Harley-Davidson V-ROD Motorcycle Engineering Process

In the mid 1990’s, the Harley Davidson Motorcycle development team wished to develop a faster motorcycle model to compete with the newer sports bikes on the market. Harley Davidson has always been known for their “look” and sound of their motorcycles rather than the speed and agility, like the competition’s street bikes. The engineers at Harley Davidson felt a need for a new and improved motorcycle. They began using the stages of Engineering Design to build their new model.

The first step of engineering design is to recognize a need. William Davidson, son of Harley Davidson, felt there was a need to build their motorcycle with more speed, power and agility in addition to the Harley look and style already achieved. There was a market pull for motorcycles with speed and power due to the new street bikes on the market and peoples’ desire for them. Also, there was a technology push; with new engines and updated systems that urged Harley Davidson to build a new motorcycle.

The next step of engineering design, defining the problem, was Harley’s design’s teams’ next objective. There were many problems of this project to make a bike that had great acceleration but also the Harley design. They encountered problems like the size of the new motor was too big to fit or that the radiator just didn’t fit with the Harley design. These were just two of the obstacles that they faced while trying to design this motorcycle. These problems were approached by a group of engineers and designers working together.

After defining what had to be done, they gathered information. In order to research and design their new engine to make the motorcycle run close to a street bike, they consulted the
experts. They went to Willy G, an engine maker, and Porsche, one of the world’s best, and fastest engine makers. They found that liquid cooled engines were now being used in vehicles. They asked Porsche for help developing a liquid cooled engine with the classic v-twin look. This in itself was a problem, which led back to defining the problem. Trying to fit a liquid cooled engine in a small bike was a new challenge; but they were up for it. Their design sculptor at Harley carved many different models in order to find the right one. They used other resources in addition to these to solve their problems in designing this bike.

After they gathered information from experts in their fields, they brainstormed with each other to generate their conceptual ideas. They knew for sure a few things that they wanted in the cycle. They knew that their new motorcycle was inspired by dragsters but did not necessarily want to look just like them. They wanted Harley’s recognizable front end and side profile on the bike, the “look”, speed, agility, power and they wanted it to be a simple, direct, artistic model. After they talked with their teams, their conceptual ideas were broad but certain. Although they brainstormed these ideas, they were open to changes as they went along. Due to the fact that Harley had many different teams working on their own ideas, they had to compare, combine and select which ideas were the most important to their model. They selected these: the “look” of Harley, the speed and power of a street bike, and the race engine were all needed. The design team got to work on the look, the engine team got to work on the new engine to fit the design and they even had a team for naming the vehicle.

After their concepts were clear to them, they did many trials of fabrication and testing of their model. It happened many times that the design team had a good look that was satisfactory but then when they consulted the engine team, they realized the two designs did not
mesh. They had to start all over. They discovered after a few trials that they needed two rails on
the front of the bike instead of the usual one. Also, the fuel tank was in the way so they designed
the bike so the fuel tank was placed under the seat of the bike. They had many problems with the
radiator of the bike. It was not cooling the bike enough when it ran. They designed multiple
different models time and time again until they came up with the right fit for the bike. They
finally came up with their first prototype, which ran and looked the way they wanted. This first
prototype was changed after the fact, but it was a huge stepping stone. In the end they came up
with a Harley that looked sleek and manly, drove with power and speed, purred like a Harley and
rode beautifully. All that was left was the name. The name design team spent hours
brainstorming names and trying to find the right one. They finally came up with the V-ROD in
honor of the V engine of the cycle.

The last step of engineering design is communicating the design. Throughout the
process of making this motorcycle, they communicated it many ways. They used computer
programs to make a 3D model of their ideas and look at them at all angles. Also, for design, they
used clay to sculpt the motorcycle because it was easy to change. The three types of
communication of engineering design are verbally, graphically, and written. Throughout the
whole process, they verbally communicated all the time. They consulted with each other and
with William Harley for ideas. Graphically, they used the computer graphing design programs in
addition to drawings on paper and sculpture. And finally, they wrote down their ideas to keep
them organized and on task with each team. Communication is a huge part of designing a new
model especially with all the different people working on the project.
Six years later, Harley Davidson came up with their perfect V-ROD. The V-ROD had the Harley look, and sounded great, in addition to running efficiently, cooled properly, ran fast, had power and was a bike that everyone wanted. When they revealed their design, the crowd went wild. The six years of engineering design and hard work paid off and the use of all the stages of engineering design enabled the team to work swiftly and successfully.