Safety and Liability

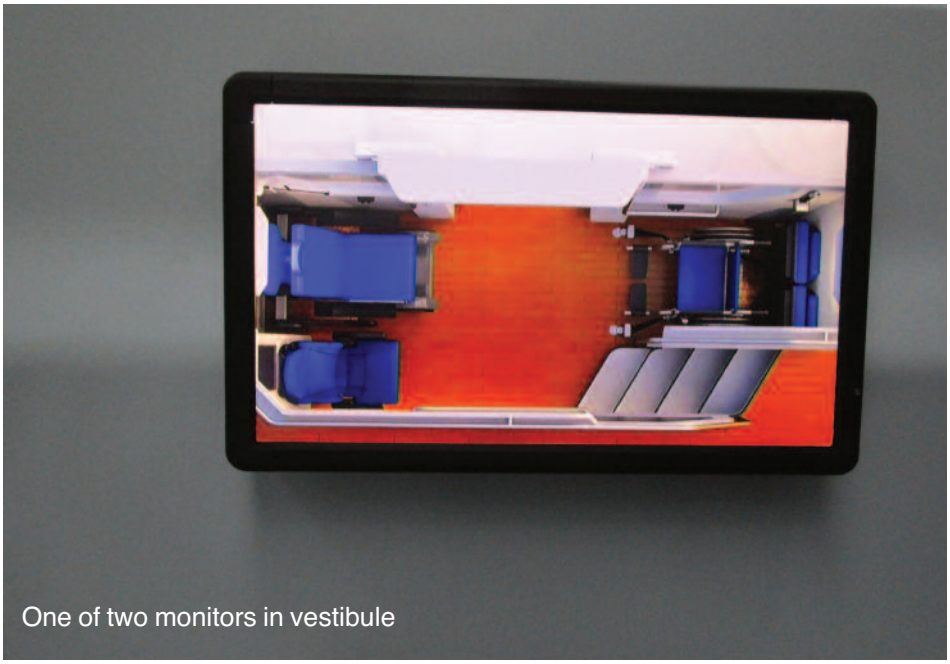
by Ned Einstein

A Paradigm Shift in Motorcoach Accessibility Part 3: The MCI D45 CRT LE Commuter Coach

In Part 1 of this series, I introduced NATIONAL BUS TRADER readers to a new vehicle: MCI's 45-foot, ramp-equipped D45 CRT LE. I hinted at its striking innovations and its promise down-the-road. In Part 2 of this series, I described the specific details of this vehicle, along with their significance. In this closing installment, I will examine this vehicle from the perspective of bus design – a discipline in which I have considerable professional experience. I will both expand upon this vehicle's brilliant starting point and explore its potential as the transformative vehicle I believe the D45 CRT LE can further become.

As a cautionary warning to NATIONAL BUS TRADER readers and MCI's designers, the D45 CRT LE is not the only unique entrant to the motorcoach or public transportation field. At periodic intervals, other OEMs have done likewise. One of the most interesting was a vehicle introduced by Neoplan at the UMA Motorcoach Expo in 2001 in Atlantic City. Known as the Intermodal Explorer, it combined passengers and freight into one vehicle. The front was a double-decker coach that could seat as many as 35 passengers while the rear was a platform supported by three axles that could transport a standard 20-foot intermodal freight container. The vehicle could presumably operate on routes serving seaports and railroad yards. While the concept was interesting, we never heard of any orders being placed.

Another lesson comes from the recent OEM Mobility Venture's MV-1. Coming upon what I immediately thought was the ultimate paratransit vehicle, I asked Mobility's VP at a trade show why it only had a single wheelchair securement position – limiting it to an accessible taxicab rather than a the ideal vehicle for shared-ride paratransit purposes. He told me that the seat directly behind the driver's seat could not flip up (as minivan seats in that position all do) because their engineers had designed the fuel tank to lie beneath it. Not even addressing the notion of a gasoline engine inside the passenger compartment, I asked this corporate official what could be done about it. He replied, "Nothing. We would have to invest another $150 million in tooling to redesign



One of two monitors in vestibule

the vehicle that way." The affordable MV-1 is still on the market. Its market potential was severely constrained by this decision at the design level. The perfect paratransit vehicle – a versatile, moderate-cost, SUV-size chameleon – turned out to be merely a niche market product on the public transportation landscape.

These examples illustrate an important principle about vehicle design, and product design in general. No matter how brilliant a newly-introduced vehicle or product is, it is only a starting point. If it is not well-marketed, if no mistakes were made at the design level which preclude the product's further development and if the initial design does not evolve quickly to expand beyond its initial target market, the starting point may be ignored. With the potential I myself see in the D45 CRT LE, I truly hope that MCI grasps these lessons, and continues to unleash the potential that would seem almost unlimited to someone with imagination – or at least to one who understands the essence of vehicle design.

The Vehicle Design Continuum

Vehicle design is not what most people think it is. While the first step in a vehicle's evolution is indeed design, this step will not succeed unless all the successive steps are taken into consideration such that the design facilitates the optimization of each successive step in the process. Of these successive steps, after design comes engineering, After engineering comes prototype cobbling. After prototypes come testing and certification. After these come the still-largely-hand-crafted construction of pilot orders (and continued testing). Then comes tooling – a major cost, where all the jigs and fixtures must be created to mass produce the vehicle (although most of today's vehicles are assembled, in teamwork fashion, with smaller inventories, according to an approach known as "lean production"). Then comes marketing. Then sales – assuming that the design facilitated the optimization of each successive step before it. Then, naturally, comes production. The vehicle's continued sales will depend on the production-line consistency of high-quality vehicles at a reasonable cost.

At each successive step in the vehicle development process, those in charge must envision the steps to follow, making sure that no step constrains the optimization of those steps which will come after it. If every step is well thought out, the vehicle's further evolution will adapt to new challenges ranging from regulatory requirements to buyer preferences. Well-thought-out is street talk for great design. For, according to the principles cited above, great design usually

translates into sales and profit, both in the near-term and down the road, as the vehicle adapts to the challenges which invariably lie ahead.

Starting Points and Constraints

Rarely is a vehicle's starting point created "from scratch." In the case of the MCI D45 CRT LE, its starting point was largely the D series commuter coaches (and other 45-foot MCI models). Not familiar with or privy to the blueprints, I can only assume that the vestibule which makes the D45 CRT LE so unique began and ended with selected vertical frame members, which in turn, began and ended with selected window posts. Otherwise, tweaking the rest of the coach would be costly, and not aesthetically pleasing (particular when viewed from the exterior). As one views the D45 CRT LE, indeed one finds that the aft edge of the side door entranceway coincides with a window post – although the window above is bisected by the top of this door, and its height intrudes into the window above (presumably requiring the manufacture of an additional, odd-shaped window). Yet the asymmetry largely disappears when the dual-panel pantographic doors are open. The expanse of the open door panels, and the open door itself, appear to total the exact length of a passenger window. Thus the modularity of the original vehicle envelope was maintained, and the costs of modifying the rest of the coach were minimized.

One of the more interesting things about the D45 CRT LE's design was that, as radical as the vestibule is, MCI did not stop its innovation with this part of the vehicle. Instead, MCI used this vehicle's entré to also introduce or refine a number of other features – like the throw-back rear window. These refinements were not superficial gimmicks. With them, this coach did not comfortably drop into the market. The D45 CRT LE exploded onto the market as a new approach to motorcoach design – replacing the traditional durability-oriented focus of MCI with a serious variation from other coaches on the market.

This latter point illustrates the importance of a concept that was secondary to product development a half-century ago: The importance of branding. There are clearly exceptions. To Americans isolated from foreign cars, the name 'Cadillac' meant a lot. It enhanced the credibility of a Chevrolet and a Pontiac. But today, branding is a major key to sales. At first glance, the D45 CRT LE appears to reflect this understanding. If the design optimizes the steps to follow, the D45 CRT LE could make MCI a familiar name in the motorcoach export market.

Constraints and Questions

With the D45 CRT LE, MCI must face the consequences of failing to think through the constraints which its design, or the design of almost anything, unavoidably imposes on the steps which follow. For example, as this vehicle evolves, some buyers may want a six-wheelchair variation. I employ this example because it illustrates the challenges that further product development will always face. The ADA requires 48 inches of wheelchair securement space. However, a driver or attendant securing large wheelchairs must have room to secure them. This task becomes increasingly more challenging when two chairs are positioned in tandem. Aware of this enigma, changes to ADA requirements were actually solicited a few years ago – including inquiries about the minimum requirement for a securement space.

An expert in accessible transportation for four decades, I commented that this space's length should be 66 inches. Many others proposed 60 inches. Of course, most manufacturers and converters commented that 48 inches was plenty and, in this country, corporate wishes rule. The FTA chose to ignore any proposals for change, and the 48-inch requirement remains. This may not be enough for the buyers of a luxury motorcoach costing half a million dollars. If these buyers want six securement positions with 60 inches of space, can the D45 CRT LE accommodate them? Without knowing the length of the vestibule, my impression is either "yes" or that it comes pretty close to 15 feet. This is what vehicle design is all about: Accommodating the demands of the future – without a crystal ball.

Second-Guessing and Second Chances.

These same questions must be asked regarding using the vestibule for anything else – additional ambulatory passengers, bicycle racks, additional luggage space, packages, mail and scores of other practical uses to which this module might lend itself. At a certain point – when the vehicle is in production and variations are desired – the initial vehicle envelope will become a necessary constraint to the variations that might be possible.

Far-thinking potential purchasers may drool over the possibilities that the D45 CRT LE presents. So MCI cannot help but second-guess its starting point in light of the many possibilities that exist – some of which lie deep inside the crystal ball. Even new regulations complicate this thinking. The requirement for three-point occupant restraints, for example, effectively defines safe seat-spacing intervals, because seat spacing must accommodate the "envelope of restraint" created by the seat belt system. Plus, this envelope is compromised by the irregularity of seat spacing endemic to motorcoaches with reclining seats.

Frankly, the variation in seat-spacing makes the inclusion of three-point occupant restraints on motorcoaches dangerous even now – a realty which both NHTSA, FMCSA and many members of the motorcoach community know full well. As things now stand, MCI has no choice. Suppose it uniformly installed compartmentalized seats? Suppose it installed a restroom in the vestibule (eliminating the ADA violation that installing it on the floor level would necessarily comprise)? It is not inconceivable that regulations about seat belts could change; just as with large school buses in 44 states, occupant restraints could be an option.

If a variation of the vestibule could be packed with a few more ambulatory seats, the seat-spacing above could be widened, and seat-belted passengers would be safe even with the irregularity of reclining seats. Thus an even stronger case could be made for creating exceptions to the occupant restraint requirement – if not making it optional. The reader should note that all these things are possible only if the D45

CRT LE's design process accommodates them. A less imaginative design process might not.

The Designer's Dilemma

To MCI's further credit, the D45 CRT LE lay on MCI's drawing board for four years before its prototype was unveiled. Still the question remains: Was the starting point optimized for everything that this brilliant starting point can be? Or now that a broader audience has had a chance to react to it, should MCI perhaps return to the drawing board and think through the initial design's implications even further?

This dilemma is unavoidable. Failing to fully explore the possibilities of further development and the constraints which the original design may eventually place on this development are the costs that every innovator must face. Failing to think through the future – as impossible as it sounds – is still rolling the dice for a brash new design, irrespective of how clever it may first seem. Innovators live and die because of this very quality of their starting points – as Neoplan, Mobility Ventures and many other vehicle manufacturers well learned.


Upper level

Time and sales will reveal how well-thought-out MCI's starting point genuinely was. If the initial design enables countless variations to spring forth from it, this vehicle could easily become an international milestone (especially as many European bus and coach manufacturers have been enamored by our water-cooled engines). If not, the D45 CRT LE could become the "hit" of some exhibition of rare, exotic buses 50 years from now. Knowing this, MCI still has a chance to revisit its starting point. In fairness, it may not need to.

Regardless, this opportunity will not last forever. The further along the initial vestibule evolves, and particularly as the commitment to tooling is made, the more existential the vehicle's ultimate evolution will become. As Jean Paul Sartre famously said, "Les jeux sont fait. On ne peut pas repondre son coup." (The die are cast. One cannot take back his bet.)

As a veteran of international bus and coach design efforts, I and many foreign bus designers have always thought of Americans as great engineers and poor designers. The dominance of non-American buses and coaches in our market would suggest this. Perhaps the D45 CRT LE will change this perception.

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