishers and explained the situation to them. As a result, he recovered that business, and safely managed his way through the crisis. Based on that experience, Yamada felt a serious need not only to bolster OKK's internal organization and to educate its employees, but also to build strong relationships of trust between OKK and its customers. The company thus made renewed efforts to modernize its management practices and to strengthen the bonds with its customers.

In June 1934, OKK completed construction of its Imamiya No. 2 Factory. The company made special efforts to bolster the new factory's equipment and machinery and to strengthen its inspection processes. It also pressed its outside suppliers to modernize and augment their own production equipment, supporting them



Solid-ring Type Bobbin (left) and Wire-ring Type Bobbin (right)



Warp Tying Machine

by providing both financing and technical guidance. As its business expanded, OKK came to be called the "No. 1 machine shop in Osaka." "Machine shop" was a term used locally for any company that used lathes produced machinery and equipment. Around this same time, Toyo Cotton Spinning Co. (TCS), Japan's largest spinning company, approached OKK for assistance in automating its cotton weaving machines. Specifically, it wanted OKK to develop a solid-ring type bobbin for winding weft. The request was important in order for OKK to develop demand in the private sector. If successful, the business could be expanded afterward into the production of parts for spinning and weaving machines. The solid-ring type bobbin that OKK produced at that time performed surprisingly well, and as promised TCS came through with large orders to OKK for producing solid-ring type bobbins. That solid-ring type became one of OKK's mainstay products, ranked with radiator tubes and instantaneous explosion fuses. Also, based on introductions from TCS, OKK received orders for extruder pumps—used for melt spinning machines—and bobbins used for rayon weaving machines. Further, based on a recommendation from TCS, OKK tackled the production of a warp tying machine. The machine it developed was less expensive than im-

ported machines, performed just as well, and delivery time was much shorter. OKK sold these machines not only to TCS but also to Nittobo, Naigai Menka, Toyo Rayon, and other rayon and spinning companies, and expanded its sales routes to include mainland China. As OKK's business expanded, Yamada reminded himself of the old saying that "Trust is an important asset that cannot be replaced by anything else."

The make-up of OKK's sales for 1932-33 included non-military products 25 percent; products for spinning and weaving machines, 11 percent; and "Rational Lubricator(s)", 10 percent. From 1930, when signs of a wartime order in Japan strengthened, the overall percentage of products to satisfy wartime demand, such as cartridge cases, bullets, and fuses, rose rapidly. Yamada was already thinking that OKK should begin preparing early for a period of postwar peace, and began making efforts to develop products for use in peacetime. In the background to the success of those preparations was OKK's technical capability to produce its own machinery and equipment. Initially, OKK purchased second-hand lathes, presses, and other equipment. OKK personnel disassembled those products and then rebuilt them to fit the requirements of OKK's processing lines. OKK also built specialized equipment in-house, adding various innovations to make the equipment more useful. Based on the accumulation of such technology, OKK was able to build most of the equipment it needed in-house.

Being able to fabricate equipment in-house was helpful during the war, a time when purchasing machinery anywhere was almost impossible. The idea of designing needed equipment in-house thus became part of Daikin's approach to technology. That thinking was seen years later in the company's efforts to develop new technology and new products. President Yamada

viewed the main aspects of business strategy—research, and diffusion—much like the wheels of a vehicle. "If research is successful," he said, "something new will be born. And whether that new something lives on or dies depends on the efforts made to spread its use." Basic to Yamada's research and its diffusion was a deep compilation of mechanical engineering technology. That basic technology continuously supported Daikin. In particular, Daikin's founder Akira Yamada established the tradition of always challenging new technology and sharing business difficulties with those inside the company. He also enjoyed the support of those outside the company with whom the company had business ties. That managerial stance of taking care of people inside the company, while people outside supported the company, was realized during the long period that Yamada was at Daikin's helm.