V-Rod; Engineering Design Process

In Harley Davidson V-ROD motorcycle documentary, the top secret digger project team struggled to create a new revolutionary bike. The team had to overcome many obstacles because the design team and the engineers clashed. To overcome these difficulties, the team had to follow a general engineering design process to meet the standards given to them by the team leaders.

In the end of the 20th century, other motorcycle companies were controlling the bike industry and leaving Harley-Davidson almost bankrupt. Customers were more interested in other new technology rather than just the Harley style. Therefore, the main problem was to compete with modern motorcycle technology in terms of speed, but also to maintain the Harley-Davidson classic style. To do so, the team had to incorporate an engine that could provide that speed, but also leave enough space for the rest of the important features. First, the team decided to use a VR1000 engine to meet the speed requirements, but it caused more problems than it solved because of its grand size. Thus, the team consulted with Porsche to help them create a new VR1000 engine that would fit into their design.

With these new engine, problems arose, but nothing the team couldn't handle. The bike needed a stronger support frame because the engine caused the design to have many curves. Back then, this could only be put together by binding two tubes making the frame weaker. So when a new hydroforming technology arrived into the market, the team jumped right into it which allowed them to have a stronger frame.

Then, with the new two rail system the team needed to find a new location for the gas tank. After trying different locations for it, they finally found the perfect spot under the seat, but with the space limitations they had to mold the tank by making it out of plastic. Something they’ve never done before. In addition to these problems, they came across the engine overheating, so they needed a radiator. To not make the bike not look cheap, they decided to place it behind front tire instead of the front of the bike; however, the front tire blocked the airflow. To overcome this, they gave wings to the radiator which allowed air to flow smoothly through the engine.

While trying to fix these problems, the engineers had to make changes and adaptations to satisfy the designers. The engineers were not just trying to produce successful technology, but they were trying to make the features aesthetically attractive. Even though the engineers
made astonishing discoveries, they still had to start over if the designers did not approve of the bike’s look.

But first to communicate their results, they had to create prototypes that the designers would approve of. Creating a model out of materials used in the motorcycle is very costly and wasteful. Because of this, the team started with drawings on paper to help themselves and other members understand what they want the final model to look like. They used the drawings to create graphic 3D models to more accurately understand the dimensions and size of the bike and its parts. One member created a to scale clay model to help point out minor problems in the design. These models helped the team to communicate their ideas to one another.

Every with the final product completed the motorcycle wasn't ready to be put on the market. Throughout the process of creating the prototype, many of the parts and even the full motorcycle itself had to go through stress tests to ensure the bike could withstand any condition it was put in. Baselines like the Autobahn test, which simulated the bike traveling along the German highway at different speeds for long periods of time. This test, made for the engine specifically, would ensure that it could endure any roadway the bike was challenged with. Other tests included power washing which simulated heavy rain, different radio wave tests, and a final test by Willie Davidson himself. With the final product the team still had to make sure it followed federal and state law. The bike had to meet sound regulation requirements in order for the bike to be sold on the market.