

Lexus Master Craftsmen Blend Old-World Traditions And Advanced Technologies on the Lexus LS

Master Craftsmen, a classification of skilled, highly trained workers almost completely eliminated by the rise of mass production, once again are making their presence felt in the automotive industry. They are the people entrusted with putting the final polish of quality and excellence on the redesigned Lexus LS600h L, LS460 and LS460L.

Once upon a time, Master Craftsmen personified a valued old-world tradition that ensured quality and workmanship. Because this tradition consisted of masters and apprentices, it also guaranteed that the skills involved in craftsmanship would be passed from generation to generation. However, in all but a few factories, the pace of the assembly line and the insistence of speed over excellence and quality almost completely eliminated Master Craftsmen from the automotive business.

The tradition of master craftsmanship was well developed in Japan, where such people are called *takumi*. These were the artisans largely responsible for Japan's unique manufacturing culture. Chosen from a select group of individuals who possess the needed combination of production experience, sensory evaluation expertise and management skills, they apply themselves with the same focus and determination that local craftsmen have devoted to their work for generations.

So it is that valuable old tradition of quality, craftsmanship and specialized training has been given new life in a place where it never completely faded away. A group of 10 of these skilled, highly trained and highly specialized workmen comprise the key ingredient to the stunning levels of quality found in the newest generation Lexus LS.



The tradition of craftsmanship has a special place of honor at Toyota's Tahara plant in Japan, where the Lexus LS is built. Tahara is a special place because it's the most awarded and recognized plant in the Toyota/Lexus firmament. But the craftsmen there were challenged to do an even better job than they were doing. They were challenged to become "takumi," or Master Craftsmen.

Under the Master Craftsman program in place at the Tahara plant, each of the 10 areas has one master engineer who performs his job better, more skillfully and more artfully than anyone else does. He's asked to develop other engineers, to create standards and measurements that will not only insure that the cars built under his watchful eye meet Lexus' expectations of and requirements for quality, but equally important, also to insure that his skills and his art will be passed on to younger workers who can carry forward the tradition of craftsmanship and quality.

At the Tahara plant each Master Craftsman is the top expert in his field. Rather than reminding one of the days when violins, for instance, were carefully and lovingly built individually by hand labor, the names of those fields reflect today's reality of automotive design and construction. The 10 are involved in the design and assembly of the LS 600h L. The areas they oversee are Engine Casting, Engine Machining, Engine Assembly, Plastics Moldings, Plastics Painting, Vehicle Assembly, Body Painting, Welding, Stamping and Final Inspection/Quality Control.

Together, these *takumi* guide every stage of the production process, adding refined touches and a deep sensitivity culled from years of experience. Their keen observations and subtle manipulations of activities are not merely a glossy finish. They are deeply embedded in the entire process from the development stages of the LS to final production, even down to refining the production technology itself.

Master Craftsmen were added to the build procedure of the all-new LS as a result of an ongoing desire by Lexus officials to continue to improve upon the already impressive build quality of prior LS models. The plan was to take that build quality even further, in some cases, cutting already close tolerances in half.

The selection process for these Master Craftsmen was careful and rigorous. Each of them not only had to be at the very top of his field in terms of skill, but he also had to possess excellent management and training abilities.

Six months before production was scheduled to begin, the Master Craftsmen were selected for each of the 10 production areas. They were given extensive instruction and education about the idea of quality, which was redefined to not only be quantitative, but also qualitative, so that it can be both felt and sensed.

Each Master Craftsman is tasked with innovating new methods for achieving higher levels of quality within his area of expertise. To achieve this goal, he works with two assistant master craftsmen, who report to him. These two are in charge of the craftsmen for each area and are responsible not only for implementing the new processes that the Master Craftsman develops, but they also train the employees that will be working directly on the line.

Early on in the development of this process, two challenges were identified: Engineering required tightened tolerances and higher standards, and manufacturing required new human skills and equipment to attain these goals.

For example, although the LS600hL is a mass-production vehicle, plant officials arranged for one of the best, most renowned car painters to paint a new LS by hand to illustrate what can be achieved when the highest levels of quality are all that are acceptable. As a result, the finishing touches on each LS models' exterior paint are also done by hand.

In this way, each Master Craftsman and his team was made aware of the targets in his own area and the gap in quality that was evident between this target and current levels. The Master Craftsmen also needed to devise an educational plan (both training, and tools and equipment) to allow the plant technicians to achieve a higher level of quality.

One of the places the work of these Master Craftsmen is felt is in the sanitized clean room where the LS engine is painstakingly assembled and inspected. Every aspect of engine performance is examined, even some aspects that others might label as unnecessary.

“One thing that differentiates the LS engine from its predecessors is the beautiful sound it achieves,” says Osamu Fujita, the Master Craftsman in charge of engine assembly.

“While prior LS engines were rightly valued for their quiet running, this time we strove to go further and create an engine that is powerful, yet melodious in its tranquility,” Fujita said.



For Fujita, rigorous inspections such as checking the block and cylinder-head interiors via X-ray and CAT scan were not enough to yield the sound qualities desired of the LS. He personally fires up every assembled engine on a test bench and listens intently with a stethoscope to detect even faint variations in sound. When Fujita discovers an off-key note, he makes minor adjustments, tuning the engine much as a specialist might tune a grand piano until it sounds exactly right to his demanding ear.

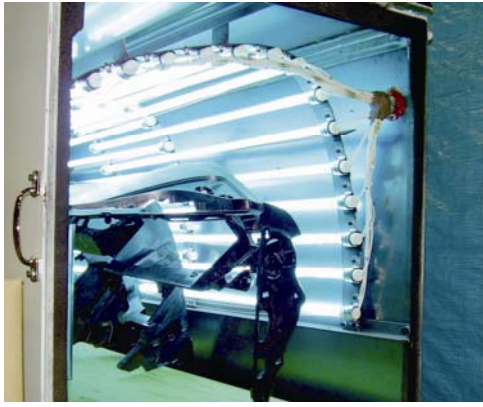
Later on, cars coming off the line will be driven by experts to ensure the engine produces precisely the right sound and feel. These very human ministrations go beyond the technical analysis of production data to guarantee each LS delivers performance that feels tailor-made to its customers.

Does this all sound just a bit extreme? It isn't, at least it isn't to these Master Craftsmen.

Masahide Sakato, the Master Craftsman responsible for the body press line, has also made it his mission to insure nothing but excellence from the new LS.

“The styling of the new LS is superb,” Sakato said. “Our mission is to bring out the vehicle's design sophistication even further for the enjoyment and excitement of drivers.”

To evolve the already advanced design still closer to perfection, Sakato subjects the car to a wide range of tests to ensure it meets the uncompromising standards set by the designers. Spacing between doors, panels, headlights and other adjoining parts are precisely measured. The data is relayed instantaneously to the production floor where any necessary adjustments are directly implemented by Kaoru Chiba, the Master Craftsman for body assembly. Chiba's vast skills enable him to align various adjoining parts with incredible precision.



Next, Sakato and Chikao Kawamura, the Master Craftsman who specializes in paint application and finishing techniques, inspect the exterior under a range of different lighting conditions. Sakato uses a specially made light tunnel that allows him to examine the surface flow over the entire body and carefully compare it against the theoretical ideals of their CAD images. Kawamura goes over the paint job under three different simulated light conditions. Together, they

ensure that the surface is free of even the most minute imperfections.

Kawamura's influence starts long before the car arrives at this point, however, beginning with his redesigning of the production-line robots to precisely mimic the movements of a craftsman's hands, giving the mechanical process a human nuance and bringing it closer to *takumi* techniques. The buffing robots' movements create a deeper finish over the curved body panels, while the painting robots function as virtual human artists, eliminating color irregularities and clotting.

Even this is not enough. Both of these technical operations are further enhanced by Kawamura's team, who step in to re-buff areas that are more detailed and perform the water polishing that gives the finished LS its unmistakable sheen. Before the cars leave the factory, every surface is given a final inspection, passing only when Kawamura feels the results are something he can look upon proudly.



The person who holds the job that might be most interesting to enthusiasts is Lexus' tuning Master Craftsman. He works in a more subjective area than some of the others, the area that involves the actual feel of a vehicle as it is driven and its responses to driver inputs. Working with the car's chief engineer, he helps develop the chief engineer's vision for the sound, feel, and handling of the car.

This concept of a Master Craftsman for Vehicle Dynamics was created in 2005. When the Lexus brand was going to launch in Japan, Hirokazu Koga was selected for this role. Koga works alongside Chief Engineer Yoshida for each LS to ensure a consistent feel among the Lexus models.

This was, at the time, an entirely new position within the corporation, but it was one that was judged to be absolutely necessary.

The Dynamic Master's role is to drive and give input on each vehicle in the Lexus stable to achieve a common tuning goal and feel for every vehicle in the brand, while allowing each model to keep its own unique personality and driving feel.

Perhaps that simplifies things too much. Actually, Lexus' goal was much more complex than that. The brand's chief engineer wanted, basically, what he called a "realization of everything." For example, the LS 600h L will utilize a 5.0-liter V8 hybrid system that will produce 438 horsepower, yet meet the most stringent worldwide emission criteria, with a fuel target similar to a V6 midsize all-wheel-drive luxury-sedan engine.

"The goal for the LS 600h L," Koga said, "is for the driver to enjoy the vehicle without any stress, and that all aspects of driving can be enjoyed, everything from city driving to freeways and interstates to the most challenging of mountain roads."

A tall order, for sure. To help fill that order, one of the Dynamic Master's activities occurs early in the vehicle-development process when a prototype is shown to third parties for vehicle evaluation. Koga's group uses this feedback and information during development.

Explained Koga, "Whether it's our cars, our prototypes or the cars of our competitors, I am constantly driving, comparing and analyzing. I work closely with the developers and chief engineers for each model to integrate key driving elements that form the foundation of Lexus vehicles. On top of this foundation, we collectively build the individual driving characteristics required for each model. I provide input and feedback from a variety of sources, and foster communication between chief engineers to see that our efforts contribute to strengthening the brand overall."

In addition to the fundamental character of the LS, such as excellent body control and rear stability, Koga is looking for a ride quality, a distinctive feel in the way the car moves and responds that belongs uniquely to Lexus.

Among the challenging goals the design team had in mind for the fourth-generation LS was that it should feel distinctly agile when driving over winding mountain roads, but without sacrificing performance for highway cruising. The result is a thoroughly engaging ride. Acceleration and braking are smooth and responsive, free from jolts associated with sudden changes in velocity, for excellent driver and passenger ride comfort.

When this level of determination to polish the LS's dynamics is equal to the resolve to polish its manufacture, the result meets Chief Engineer Yoshida's high standards for satisfaction.

"Only by joining the finely honed skills of our master craftsmen with the world's most advanced production technologies can we create a vehicle that achieves an unmatched degree of perfection," Kawamura said.

And that, of course, is exactly the ideal for which Lexus is striving.