The Stages of Engineering Design of the V-rod

The first step in any engineering design process is to recognize the need. New customers wanted a faster bike but didn’t want to change the Harley design. They needed a bike to appeal to consumers that included the classic Harley design as well as speed and safety. In order to keep the Harley name at the top of the market, they needed to innovate new technological ideas that can be implemented on the classic Harley design.

The problem for this idea is that they needed to make a new design from scratch, since the old one was not sufficient enough to include and fit all of the necessary parts. They needed to redesign the frame so that the engine and all other parts would fit. The company needed to find an engine that would be cheap enough for the average consumer to afford but also needed to be faster than past engines and safe as well. Originally, the company looked at the VR1000 racing engine, however it was too big to fit into the frame.

A lot of brainstorming was necessary to decide where to place everything and still make the bike look good with the classic Harley design. The company turned to Porsche to design a better liquid-cooled engine that was more efficient and still looked cool. A larger muffler was needed for the bike to keep within noise regulations on the roads. The original design of the 2 chamber muffler was too bulky and did not look appealing to the buyers, so they were able to add a third chamber that was easier on the eyes. A second bar was then added onto the frame to gain more stability. They wanted an easier method of manufacturing the frame because old
methods bent the frame past its limits. A new method using water to bend the metal was utilized, creating a solid, stronger frame. It also looked better because it involved less welding.

Many sketches were created from different angles and perspectives to analyze the overall dimensions of the bike. In order to conceptualize a 3D model that could easily be modified they used clay models to sculpt the bike. After many changes were made to the model, the company went on to make a prototype. After prototypes were fabricated they went on to be tested for different situations that could occur on the road. Examples include, a shaking test to resemble bumps, a radiation test to ensure radio waves don’t interfere with the bike, a water test to see if there is any leaking present, and a road test to make sure the bike doesn’t overheat.

Good communication was needed between the various teams of the project with the head of the company. Sketches and 3D models were necessary to better communicate different ideas. The team was told to go back and redesign their model during many steps of the engineering process. The head of the company was able to drive the prototype himself to see if he wanted to make any changes. Over a period of 6 years, the bike was finally finished. It was presented to the public as the V-rod, a bike that was innovative in many aspects of the motorcycle market.