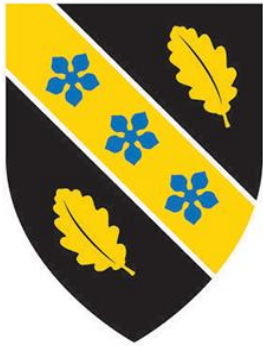


University of Wales Trinity Saint David

Wales Institute of Science and Art



Prifysgol Cymru

Y Drindod Dewi Sant

University of Wales

Trinity Saint David

Motorcycle designs; affected by emission regulations

Megan Gwilym

2200683

05/10/2022

Academic Skills ACHA4005

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Introduction:

Within this paper you will find research into the history of electric motorcycles, the invention of the iconic classical designed bikes and how they can affect the power and care of the motorbike. I will also be investigating the future of motorcycle styles and whether we are losing the iconic American styled bikes we see.

Literature review:

A brief history:

The first documented electric motorcycle that has exceeded 100mph was built by Mike Corbin's company, that in the early 1970s was one of the leading pioneers in the production of electric motorcycles. However nowadays Mike Corbin's company is well-known for its custom motorcycle seats.¹ Due to gasoline shortages in the early 70s this company decided that an electric motorcycle would fit their company and appeal to the public.



The bike was called the XLP-1 'City Bike' and claimed to have a range of 30-40 miles at 30mph, with a battery life of 6000 miles². The weight of the bike is around 145kg with three lead acid batteries that held 4.7kWh of energy, which is less than half of most modern electric bikes. As you can see the design of this bike is very restricted due to the weight and size of the batteries needed to run the bike. Throughout the years the batteries have greatly improved freeing more space for the design of electric bikes however, compared to the classic and famous designs of motorcycles there is still a long way to go.

The question that I have is why aren't electric motorcycles as popular? The public have access and knowledge of them, and yet regular engine motorcycles are more popular with the public. The most likely cause of this would be due to the costs between an electric motorcycle and a regular engine, with a regular motorcycle being priced at £1,500 to £30,000 and then an electric motorcycle being £2,000 to £90,000. Most companies are now focusing their efforts on electric motorcycles due to the damage that regular engines do to the environment with the effect their motorcycles have on climate change being a key question from governing scientific bodies. The change from regular to electric motorcycles is large, gaining a greater understanding of what restrictions and design decisions are made is the aim of this essay.

¹ Spragg, N. (no date) *Pioneer: the story of the world's first electric motorcycle* - Carole Nash, Carole Nash UK. Available at: <https://www.carolenash.com/news/bike-news/detail/pioneer-the-story-of-the-worlds-first-electric-motorcycle> (Accessed: 22 November 2022).

² Spragg, N. (no date) *Pioneer: the story of the world's first electric motorcycle* - Carole Nash, Carole Nash UK. Available at: <https://www.carolenash.com/news/bike-news/detail/pioneer-the-story-of-the-worlds-first-electric-motorcycle> (Accessed: 22 November 2022).

Harley Davidson:

*'Harley-Davidson was founded in 1903 in Milwaukee, WI and officially incorporated in 1907 with Walter Davidson acting as the first president. Arthur Davidson became the first general sales manager and the secretary while William Davidson was the first works manager. William Harley, meanwhile, became the chief engineer and treasurer.'*³



Comparing Harley Davidson with one of their biggest competitors, Yamaha, it's clear that a Harley bike is indeed powerful but lacks the experience compared to most Yamaha bikes which are a more economic choice, with plenty of power on tap, suitable for a wide variety of riding situations and is better at cornering than the Harley⁴. Even with this information Harley Davidson will always be one of the greatest motorcycle creators due to it being a cultural icon, which is hard to beat in terms of historical impact and legacy⁵. The reasoning behind its fame is due to the classical design Harley Davidson has created and stuck with throughout generations. Although, by doing this they have neglected the opportunity to improve the power of their motorcycles.

Discussion:

Livewire:

'Livewire', being the name of Harley Davidson's first electric motorcycle, follows Harley's tradition of drawing attention to the engine, only in this case the engine is an electric motor its power is being drawn from a lithium-ion battery; however, it is important to note that the lights, horn, TFT display and so on are powered by a separate 12-volt supply.⁶

³ *H.O.g. history: Who were the founders of Harley-Davidson?* (no date) *Harley-davidson.com*. Available at: <https://www.insurance.harley-davidson.com/the-open-road/profiles/founders-of-harley-davidson> (Accessed: 22 November 2022).

⁴ *Harley Davidson vs. Yamaha* (no date) *Recomparision.com*. Available at: <http://recomparision.com/comparisons/100437/harley-davidson-vs-yamaha/> (Accessed: 22 November 2022).

⁵ *Harley Davidson vs. Yamaha* (no date) *Recomparision.com*. Available at: <http://recomparision.com/comparisons/100437/harley-davidson-vs-yamaha/> (Accessed: 22 November 2022).

⁶ Gear, T. (2018) *The Livewire is Harley-Davidson's first electric motorcycle*, *Top Gear*. Available at: <https://www.topgear.com/car-news/electric/livewire-harley-davidsons-first-electric-motorcycle> (Accessed: 22 November 2022).

Harley Davidson did try to keep Livewire's style traditional you are able to see that due to the size of the electric motor and the 12-volt being the power supply for the separate parts of the bike it had many restrictions in place to feel fully free with their design. The great difference in the style change means that without this information I and many others would've believed that Harley Davidson was looking towards a future of concentrating on the power and performance of the bike rather than keeping their signature design.

With this change in the company, the inventions and improvements on electric motors for all types of vehicles mean it may take a few years until Harley's are not restricted with the size and weight of an electric motor and then will be free to continue their classic designs, or even experiment with a style that hints towards the classic and iconic Harley Davidson with its electric motorcycle, Livewire.

Curtiss 1:

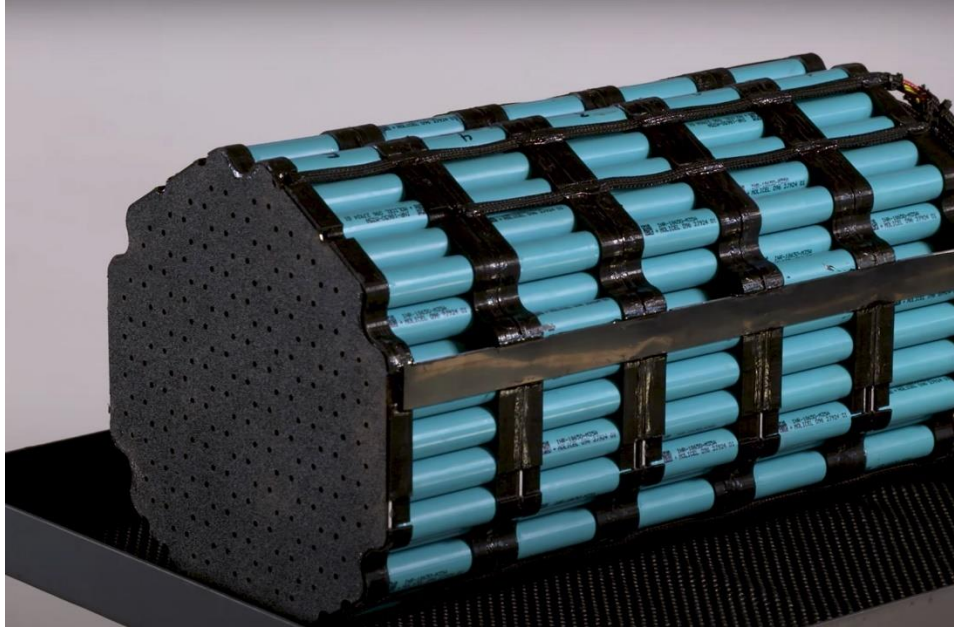


Throughout finding my research for this report I was inspired when reading an incredible article telling the story of a classically designed electric motored motorcycle named "Curtiss 1", created by Matt Chambers with the name being inspired by Glenn Hammond Curtiss, who was a pioneer of the early motorcycle industry⁷.

Just by having a glimpse at the style and small details of the Curtiss 1 any Motorcycle fan who sees a familiar design from the classical bike designs where the engine, or in this case a battery system, is clear to see. With the Curtiss 1 it is the main star of the model. Due to the change from an engine to electric motors a great change in Motorcycle designs was expected, however having done further research into the planning of the Curtiss 1's design Matt Chambers was dedicated to having the iconic design through true American inspiration. An important point to make about the Curtiss 1 that I would like to make clear is the clever crafted and powerful battery system used.

⁷ Baldwin, G. (2022) *The opposite of death - the Curtiss 1 electric motorcycle story, Return of the Cafe Racers*. Geoff Baldwin. Available at: <https://www.returnofthecaferacers.com/electric-motorcycle/curtiss-motorcycles-1/> (Accessed: 22 November 2022).

Many companies are taking the opportunity to prove to the public that they do care about the environment whilst marketing their electric bikes, however companies skip the fact that once the batteries die in five to ten years their motorcycles will end up in a landfill, this isn't the case with the Curtiss 1.⁸



They have created a modular battery system whereby the worn or obsolete cells can simply be replaced with contemporary technology which is a service that is offered to their clients. The bike is returned, the battery vessel removed, the old cells pushed out and replaced with new parts. The battery is the first full-emersion system used in EVs. The cells are liquid-cooled in the finned vessel, creating an operating temperature of just 31 degrees centigrade, which in turn eradicates the danger of fire.⁹

Conclusion:

As a result, due the size of some electric motors there is evidence that the designs of electric motorcycles are due to change and possibly be unfamiliar in the future. However, with cases such as the Curtiss 1 there is proof that electric bikes can keep the style of the iconic designs depending on the sizes of the batteries and what they use.

⁸ Baldwin, G. (2022) *The opposite of death - the Curtiss 1 electric motorcycle story*, *Return of the Cafe Racers*. Geoff Baldwin. Available at: <https://www.returnofthecaferacers.com/electric-motorcycle/curtiss-motorcycles-1/> (Accessed: 22 November 2022).

⁹ Baldwin, G. (2022) *The opposite of death - the Curtiss 1 electric motorcycle story*, *Return of the Cafe Racers*. Geoff Baldwin. Available at: <https://www.returnofthecaferacers.com/electric-motorcycle/curtiss-motorcycles-1/> (Accessed: 22 November 2022).

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