The Harley Davidson V-Rod and the Stages of Engineering Design

In today's world, the stages of engineering design is used in every type of market to create products that consumers want to purchase and are pleased with. This process is made up of eight different stages that all play important roles when designing different products and help to explain the process of how items are designed. Every company uses these stages for all of their products. The Harley Davidson Motorcycle Company utilizes these steps during their designing process for all of their bikes. The one bike in particular that stood out in their fleet of motorcycles was called the V-Rod. It was the first of its kind as it had the perfect combination of speed, power, and astheticism. Through the eight step engineering design process Harley Davidson fabricated the new V-Rod motorcycle and made it one of the most popular bikes on the market.

The first stage of the engineering design process is to recognize the need. At this time, Harley Davison was one of the top motorcycle companies, but other kinds of bikes were growing in popularity. Companies were manufacturing sports bikes that were very fast and powerful. Harley Davidson realized that they needed to step up in the motorcycle industry and create a bike that could compete with the others. They needed to design a bike that was much more powerful and fast than any other motorcycle Harley Davidson had. Along with the speed and power, the company also recognized that the bike they needed to design had to be a sleek looking bike like the others of its kind.
The second stage of this process is defining problems with the creation of the bike. This process can repeatedly be used because new problems arise constantly and the company is trying to design the perfect bike. Some problems that Harley Davidson had to overcome was that they had to make an engine that was fast, affordable, and reliable. This bike was going to be much more powerful than any Harley bike before so they were working with a whole different engine. Another problem they faced was with the frame of the bike. It had to be stable and also had to fit a bigger engine. The company was known for a basic frame with a bar running down the middle. This design would not work for this bike though due to the bigger engine needed, so the company designed a new framework that had two bars split and surrounded the interior of the bike. Finally, they had to specify the problems they had with getting air to the radiator. Allowing the right amount of air to the radiator is a key role in the bike running properly because the bike needed the air to cool down the engine. After many tries and drafts, Harley Davidson had created a new design for the air scoops on bike that allowed enough air to reach the radiator on this new powerful bike. This process helps everyone know what problems they are facing so they can then solve the problem and help make the products the best they can be before entering the market for individuals to purchase.

The third step in the stages of engineering process is to gather information. This step is one of the most important ones because it helps the company learn about what they need and what they need to do to make their product better. During this step, the Harley Davidson motorcycle company looked at dragster motorcycles to gather information about what kind of fast racing engine to put into the bike and to help the sleek look of the bike. They noticed that these dragsters were longer and lower bikes than most and that is how they needed to design their bike. Along with looking at dragster bikes, Harley Davidson also went to the company in Germany called Porsche. There, they studied new racing engines and figured out which engine
would be best for the new V-Rod. Also, the company studied different materials and learned how to forge them into the desired shape for the bike that they were designing. The company ultimately used a hydroforming process to reduce the number of welds on the bike frame. Doing this allowed the company to make this bike much stronger and durable which was needed for a powerful bike the V-Rod. Gathering information is important on any topic, but especially when designing something for the public as popular as this bike was going to be.

The fourth stage involved selecting which ideas could potentially develop into solutions for the V-Rod and were the brainstorming stages for the bike. This is a very long process that looks over different ideas for the bike and all of its options. One of the first things the company had to brainstorm was the look for the new bike. They sketched many different models trying to combine the classic look of a Harley Davidson with the fast look of a dragster and other new bikes in the motorcycle industry. This took many sketches, computer designs, and models. Then, they moved on to look at different frame structures, focusing mostly on the strength, power, and simplicity. The company had never created a bike this powerful yet so the structure of the bike was going to be different than usual. Harley Davidson also has to consider the different avenues regarding the radiator of the bike. They had to ensure that there was enough airflow to prevent the radiator from overheating, while still maintaining the classic, sleek look Harley Davidson was known for. This bike was not brainstormed in a day or two, the company took a tremendous amount of time to perfect this bike and worked on it for a total of six years before releasing the V-Rod.

In the fifth step of the stages of engineering design, Harley Davidson compared, combined, and selected their ideas for the V-Rod. The company used different clay models of bikes to visualize what it would look like without actually building a prototype. The design team also had to decide how and where to attach the exhaust pipes to the bike without making the bike
lose its sleek look. In addition, to keep adequate airflow to the radiator, the design team tried many different designs and came up with using fins to create a vortex generator to get airflow to the radiator. When deciding on where to put a gas tank, the team tried different ideas as well and came up with the idea to put a plastic gas tank under the seat which could be molded into the shape of the motorcycle. The gas tank for the V-Rod was actually made out of plastic which was never used before by the company and held more gas than they had expected. The company also had to select a name for this bike and that was not easy. It took them many years to pick the right name but finally they did, and the bike was called the V-Rod. This stage plays a big role in the final outcome of the bike because this stage picks certain ideas. The design team compares many different parts to one another and combine things to make them better. Doing all of these things allowed Harley Davidson to create the best bike possible for the market.

In order to begin building prototypes for the V-Rod, the Harley Davidson Company took the next step and analyzed the design concepts. They utilized design software in order to create 3D visuals, which allowed the designers to visualize the different models and combine ideas. These 3D models could be easily changed, which allowed the designers and engineers to work together and compromise. Soon after, Harley Davidson designers began to create 3D clay models, which provided a to scale model that allowed the designers to examine their computer designs. As well, it allowed them to fine tune potential designs and consider other options that are more functional and visually appealing. These clay models allowed for easy structural changes and concrete designs, which paved the way to the next step, prototyping.

With research and design being complete, they then had to fabricate the parts for the prototype which is one of the last steps in the stages of engineering design. Many of the parts they used were handmade with others being made in their factory. After putting everything together, they finally had a bike they could test. They would test the prototype they made by
putting it through driving tests, bump road tests, and many different weather tests. Harley Davidson would also put each individual part through a wear test to see how much they could do to it before it broke. They bike took a lot of abuse and handled it all. After testing and redesigning new prototypes throughout the years, Harley Davidson finally had bike that would sell off the shelves. The bike was built the best it possibly could and after testing the prototypes, Harley Davidson proved that this bike was revolutionary.

The final step in the engineering process is for the company to communicate their new design. They did this through verbal, graphic, and written communication. At a bike show, Harley Davidson unveiled their new bike to the public. At this showing the company explained how the bike worked and all of the steps they took to make it the best it possibly could. To communicate the design graphically, the designers used CAD software which showed the other designers what they created. The Harley Davidson motorcycle company effectively used the engineering design process to effectively communicate the V-Rod motorcycle.

In conclusion, Harley Davidson, one of the most popular motorcycle companies in the world used the eight stage engineering design process to create a top of the line bike for the market. They used each step to help make this bike better and work more efficiently. The engineering design stages are a long process, but work very proficiently and overall the V-Rod motorcycle was one of the most successful bikes to date.