



Tarform Pushes Sustainable e-Motorcycles

A Brooklyn-based startup finds novel ways to use eco-friendly materials in two-wheeled vehicles

By Robert Grace

A slumping U.S. market for two-wheelers is not deterring Swedish designer Taras Kravtchouk from forging ahead with launching the latest in his line of eco-friendly electric motorcycles from his base in Brooklyn, N.Y.

Through its use of natural fiber-reinforced bioplastics for certain components and a focus on upgradability, recyclability, and circularity, Tarform aims “to build the world’s most sustainable vehicles.” Courtesy of Tarform



Kravtchouk, who moved to New York from Sweden a decade ago, founded Tarform Inc. in late 2017 to produce what he calls a new breed of e-motorcycles, “by integrating cutting-edge technology, green mobility, and smart connectivity.”

He’d been working on the concept for some time before that. In late 2018, Tarform unveiled its first two prototype e-motorcycles, dubbed the Café and the Scrambler.

Kravtchouk teamed up two years ago with New York sustainable product development consultant Grant Goldner, of Goldner Sustainability Consulting, and they’ve been working ever since to find ways to incorporate more environmentally friendly materials wherever possible. Goldner discussed the partnership in an online June presentation as part of the Sustainability Deep Dive conference put on by the Industrial Designers Society of America (see *Plastics Engineering*, July/August issue, p. 24).

The result is the creative use of natural fiber-reinforced bioplastics for the bike’s side fairings and for the production version of its top tank. Plans call for the firm to convert the aluminum seat pan to bioplastics, as well, if designers can make that work, while continuing to search for other applications.

The bodywork is made from a flax seed weave that acts as a reinforcing mechanism to the composite panel construction. Aluminum is used for most components as it is 100 percent recyclable. The seat upholstery is made of biobased vegan leather (which contains no animal byproducts). The company also is developing a way of eliminating the need of paints and primers with a mono-material infused with algae- and iron-based metallic pigments.

“Our goal,” Kravtchouk says, “is to build the world’s most sustainable vehicles without compromise.”

Targeting a New Type of Rider

On July 1, five days after the introduction of his latest line of bikes, Kravtchouk said in a phone interview that he believes the market prospects remain strong for his type of future transportation. He is not looking to sway old-school buyers of Harley-Davidson and Yamaha motorcycles, but rather is targeting a new generation of consumer, one who, he says, is more sustainability- and

technology-focused, and is embracing the rise of clean, electric mobility.

Tarform declares that its concept is based on three principles:

- » Designed to embrace change—A modular platform that enables continuous upgradability of parts and aesthetic appearance that can evolve;
- » Technology that empowers—The use of sensors, machine learning, and connectivity to design intelligent machines and provide meaningful insights to the rider; and
- » Care for the environment—Take responsibility for the lifecycle of the vehicle. Prioritize the use of high-performance biomaterials and work with ethical suppliers.

Its latest model, the Tarform Luna, is the firm’s first



Instead of gluing logo letters to the side of the bike, Tarform 3D prints them and mechanically attaches each one. Courtesy of Tarform

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— Taras Kravtchouk



street-legal e-bike. It will have a starting price of \$24,000, once commercial production begins next year, when Kravtchouk expects to build 200 to 300 units. This year, the firm will begin hand-building 54 limited-release, custom models of what it calls the Founder Edition.

Goldner helped to introduce Kravtchouk to the concept of natural filaments as a reinforcing material, and they explored everything from coffee beans, pineapple, and hemp to algae, coconut, and flaxseed. They found that some natural fibers offer excellent vibration-dampening properties.

Tarform decided it was wisest to stick with established materials such as aluminum for the key structural parts, but is striving to find ways to use bioplastics and sustainable processes wherever possible.

It also aims to keep its older, used bikes out of landfills and on the road longer by applying the concept of modularity to enable the easy swapping out of various components. "It's more impactful to make products that last," Kravtchouk says.

Seeking Client Input

For its Founder bikes, the client will be actively involved in deciding on some of the materials used. And given that some of the green materials that Tarform is offering haven't yet been able to undergo long-term durability



The Luna model will be priced at \$24,000 once commercial production begins in 2021. Courtesy of Tarform



The Luna e-bike's smart technology includes blind-spot protection and a data-rich dashboard that pairs with an app to provide riders with a wealth of information. Courtesy of Tarform

testing in these applications, Kravtchouk says the company is advising buyers of its custom-made bikes of all the pros and cons, and offering to replace any components for free down the road, if necessary.

"The journey is more important to us," he explains. "We want to be that case study."

Tarform worked to avoid using glues and adhesives as much as possible, Goldner says, but they are still important in some applications. In those cases, the firm is working with suppliers to apply existing "reversible" adhesives that can be chemically undone when the time comes to remove a fixed component.

"We're trying to ensure at end of life of the body panels that we can separate out and reuse the fiber," Goldner says. Typically, such composite parts would simply be ground up. "We want to use chemical recycling to disassemble the composite parts."

Making e-Bikes 'Smarter'

Not all of the Luna's noteworthy features are materials focused. Some are "smart" and leverage today's technologies. For rider safety, Tarform is incorporating blind-spot protection with both haptic feedback (via seat vibration) and visual signals on the front "dashboard" when another vehicle is alongside or too close in an adjacent lane.

Technology built into the bike, combined with a mobile

app, will offer data about the ride including battery health, an instrument to track acceleration, and more. This information is designed to help riders assess how aggressively they have been driving and how they can enhance eco-friendly performance, for example, by being smoother on the throttle.

Tarform e-bikes also will include regenerative braking, which converts the kinetic energy generated and sends it through the motor back into the battery, to help “recycle” the electricity in real time. The rider can choose different percentage settings for this braking feature.

Tarform sources biobased epoxy resins from Hayward, Calif.-based Entropy Resins, which was acquired in January 2018 by Gougeon Brothers Inc. of Bay City, Mich. Entropy Resins claims to have been the first epoxy formulator to exclusively design its products to maximize biobased renewable ingredients.

Connora Technologies, also of Hayward, Calif., supplies Tarform with a reversible “hardening agent,” and both materials are sent to the firm’s composites fabricator, Tannermatic, of Hull, Mass., explains Goldner, “which combines the two components of our resin and impregnates our natural fibers.”

Connora pioneered the concept of recyclable epoxy resin technology, based on a proprietary polyamine synthesis

platform it calls Recyclamine. On the company’s website, Connora describes it as a low-energy recycling process specific to its epoxy resins that can reuse both manufacturing waste from the process, as well as end-of-life products. The firm says it can recover high-value materials such as carbon fiber in near-virgin and woven form. In July 2019, Connora’s long-time partner, Aditya Birla Chemicals Thailand Ltd., acquired the Recyclamine technology.

One problem today, Kravtchouk suggests, “is that we have no relationship with the products we use. Our vision is to get people excited about the way things are made.”

ABOUT THE AUTHOR

Robert Grace is a writer, editor, and marketing communications professional who has been active in B2B journalism since 1980. He was founding editor of and worked for 25 years at *Plastics News*, serving as editorial director, associate publisher and conference director. He is now both editor of SPE’s *Journal of Blow Molding* and a regular contributor to various outlets. A long-time member of the Industrial Designers Society of America, he runs his own firm, RC Grace LLC, in Daytona Beach, Fla., and can be contacted at bob@rcgrace.com.



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