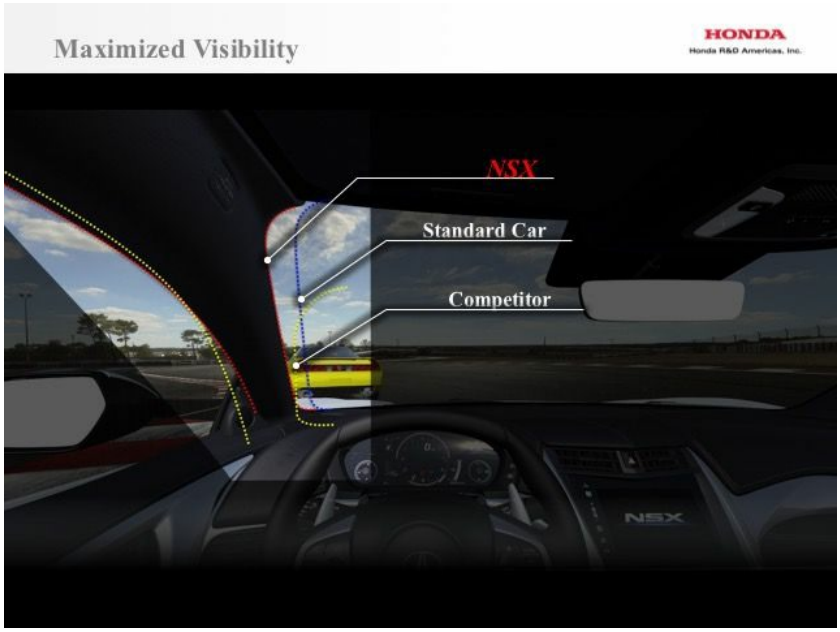
Thanks to "3DQ," you can actually see out of the new Acura NSX

Extremely high tensile strength A-pillars are the key.

by Eric Tegler - May 17, 2016 6:41am PDT



Honda

Modern supercars and hypercars are blazingly fast. Ironically, the sensation of speed they generate is often dampened by the fact that you often can't see a thing from the driver's seat.

Blame a combo of safety priorities and style. Over the last decade, crash and rollover regulations have dictated more robust cabin structures characterized by ever thicker, vision-blocking A-pillars. The regulations coincided with an in-vogue design language that gave us "turret-style" cabins from which to peer out.

With the new NSX, then, it's refreshing to see Honda put an emphasis on visibility in the design of its halo car rather than cobbling together a few sensors and a backup camera in the name of "safety." It's also not surprising. Cast your mind back to the 1980s/'90s heyday of Honda/Acura and you'll recall the pride Honda took in its airy cabins with low beltlines and superior visibility. The first generation NSX was lauded for its performance, dependability, and functionality, including cockpit visibility.

"The original NSX was known for having great visibility. Because of this, optimum visibility was a key structural target when developing the all new-next generation Acura NSX," said the Honda R&D team in Raymond, Ohio. "Therefore the goal became to reduce the field of visibility that is blocked by the pillar, what we call the obstructed view."

To achieve that goal, Honda designed the NSX's A-pillar and the roof side rails as one contiguous piece—strong but thin. It could do so thanks to a process called Three-Dimensional Hot Bending and Quench Processing (3DQ), developed by Japan's Sumitomo Metals Group.

Automobile components with hollow steel tubular structures have until recently been able to achieve a maximum high-tensile strength of 980 Megapascal (MPa). As a result, pieces like A-pillars have had to be enlarged to distribute the structural loads imparted in a crash or rollover. Prior to the NSX, the highest strength steel tubing that Honda had applied to one of its vehicles was hydro-formed 980MPa tube in the Japan-market Odyssey minivan.

Using 3DQ, the same components can achieve tensile strength as high as 1470MPa. The technique allows for components with complex shapes to be manufactured in one process. 3DQ is essentially a consecutive forming method; selected steel tube parts are heated and quenched with cooling water while a bending moment is simultaneously applied to the steel pipe with a movable roller-dice so that the pipe bends.

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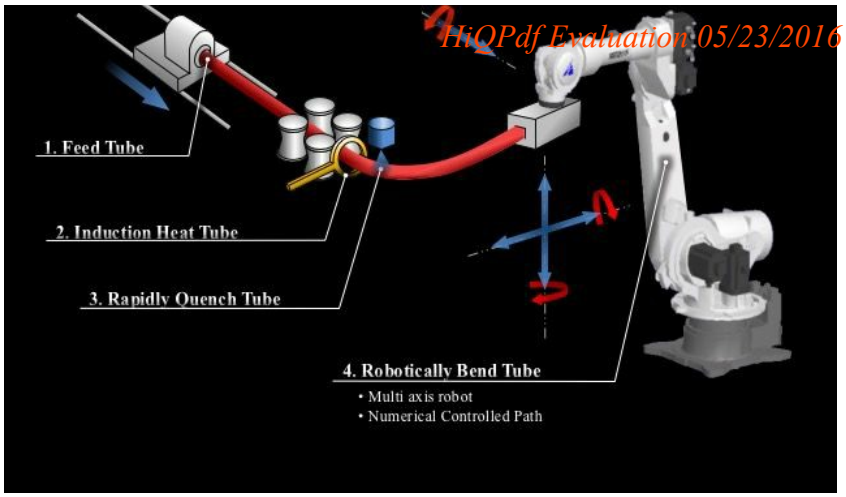

Honda

The process allows three-dimensional complex hot bending and quenching at the same time, producing effects that are difficult to achieve with conventional hydroforming and other cold-forming methods. According to Sumitomo, 3DQ yields a 30 percent to 50 percent reduction in component weight and a significant improvement in crash safety.

Such qualities make it ideal for applying to the NSX's A-pillars and roof rails. Honda R&D evaluated an array of other technology and material options including carbon fiber but ultimately concluded that 3DQ "was the most efficient balance of weight, performance and dimensional requirements."

Not surprisingly, there are other components which can benefit from Sumitomo's 3DQ process, and Honda acknowledges that the technology is being used for a seat frame by another OEM. Ironically, the NSX's Marysville, Ohio assembly line is in a former Honda seat plant, but the 3DQ pillars and rails are produced in Japan. They come to the US from the Koriyama factory of Honda tier 2 supplier H1 in Fukushima.

The new A-pillars give the NSX a minimum obstructed view, which you appreciate when rounding a corner on a city street or looking out to an apex on track. In addition, Honda says the NSX has a projected best-in-class crashworthiness.

"By comparison, we believe the NSX A-pillar width is 60 percent thinner than the average pillar width of the competitors we measured and 30 percent thinner than the closest competitor we measured," Honda said. "Our third priority was to maximize interior space [3DQ enabled a low roof line] to achieve unique packaging requirements such as a driver wearing a helmet."

The use of 3DQ also aligned with Honda's broader minimum weight goal for the NSX, and at 3800lbs (1724kg), the supercar can use every bit of help. Where else might 3DQ be of assistance? Honda says the process is scalable for higher volume vehicles, so we'll likely see the technology trickle down from the NSX. Conversely, 3DQ was selected and remains efficient for low-volume production because it does not require a large, exclusive investment.

That means we may see 3DQ-enabled A-pillars show up on other sports or luxury vehicles in the near term. Since "seeing is safety," that would be a welcome thing.

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