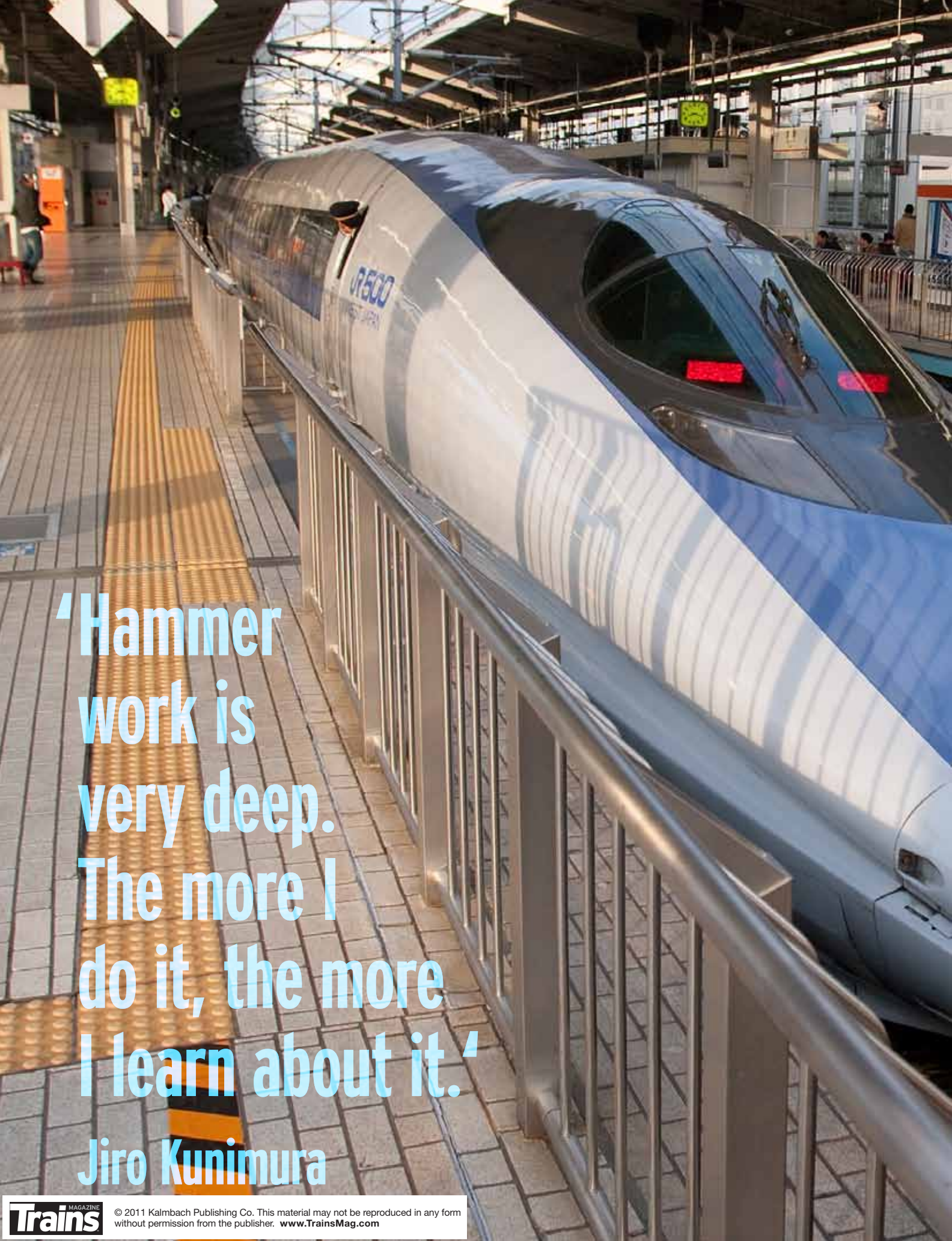
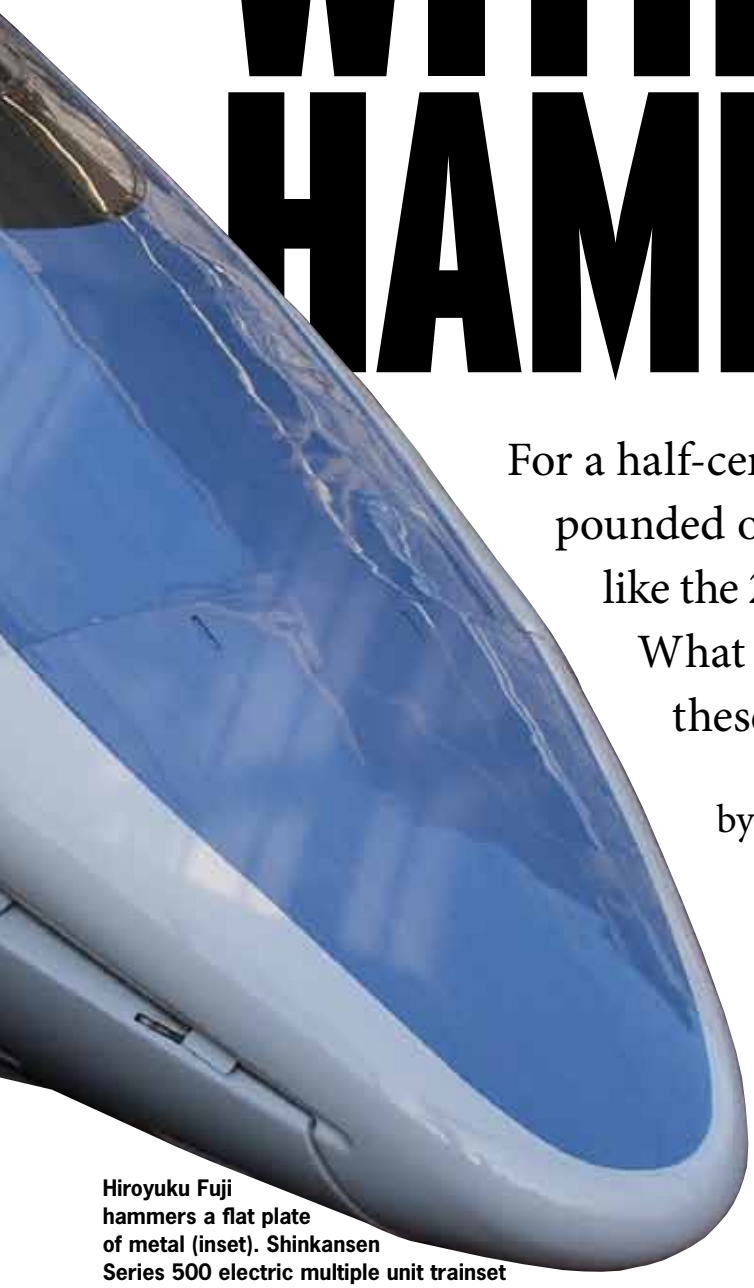


Building the world's fastest trains... WITH HAMMERS

For a half-century, Japanese craftsmen have pounded out the nose cones for trains like the 200-mph Shinkansen. What happens when these experts retire?

by Joseph Coleman



Hiroyuku Fuji hammers a flat plate of metal (inset). Shinkansen Series 500 electric multiple unit trainset rests at Kyoto, Japan. Inset, Joseph Coleman; Scott Lothes

For nearly 50 years, Jiro Kunimura has been crafting the nose cones of Japan's high speed "Shinkansen" trains. He and his co-workers fashioned the bullet face of the Series 0 model that debuted just before the Tokyo Summer Olympics in 1964. Now he's working on the new E5, a sleek machine that flies along the rails at 200 mph.

The work is high-tech and precise. But Kunimura's tool of choice is hardly delicate; he uses a hammer.

"The nose cones can't be mass produced — this is a job that can only be done by hand," says Kunimura, 66, who has been working since 1963 at the sheet-metal company Yamashita Kogyosho, in the southwestern Japanese city of Kudamatsu. "Hammer work is very deep. The more I do it, the more I learn about it."

Craftsman Jiro Kunimura holds a sheet of aluminum that he hammered into shape for use in a Japanese bullet train.

Craftsman Susumu Okada works on the cockpit of a bullet train at the Yamashita Kogyosho factory in Kudamatsu, Japan, on June 24, 2010. Workers swing their hammers in short, rhythmic strokes to soften, stretch, and mold the aluminum. Two photos, Joseph Coleman

The combination of the most primitive of tools with the trains' cutting-edge technology is surprising, but it's hard to argue with the technique's staying power. Yamashita Kogyosho, considered the only company still using this method to make train parts, has built about 30 percent of the bullet train noses on the rails in Japan today. People from around the world respect these trains for their speed, efficiency, and sparkling safety record.

One key to the company's survival is right across the street: Hitachi Ltd. This premier Japanese manufacturer has a train-making shop that can be seen from Yamashita's parking lot. A private Hitachi service road ends at the sheet-metal company's doorstep. Yamashita does 90 percent of its business with Hitachi, one of the two largest Shinkansen producers in Japan (the other being Kawasaki Heavy Industries).

The endurance of the manual hammering method, however, is testament to the quirks of history, the unique nature of Japanese train manufacturing, and the skill of the company's craftsmen.

The hammering technique (called "uchi-dashi bankin" in Japanese) first came to Kudamatsu in the 1950s, when a group of craftsmen who perfected it while working on car bodies in postwar Hiroshima arrived to help Hitachi with a train project. When the contract ended, the original hammer men went back to Hiroshima. However, one young protégé, autoshop worker Kiyoto Yamashita, had learned the technique well, and he used it to build his reputation as a master craftsman.

In the early '60s, Yamashita got his big break. Hitachi hired him to use his odd method to fashion the nose cone of a Shinkansen prototype. As more contracts for hammer work came his way, he called together a team of workers that included Kunimura and another colleague, Hiroyuku Fuji. Thus, Yamashita Kogyosho was born.

"Back then, we didn't have any machines, so we had to work with hammers," says Fuji, who at 66 still works part-time with Yamashita as a technical advisor and craftsman.

Kunimura has used the hammering technique "uchi-dashi bankin" to make the nose cones for the past 50 years at Yamashita Kogyosho. Yamashita Kogyosho collection

'In golf, maybe you get old and you're not good anymore,' he says. 'But that

One of the company's first craftsmen, Hiroyuku Fuji crafts a hammer-made magnesium violin to show at schools to get young people interested in the craft and ultimately build the company's workforce, which is aging rapidly. Two photos, Yamashita Kogyosho collection

The shop crew, including Kiyoto Yamashita (center), Hiroyuku Fuji (left), and Jiro Kunimura (right) pose for a picture.

The production methods of the early '60s look primitive to modern eyes. Yamashita and his team took specifications from Hitachi designers and built a wooden frame in the shape of the train. Then workers laid huge sheets of aluminum over it and hammered them into shape. Workers, some wearing traditional Japanese wooden clogs, used ladders to climb on top of the 12-foot-tall model to mold the metal.

The hammering method managed to survive the onslaught of late 20th century technology. Of course, some elements have changed. These days Yamashita's 34 employees use steel frames, and they can work with smaller sheets of metal and then weld them together, rather than using huge pieces like in the old days. Back in the '60s, a single nose cone could take workers three months to make. Now it takes two weeks.

But some aspects have stayed the same. For one, unlike many European trains, Japanese bullet train manufacturers prefer hard, lightweight aluminum alloys over thick, heavy plastics for their train bodies, meaning plastics workers have not replaced Yamashita's crew. Lighter trains run on less energy, and their pointed ends run quietly through the mountainous country's many tunnels and heavily populated areas.

Yamashita also has another factor on its side: Machines can't beat humans at this job. Manufacturers have failed so far to come up with a more efficient way of making nose cones, company officials say. Since the number of cones needed for any model is limited, they don't need to be mass-produced. Tatsuto Yamashita, who took the helm of the company from his ailing father in 2007, says that while cones can be made with machines that shave thick slabs of metal into shape, the process wastes so much metal that it's cheaper and quicker to just hammer them.

"If they asked for 10,000 nose cones, then the price of each one would be low," he says of mechanized methods. "But for each cone design, they say they only need about 60 of them. So making a mechanical press to produce them isn't justifiable."

The staying power of the technique, however, comes down to the skill of workers like Fuji, who demonstrated his ability for a visitor by hammering a flat plate of metal into a perfectly symmetrical bowl in about a minute.

While one typically associates hammering with brawn, the men at Yamashita say it depends more on years of mastering the pounding technique. The workers swing their hammers in short, rhythmic strokes, using the hammer head to soften, stretch, and mold the aluminum. They pound the sheets either on a block of iron or place them directly on the frames and tap them into shape. Fuji says the emphasis on precision rather than muscle is why he and Kunimura have managed to work well into their 60s.

"In golf, maybe you get old and you're not good anymore," he says. "But that doesn't happen with hammering, because you don't need that much strength."

Still, time is running out. The core of the company's workforce is aging rapidly, and the younger Yamashita has gone on a campaign to publicize the hammering skill to draw young trainees. Fuji, for instance, has been crafting hammer-made magnesium violins and cellos, and the staff makes presentations at public and vocational schools. Yamashita hired two people in 2010.

"I tell the newcomers this is going to take 10 years," he says. "It's only the people who really want to get good at this who can make it." ⊥

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