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WaterCraft WORLD



Kawasaki Ultra 250X

A STAR IS BORN

Ever wonder how a PWC comes to life? We follow the process from start to finish.

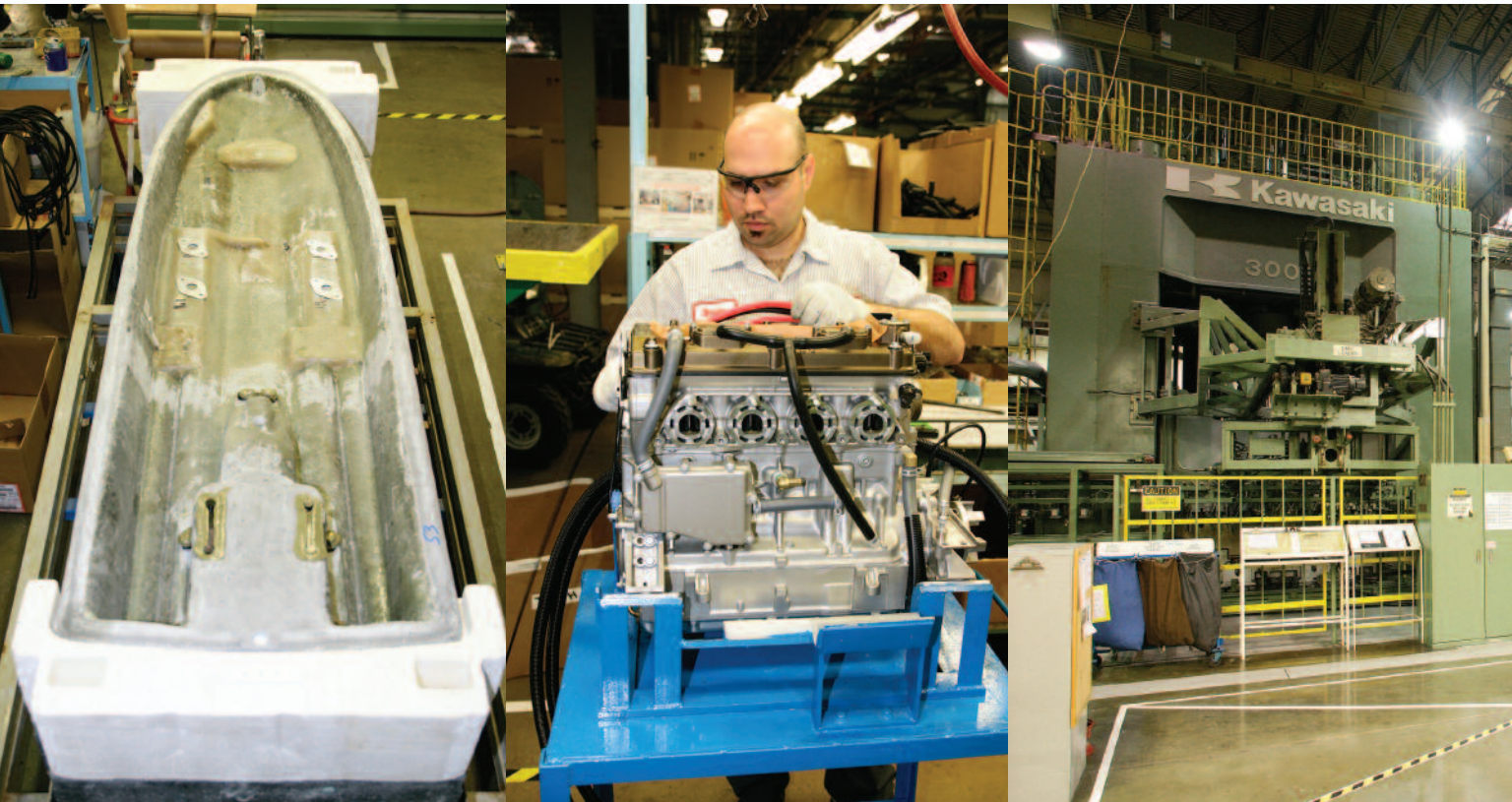
STORY BY
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They start as a designer's dream, and end up as many an owner's ultimate fantasy. In between, however, the steps aren't nearly so clear.

How does a personal watercraft go from concept to reality? We recently got the chance to visit Kawasaki's production facility in Lincoln, Neb., and follow the creation of this year's Watercraft of the Year—the Kawasaki Ultra 250X—as it went from a twinkle in a designer's eye to a newborn ready for delivery.

Congratulations—it's a PWC!





From left: Hulls are made of fiberglass-reinforced plastic (FRP) in traditional boat fashion and come from an outside vendor. Engines are the only piece of the Ultra 250X assembled outside the Lincoln, Neb., facility. The deck of the boat is constructed in-house using a 3,000-ton Sheet Molding Compound press.

THE EVOLUTION

The newest personal watercraft are envisioned as many as several years before a boat is actually put into production. Designers and engineers typically start with a sketch, later mocking up the craft as a miniature clay sculpture. Ultimately, a life-size “plug” is made from wood, wire lathe, foam and fiberglass. This is the hard tool from which the hull and deck molds will ultimately be formed.

Like many watercraft brands, the Ultra’s hull—the lower half of the watercraft—is fabricated by Camoplast, an outside vendor that specializes in fiberglass production. Hulls are built literally from the outside in using the female mold, with workers first spraying a layer of glossy gelcoat to give the boat its shiny exterior, followed by applying successive layers of fiberglass to give the hull its strength and rigidity.

Engines are the only major component

assembled outside Lincoln. They’re fabricated by Kawasaki Heavy Industries in Japan, and imported to the United States. Kawasaki’s facility in Nebraska is actually considered a foreign trade zone, meaning items can be imported and exported duty-free.

The deck—or upper half of the Ultra—is built in-house using a 3,000-ton SMC (Sheet Molding Compound) press. Sheets of premix fiberglass material already saturated with polyester resin are laid within a

From left: Placed on carts, hulls are fitted with components and engines while there still is plenty of access. A high-pressure, 4,000-psi water-jet cutter precisely carves out holes in the deck.





two-part mold, which is then placed under tremendous heat and pressure inside the press. This forces the material to flow into all of the mold's voids, taking the shape of the deck.

While the hull basically stays intact, decks need numerous access holes cut into the interior to allow room for control cables, electrical harnesses and steering linkages. Stowage cutouts also need to be cleaned up so that they feature a snag-free edge. Kawasaki accomplishes this with a high-pressure, 4,000-psi water-jet cutter. Using a mix of water and an abrasive compound, openings are precisely cut into the deck.

Decks are then brought to the painting area, where they hang vertically on a revolving overhead conveyer. Workers carefully paint the hulls with their trademark glossy colors using high-solids coatings, which are not only better for the environment, but also are more cost-efficient.

With the major components prepped and in place, actual assembly of the boat begins. First, hulls are fitted with inserts, plumbing fittings and engine supports. Carts, with rotating connection points, give workers the ability to flip the hull over for easy access to the underside. Next, engines are installed. Working on the open hull allows workers easy access to the interior, answering that inevitable owner's question, "How did anyone ever get their hand in here?"

Carts are pulled along by a floor-mounted track where workers at individual stations install a variety of components. Kawasaki uses the Andon production system, which allows individual workers the ability to stop the line should a problem arise. Superiors are alerted by audible alarm, as well as a visual indicator at the station in question.

An overhead marquee board displays the number of any station with a problem and keeps a constant tally of the day's production. Also noted are daily production



From top: After holes are cut into them, the decks are sent to the painting area where they hang from an overhead conveyer. Individuals at work stations install various parts along the line. Kawasaki keeps close tabs on inventory to save warehouse space.





From left: Once the hull and deck are joined together, the new Ultra 250Xs receive finishing touches including the decals, rubrails and seats. Completed models are then sent to the quality control area where they are inspected for flaws before being packaged in wooden crates and shipped out to dealerships.

goals, as well as how many boats have actually been produced up until that point. To Kawasaki's way of thinking, the occasional work stoppage is a good thing. No stoppages would indicate the plant had too much labor.

Kawasaki's "kanban" signaling system has been heralded as a classic example of manufacturing and inventory efficiency. When a component gets low, workers on the assembly line send a coded signal card to the inventory specialist, who in turn sees to it that the part gets restocked long before any shortage slows the worker. Inventory is never stockpiled, but instead is scheduled to arrive "just in time," or shortly before needed. The idea is to respond to actual

demand, rather than a forecast. One practical benefit is that the company reduces costs by saving on warehouse space.

When the time comes for the deck and hull to be joined, a robot precisely meters out the correct amount of adhesive along the bond line of the overturned deck. The deck will then be flipped over onto the hull like the lid on a shoebox, and placed inside a heated press that will permanently bond the two halves into one solid unit.

Boats receive the finishing touches, including decals, traction mats, rubrails and finally the seat. Decals are put on with a soap-like solution, which allows workers to position them precisely, then squeeze out the moisture in order to

permanently affix the stickers.

Finished models are sent to the quality control area, where they are carefully inspected for flaws. All vital components are examined, from engine to controls to overall fit and finish.

Completed craft are then crated for shipment to dealers around the world. Kawasaki's wheeled vehicles are packaged in reusable metal containers. PWC, however, require wooden crates, which are discarded by the dealer.

Lincoln is centrally located within the United States along a major interstate. Crates are loaded onto trucks at the factory, and ultimately the finished product arrives at dealers, ready to hit the water. **www**



Centrally located in the U.S., Kawasaki's Nebraska facility is near a major interstate, which simplifies shipping.