

Marathon Engineering Department

From Concept to Custom Coach



The engineering department. Interviewed in this article: Mark Williams, far left; Jay Graham, fourth from left; and Alan Christianson, fifth from left.

by Sharleen Nelson

With deluxe features ranging from fine, hand-built cabinetry, imported leathers, and stunning stone and woodwork, to complex and innovative A/V and mechanical/electrical systems, as many as four slide-outs, and exterior paint designs that have garnered worldwide recognition, converting a Prevost bus shell into a luxurious custom-designed Marathon coach is a complex process that requires systematic advanced planning.

Although countless people from multiple departments spend thousands of hours working on and making allowances for every detail, the bus-conversion process ultimately begins with the engineering department. Every department relies on engineering to provide detailed, practical information about how something works or how something can be accomplished to ensure that each new custom coach is not only beautiful, but also safe and well designed.

There are currently 15 mechanical and electrical engineers in the department, many of whom have been with the company for more

than 20 years. A majority of them started out on the production floor, where they acquired indispensable hands-on experience. According to Senior Project Engineer Mark Williams, who has been with Marathon for 21 years, in the beginning all 25 employees were involved in the process. "One day you'd be working down in the underbelly, and the next day you'd be upstairs installing cabinets or putting headliners in," he said. "That hands-on experience has given all of us a better understanding of what's involved in actually getting the tasks done."

The engineering department has seen a marked change in production procedures since the early days of building one coach at a time and one engineer taking a project from start to finish. Vice President of Design and Engineering Alan Christianson has the distinction of being Marathon's very first employee. "When we first started we did hand drawings and pretty much designed and built everything on our own," he said. "We even made our own workbenches."

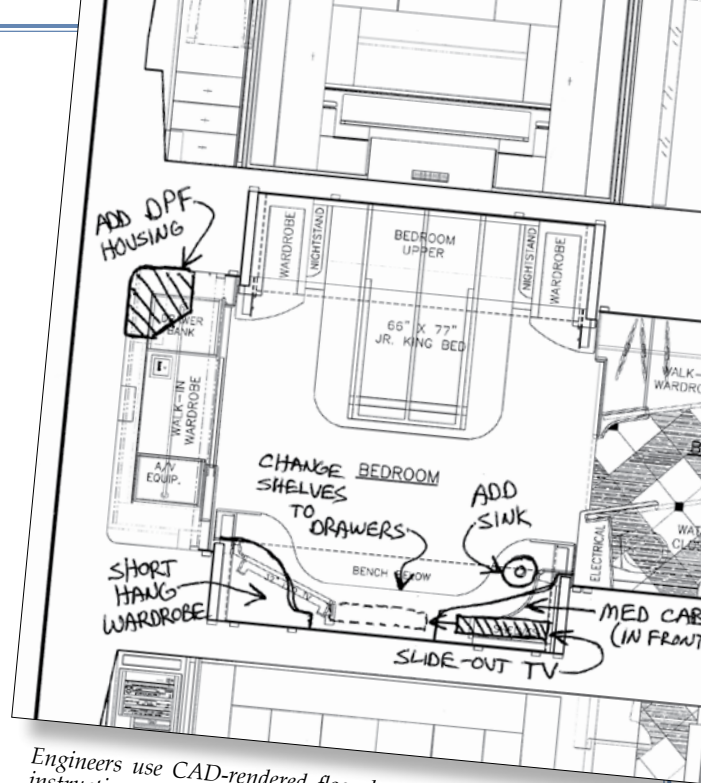
"Alan was it. He was *the* design engineer," said Mark. "The customer would literally walk into a bus and say, 'I want to see a galley over here and a bench seat there and a sleeping area here,' and away we'd go. It was like the Wild West; there were no rules because nobody else was doing this."

In the Zone

As the company grew, however, so did the complexity of coach building. To streamline the process, the department employs what they call the "zone approach." The way it works is the coach is divided into four distinct areas: the bedroom, the bathroom, and the salon and galley are split between the driver's side and the curbside, and engineers are assigned to those areas. This approach speeds production by allowing the work to be done concurrently so information can be shared as a bundle rather than piecemeal. Mark, who is one of four project engineers, is responsible for coordinating the project. "I make sure everything matches up stylistically and functionally for all of the different areas," he said. "If you have one style of cabinetry happening in the bath area, you want to make sure it will interface visually and structurally with whatever is next to it where the transition between those areas occurs."

As one can imagine, communication is paramount to bringing all the pieces of the puzzle together. "It was different when there were so few of us and we knew exactly what was going on because we were doing a little bit of everything," said Mark. "But now we're able to produce more coaches by breaking it down into individual tasks."

Ensuring that the process works as efficiently as possible requires both planning and foresight, and the engineering department has developed a number of strategies. On the mechanical side, some spaces can be pre-wired or pre-plumbed in anticipation that the area may



Engineers use CAD-rendered floorplans to provide detailed instructions to other departments.

be converted for a different use down the road; for instance, pre-venting the inside cabinet of a wardrobe for a stackable washer/dryer, or pre-wiring for electronics in a potential bunk area. Various floorplans are also set up for standard spacing of cabinetry and furniture configurations. For instance, a standard length sofa can be blocked out on most floorplans to accommodate multiple styles of sofas. In electrical, Techlink and Crestron systems allow engineers to reprogram switches and equipment on the fly.

The Process

Think of it as building a home on wheels, and every home starts out with a floorplan. According to Engineering Department Manager Jay Graham, who designs the floorplans and has been with Marathon for 21 years, in the company's early days it was simple. There were two floorplans from which to choose: the "A" floorplan and the "B" floorplan. With the evolution of slide-outs, beginning with the first single XL slide-out in 1996 to the introduction of H and XL quad slide-outs this year, the number of floorplans—excluding client-designed plans—has grown exponentially. "We now have 24 engineering-designed floorplans for each chassis," said Jay. "The H3-45 and the XL each have 8 doubles, 8 triples, and 8 quads." The changes have kept the engineering department on its toes. "In years past, you had designs that lasted 10 years; now we have designs that last

barely 2 years,” he said. “But it’s great for our engineers because that’s what they thrive on.”

Deciding which floorplan to use depends not only on the production schedule, but also on the type of coach that is being built. There are two styles of coaches: a custom “designer’s choice” or show coach; and a customer-ordered/designed coach, whereby the client chooses everything from the floorplan to the interior and exterior materials. Adding to the production mix are special “M” series coaches that comprise exclusive design features. “It can be soup to nuts on some things,” said Jay. “If we add a pop-up TV, a new ceiling, new window treatments, new pocket doors, and a special underbelly entertainment center, it can go from a 50-hour to a 600-hour engineering package.”

Regardless of whether it’s a show coach or a client-designed coach, each project entails a concurrent electrical/mechanical/project engineering/interior designer process. The project engineer, who is Marathon’s version of an architect, leads the coach project and renders



cabinet drawings—the cabinetry refers to all built-in components from the cockpit to the rear wardrobe, and there are approximately 40 separate cabinets in each coach for which engineering provides drawings. At the same

The engineering department is preparing to take the leap into “Inventor,” a solid modeling package that creates a 3-D digital prototype that helps users visualize, simulate, and analyze how a design will work under real-world conditions before a product or part is ever built.

time, the electrical engineer generates electrical schematics, the mechanical group works on any individual mechanical components, and the interior designer selects fabrics, materials, and design elements.

On a customer-ordered coach, however, the project engineer works with the client to design and record how their coach is to be built. Along with the interior designer, the project engineer is the liaison between the customer and the salesperson. “You meet with the client first, take notes like crazy, design a floorplan, so you have a basic footprint of what you’re going to do,” Mark said. “The more information you can include, the better chance production has to be successful.” From there, the information is organized as a set of sales document reports. With this information, members of each project team use AutoCAD, a computer-aided design software application, to draft and design in their specific zone. The completed drawings are published as an extensive package that is distributed to each production department to serve as a blueprint during the process. “It’s critical to be aware of what is happening collaterally because even a



small change can affect another area," he said. For example, an electrical concern might be something that mechanical should be aware of in terms of integrating the two systems. Some mechanical devices require electrical control, in addition to spatial consideration in trying to ensure that there's enough room.

Customer requests and coaches requiring special features play an enormous role. The installation of cribs, playpens, treadmills, fireplaces, jetted tubs, bunks that pull down from the ceiling, liquid crystal TVs, and audio speakers in the shower—or even a "kitty condominium"—all pose unique challenges, as well as dramatically change the dynamic of the coach. "We're constantly tweaking, adjusting, and massaging things," said Jay. "We've produced more than 1,100 coaches, and you can't go more than a few coaches before you run across something that you haven't done before."

From 2-D to 3-D

Computer software technology is also changing the way coaches are designed and built. The engineering department is preparing to take the leap from AutoCAD to 3-D modeling with "Inventor," a solid modeling package that creates a 3-D digital prototype that helps users visualize, simulate, and analyze how a design will work under real-world conditions before a product or part is ever built. According to Jay, in the future customers will be able to view a

3-D representation of their coach and choose items and materials in a more efficient manner. The software also allows you to create a movie. "A camera will take you through the coach on a 'fly-through,'" said Jay. "It's the stuff they're using in Hollywood." Still, for some things there is just no digital substitute. "You can make all these great renderings on the computer, but how does that entry handle *feel* when I grab it?" Jay said. "Sometimes you've got to be able to actually get your hands on something to know if you like it."

Much has changed from Marathon's early "Wild West" days to today's streamlined "zone approach" and sophisticated design systems, but what hasn't changed is the engineering department's innovative spirit. "We started out with a bunch of guys working with pencil drawings and a vision," Alan said. "But over the years, our engineering design teams have realized a certain creative 'synergy'—of sharing ideas and getting and giving input, which is one of the main reasons Marathon has evolved into the world-class company it is today." Mark Williams concurs. "After 20 years I still walk into a finished bus and it still knocks my socks off."

Look for part two of this series in an upcoming issue of *The Maritime*. If you'd like to learn more about Marathon's engineering department, or see how a coach is made, Marathon's Coburg, Oregon facility offers factory tours Monday through Friday beginning at 11:30 a.m. •