

Seating Comfort and the Age of Autonomy.

by Alison Smith, Lead Biomechanical Engineer, Magna Seating Center for Biosciences

When people ask me what I do, I usually answer: I'm a scientist. I'm someone who unlocks the answers to questions through facts and data, exploring various "what ifs" through an objective, analytical lens. My area of expertise is ergonomics. For nearly 17 years, I've focused on improving human-to-object interaction, specifically people and seats. It's my job to marry what we know about the human body and its response to stresses in seated positions with how we design our seats to create comfortable customer-pleasing experiences. Pretty straightforward, right?

In many respects, it is. But as I look to the future of mobility and the seismic shifts occurring, especially in autonomy, what I encounter is a host of curves and unknowns. Think about it. What happens to the driver's seat when there is no longer a driver? When a seat is used more as a lounge or a bed, is it still considered a seat? How do we approach seat comfort as vehicles morph into rolling conference rooms, motels, entertainment centers, and sanctuaries from stress?

As a scientist, I'm supposed to be detached; impartial. But right now, when it comes to what's next in seating comfort, nothing could be further than the truth.

I couldn't be more thrilled.

For decades, the industry has used the same mechanical setup that enable seats to recline. The design features a combination of components placed inside the seatback and base, which converge into a pivot mechanism that moves the seat forward and back. In 2019, as our seating innovation team explored what's next for seats and comfort with an eye toward autonomy, we took a hard look at all aspects of reclining seats, and we realized something was off.

Traditionally, the pivot mechanism is two separate pieces – one to lower the seatback and one to extend the seat base – which come together near the upper lumbar region of the spine. What we noticed is that the separate pieces, along with where the pivot is positioned, inadvertently force the spine, hip and legs, to first, absorb the stresses of securing a comfortable position, and then second, maintaining it. Further comfort complications occur when you add leg rests – a feature that's expected to become standard in autonomous vehicle seats – with joint and muscle fatigue issues. All told – *it's just not natural*.

Using our nearly 30 years of ergonomics expertise, we've now reimaged reclining seat structures into an industry-first that has applications for today's first-row passenger and second-row captain seats, as well as tomorrow's autonomous vehicles. The patent-pending innovation eliminates the two separate pieces, merging them into one with a pivot mechanism that's now positioned just below the hip-point, which is the *natural* pivot point on the body between the torso and upper portions of the leg. The redesign increases comfort by creating a stress-free position for the lower back, allowing the upper torso to recline more fully, and repositioning leg rests for improved support.

We've also made it zero-gravity seat compatible. First developed for the space program, zero-g seats are designed to mimic the body's natural, relaxed postures that occur when floating in space. The idea behind zero-g seats has gained increased traction in recent years in the auto industry as automakers look to increase seat comfort.

It's been said that some scientists would rather have questions that can't be answered than answers that can't be questioned. I agree. Do we have all the answers yet when it comes to seating comfort in the age of autonomous vehicles? No. But we're certainly on our way. The key going forward will be to apply what we know; discover what we don't; keep asking the questions; and to remember to enjoy the ride.

As a scientist, and member of the Magna Seating comfort team, it doesn't get any better.

Alison Smith