Stages of Developing the V-Rod

In the early 1990’s, the Harley Davidson Motorcycle Company was faced with a daunting challenge. Their business was being cut into by the newer, faster style of racing bikes. They realized that in order to compete, they would have to create a Harley like no other—easier said than done. Not only did they have to make this bike fast, but it also had to maintain the classic Harley style that their loyal fans had come to know and love. In order to achieve this, they had to overcome a plethora of structural issues. First off, the classic Harley frame wasn’t strong enough to handle such high speed cruising and their current engines weren’t powerful enough to reach the desired speeds. As they continued the developing process, they ran into even more complications: the design crew struggled to reach agreements with the engineering crew, they needed more space for air in the exhaust pipes while still maintaining their aesthetic design, the radiator wasn’t getting enough air to cool the engine, the engines weren’t surviving long enough during their “Dusseldorf Test” simulation and the gas tank could only be large enough to hold one gallon of gas. However, despite the innumerable roadblocks that kept them from their goal, they managed to overcome each obstacle one-by-one through years of hard work and collaboration.

In order to successfully complete a product it is important to gather information required to construct it. Harley was tasked with the job of fitting the new engine and fuel tank into the narrow body of their bike. What’s more, they had to figure out a way to curve their usually straight steel frames and then the adjusted steel frames would have to be able to withstand the
capacity of the engine. Additionally, Harley had to research how to construct this idea without going over budget. With all these complications in hand, Harley took help from Porsche automobile manufacturer. At the time, Porsche was the leading industry in designing and constructing engines in a sustainable and affordable manner. Harley then had to research a way to place the radiator in its optimal position where it would do its job of cooling the engine while being inconspicuous for the rider. One of the last problems that Harley had to investigate was a way to regulate the noise emitting from the engine of the motorbike. Due to various noise regulations throughout the world, Harley had to figure out a way to make a large exhaust for the vehicle while maintaining the iconic Harley style. These breakthroughs were turning points for the company.

The design team created a clay model of the motorcycle to gain a three dimensional understanding of any problems they may have been facing. Using this model they were able to communicate their ideas visually and effectively. After reviewing the model, the engineering team decided if the designs could be incorporated into the bike or if further redesign was necessary. It was the design teams job to maintain the Harley-Davidson “look” while the engineering team focused on constructing the mechanics to make the bike work.

When it came to finalizing an idea for the Harley, there were multiple groups that had to share ideas with each other in order to come up with the absolute perfect design and form for the bike. In one demonstration of collaboration, the design team and engineers were having constant back and forths about what was going to look good and what was simply going to work. In another instance, the developers at Porsche, who were working on an engine for the bike, had to be in collaboration with people at Harley Davidson to get the specifics of the bike and make sure
the engine they were producing was going to work for the type of bike Harley Davidson was looking to make. A few workers for Harley Davidson actually flew out to Germany in order to be in constant coordination with Porsche. Constant comparing and combining of ideas was crucial in getting this Harley on the road.

After these ideas were selected and the developers at Harley had a good idea of what they were working with, it was time to analyze what they had and come up with a design. The designers at Harley actually analyzed other bikes to take ideas and try to come up with something that was going to work. They had to solve the problem of making a Harley Davidson chopper fast. That was no easy task for the designers and engineers alike. They would come up with a design and it wouldn’t work out in some way, shape, or form so they would change the piece that didn’t work. However, that change would alter something else on the bike and it’s easy to see how the design for this bike turned out to be a very long and arduous process. One main problem that was presenting itself was that they couldn’t make the frame without a ton of welds because of the extreme angles the steel would have to be bent at. So, they decided on “hydroforming” a technique that uses water pressure to form the steel into the desired shape. Using this method they were able to construct a frame with an acceptable amount of welds. Another problem they were experiencing was that the radiator wasn’t getting enough air flow. So, the teams came up with a vortex generator. The design team did something so rudimentary as inserting cardboard fins into the radiator just to simulate the fins they would need, and it worked. After they figured out this technique worked, the design team got to the drawing board and made it pretty. There was much fighting back and forth and picking apart of everyone’s ideas, but the engineers, and the design team finally achieved a design they were happy with.
Since Harley was starting from the ground up with their new bike design, all of their prototypes needed to be tested. One of their new ideas included the use of a radiator. Harley had never used radiators in any of their bikes before, so they were extremely skeptical about putting them into their new design. The radiators needed to provide enough air-flow to cool down the bike’s engine. The vehicle had to idle without shutting down or overheating, and when the team tested this, the bike ran for over eight hours straight. When the team turned to Porsche for design help, several new ideas were presented including the following: the use of clay to form the exhaust pipes since mistake could have been easily fixed, forming an aluminum body since it was lightweight and corrosive resistant, and a plastic fuel tank since it was more durable and could hold about four gallons of gas. At first, the Harley team was unsure that these ideas would be effective in the design of their new bike because they were materials they were unfamiliar with using, but there was no way of testing if these additions would work. It was a matter of figuring out if the new ideas suited the overall look of the bike, which they did. Next a simulation was ran for the engine and it was tested on the road for durability. The bike passed the 500 hour-long “Dusseldorf Test” drive in Germany. Test drivers rode the motorcycle a total of over 80,000 miles to determine how good the quality was and they loved it. Later, the team tested if there were electrical interferences with the bike in a copper room to simulate waves created by the antennas out on the road. After that, the bike was put through a hogwash to determine if there would be any leaks or if it would still run afterward. It was also tested through fog, salt water air, acid rain, sunshine, and other elements. It is known that Harley’s motorcycles produce a signature sound, and the team wanted to make sure that the noise wasn’t too loud or overwhelming. To ensure this they used a holographic field to determine whether or not the bike
produced a suitable sound. Throughout the process of creating this new vehicle, a great deal of thought and hard work went into the prototyping and testing of the V-Rod. At last, after many years of perfecting their product, they achieved the test results they were looking for.