COMPANY

Pi Mobility
picycle.com

LOCATION

Sausalito, California, United State

SOFTWARE

Autodesk® Alias® Design
Autodesk® Inventor®
Autodesk® Showcase®
Autodesk® Vault

A new breed of bike

Pi Mobility uses Digital Prototyping and Autodesk software to design electric bikes

After only three weeks the team produced a 3D digital prototype using Autodesk® Inventor® proving that, by reducing the diameter of our tube by a half an inch, we could immediately save $335,000. When you extrapolate that over the next few years, it means easily seven figures saved. That discovery means that Pi Mobility can achieve profitability a full year ahead of schedule. From our perspective, it just doesn't get much better than that.

—Marcus Hays
CEO
Pi Mobility

PiCycle. Image courtesy of Pi Mobility.

When Marcus Hays first heard about an electric bicycle, he was less than enthusiastic. Why load a bike with battery weight, turning the human motor into a passenger in the process? The year was 1995 and Hays found himself working with legendary automotive executive Lee Iacocca to develop electric cars and bikes.

Fifteen years later, Hays admits to a profound change of heart: "In the years that followed, I grew more convinced that the electric bike would be a singular tool in enabling us to move away from our dependency on automobiles," he says. "I started Pi Mobility in 2000, and I've been working in this segment ever since."

Electric bikes use less than 1,000 watts of total power and can be used on bike paths. When Hays first encountered these hybrid vehicles, most models were imported from a variety of countries, especially China. The bikes typically relied on an injection molding manufacturing process, which produced parts made of a variety of thermoplastics. While initially pleasing in appearance, the plastic parts raised questions of reliability and tended toward unsightly discolorations and dangerous cracks. All too often, those bikes were simply discarded. "As an advocate for electric bikes, I felt these problems had to be solved," says Hays.

To efficiently produce a more reliable and environmentally friendly electric bike, Pi Mobility took a decidedly minimalist approach. For Hays and his team, the longer a product will last is a key factor in making it more sustainable. Rather than rely on brittle plastics for a multitude of parts, Pi Mobility used an elegant, solitary arch of recycled aluminum for its bikes' instantly iconic frame. Not only does recycled aluminum last considerably longer than plastic, the batteries and electronic components reside safely within the aluminum tube rather than an injection-molded plastic battery enclosure, better protecting them from the elements and providing more efficient heat dissipation.

Recycled aluminum requires just one-thirteenth the amount of electricity to produce compared to virgin aluminum. What's more, a Pi Mobility bike produces a relatively measly 300 pounds of carbon dioxide per 12,000 miles of travel, making it 20 to 30 times more efficient than a conventional motorcycle or car. Perhaps best of all, the single tube used in the PiCycle and PiMoto models' "battery agnostic design" means they can conceivably handle any battery or chemical process that produces electricity, allowing for easy upgrades in the future.

The Autodesk Clean Tech Partner Program supports clean technology innovators with design and engineering software they can use to accelerate their development of solutions to the world's most pressing environmental challenges. For more information, visit **autodesk.com/cleantech.**

AUTODESK.

PiMoto. Image courtesy of Pi Mobility.

PiCycle. Image courtesy of Pi Mobility.

Thanks to the less labor-intensive design of the single tube, Pi Mobility has been able to maintain production in the United States and still be profitable: "We can create smaller volumes wherever there are enough Pi riders, and be profitable," says Hays. "For a small company like ours, that means much better quality control and throughput. We can form a tube in about 30 seconds, and with the help of Autodesk software, changes to the design can be embedded very quickly. Our manufacturing method offers very rapid scale at very competitive prices, but it also reduces the required labor to a fraction of more traditional electric bikes. By producing our bikes locally, much of the transportation carbon that often affects even environmentally sustainable goods can be eliminated."

The company's testing program makes durability and sustainability its top priorities, before appearance. That said, Pi Mobility seeks to combine all three elements at every opportunity. The Autodesk® solution for Digital Prototyping helped the company to optimize its design and bring new products to market faster.

According to Hays: "We used Autodesk® Inventor®, Autodesk® Vault, Autodesk® Alias® Design, and Autodesk® Showcase®. Our design team took to the software immediately. After only three weeks the team produced a 3D digital prototype using Autodesk Inventor proving that, by reducing the diameter of our tube by a half an inch, we could immediately save $335,000. When you extrapolate that over the next few years, it means easily seven figures saved. That discovery means that Pi Mobility can achieve profitability a full year ahead of schedule. From our perspective, it just doesn't get much better than that."

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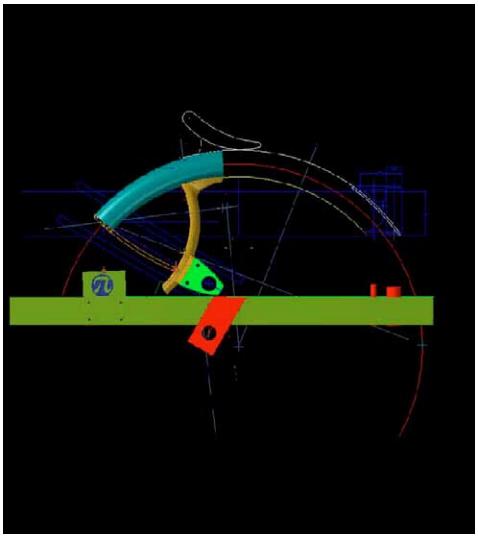

PiMoto aluminum monocoque in fixture drawing. Image courtesy of Pi Mobility.

For more information

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