

Man Vs. Machine

Automakers like Honda are turning to biomechanics to make life better for their assembly-line workers.

By Christopher Steiner | Photographs by Stephen Webster

IN COLUMBUS, OHIO AN AUTO-worker approaches an assembly line for an intense shift of affixing brake lines to a Honda Pilot. The car is suspended inside a giant carrying harness, similar to ones that hang from ceiling girders in other Honda auto plants. This assembly line, however, consists of one car, and the worker is an Ohio State University graduate student draped in wires, sensors and electrodes that record every move. This is OSU's Center for Occupational Health in Automotive Manufacturing, where engineers apply the latest biomechanical technology to the struggle against the pinched neck and slipped disc.

Honda's seven-year-old partnership with OSU is the latest in a safety push by manufacturers anxious over liability claims and rising health care costs. In the past decade and a half U.S. manufacturers cut the number of injuries and illnesses involving days away from work from 352 to 141 per 10,000 full-time workers. Honda North America has cut accidents that resulted in lost time by 70% in the past five years.

Honda used the OSU shop to re-design some of the assembly of the 2008



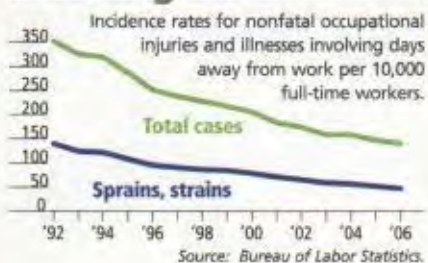
I, Worker

Lee Mazurek, an OSU grad student, confronts the underbelly of a 2008 Accord, air wrench in hand. He will attach a brake line to the bottom of the car at least five times from different angles while wired up with several pounds of electrodes, electromagnetic transmitters and a cerebral oximeter that track the strains and exertion levels in his muscles. It can take four hours to put the gear on. "With all those wires coming off of me, it was almost like I had a tail," says Lori Humble, an assembly line worker at Honda's East Liberty, Ohio plant.

Accord. Where once workers had to bend awkwardly to hold and whack headliners into place on the car's ceiling, a headliner now has sewn-in magnets that keep it in place on the roof's metal frame. Workers just toss it up and lightly tap it in with plastic anchors.

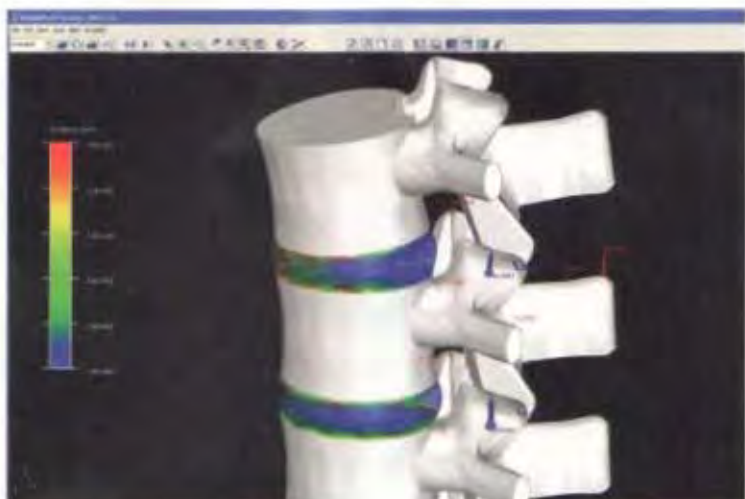
Honda moved to protect its most valuable asset, says associate chief engineer James Wolever: "The human hand is awesomely flexible and adept, but it's also our workers' minds and eyes that drive the improvements in our processes." That Honda has brought innovation to the safety realm should surprise nobody. "Its history is a tale of strategic brilliance and operational excellence that all managers dream will be told about them some day," writes Harvard professor Clayton M. Christensen in his book *The Innovator's Dilemma* (Harvard Business School Press, 1997). **F**

Getting Safer



The Super Chair

Honda dreams of putting the so-called Super Chair (above) into its American assembly plants. Where workers once craned and crawled, they would flit and swivel in and out of SUVs to install overhead lamps, seat belts and air bags. "Moving around is surprisingly smooth," says staff engineer Karen Lewis. "It's kind of fun." Honda is testing the chair in its Lincoln, Ala. plant, where it builds the Odyssey and the Pilot. The chair, made by a company called Stillwater, costs \$70,000 to \$100,000. Honda would need four of them to outfit an entire line.



Cars Go for a Spin

A car carrier in testing at OSU (below) can swivel a Honda 90 degrees to give a worker an unfettered crack at the car's bottom. Honda workers currently do undercar work—such as installing brake lines, metal baffle plates and fuel components—overhead, while the cars pass above them 70 inches from the floor. This leads to shoulder, neck and back injuries. "Your shoulders aren't designed to work that high," says Honda engineer Karen Lewis. But at \$5 million for parts alone the car spinner "looks like a very useful but extraordinarily expensive upgrade for us," Lewis says.

A software program (above left) that can chart the strain and position of back muscles on sensor-wearing human subjects. It also models the shear stress on spinal discs for each repetition.

