The Harley V-Rod

The V-Rod changed the world of motorcycles. The renowned motor company combined both the speed of racing bikes and the style of the classic Harley Motorcycles to boost consumer expectations around the world. From the first idea, in 1995, until the official release date in 2001, there were many compromises between the stylists and the engineering teams to complete the bike. The V-Rod is a perfect example of the lengthy engineering design process.

Identify the Need and Research the Problem

When the front office of the Harley Davidson Company began to see their revenues decline, they knew they needed a change. There was a heavy market for bikes with style and also a heavy market for bikes with speed, but there was no bike that had both; which the consumers demanded. The company had to research the market in order to create something that would interest everyone; something that had the speed that everyone desired but with the beautiful Harley style that everyone loved.

Develop Possible Solutions

After setting an objective to meet, the company started to search for different solutions. The design team began by looking at the engine of the VR1000, one of the most popular racing bikes. A liquid cooled engine, rather than air cooled engine, would allow the bike to rev higher and cool down faster. With 115 horsepower, 9000 rpms, and a max speed of 140 miles per hour, it would be able to satisfy the consumers. They tried to put the engine into their traditional Harley Davidson frame, but realized it was too big and too heavy for the original frame to
support. These engines were also extremely expensive so they turned to Porsche to try to find the best product possible.

Select the Best Possible Solutions

The first step to producing the V-Rod was to create a new frame; instead of a one bar support frame, they put two. They also needed to find a new way to bend the metal because welding the pieces would make the frame much weaker. They researched and found the process of hydroforming, which uses water pressure to bend the metal. A huge problem with the frame was lack of space for other necessary parts such as the gas tank. A metal gas tank was unable to fit in the small spaces so the engineering team came up with the idea of a plastic tank, which would be able to be molded to the desired shape. It also ended up holding more gas.

Construct a Prototype

In August 1996, the first prototype was made. It did not look good, but it tested the frame and the engine together. They considered it a success but they knew there was work that had to be done. Instead of adding to the physical prototype, they began to use 3D modeling and clay in order to design the final product. Using these methods made it easier and more practical to manipulate the product without wasting materials.

Communicate Solutions and Redesign

The bike faced problems with the exhaust pipes and the radiator. The radiator was not getting enough air which created another disagreement between the styling and engineering teams. The engineers wanted to be practical and efficient so the radiator would work, but the stylists thought that the style was the most important factor. After arguing about it they molded a radiator that both looked and worked great. Another problem was the exhaust pipes; however it was miniscule. They needed to be constructed to be able to meet noise regulations, but after they
found out about hydroforming, it was an easy solution. The last change everyone agreed upon was using aluminum for the frame. Aluminum made the bike strong, non-corrosive, and most importantly, aluminum made the bike look sharp so the customers would enjoy it.

**Test and Evaluate the Solutions**

Once they had the final V-Rod, they needed to test it. The first test they conducted was the Autobahn test. This five day process continuously ran the bike in order to test its durability. It made sure the engines had zero flaws and would be able to handle lengthy rides. Another test was a heat test, which made sure the engine would not overheat. The next test they used was the radio test. This test shot radio waves and other waves at the bike to make sure it would not malfunction due to interference. The last thing they did was make sure the engine and other parts did not hold water; they sprayed it with hoses for hours and made sure the bike still worked after.

**Conclusion**

After six years of work, Harley Davidson introduced the V-Rod, which was a huge success. They successfully combined the performance of a racing motorcycle and the style of a Harley by using the engineering design process. They began with a simple idea, built and tested prototypes and redesigned the V-Rod until it was complete. The customers and the producers were extremely satisfied with Harley’s latest bike.