Stages of Engineering Design

To learn the stages of Engineering Design, the students watched the documentary, V-Rod. In the documentary all of the stages of the Engineering Design process were put into use to make a revolutionary new motorcycle. These include, recognizing the need, defining the problem, gathering information, generating conceptual ideas, compiling and choosing ideas, analyzing and designing, fabricating and testing prototypes, and communicating the design.

The company, Harley Davidson’s, stocks started to fall as the public’s interest in a faster motorcycle began to rise. The public’s desire for speed and power contradicted Harley’s signature style. Since Harley was known for their signature sound and design, manufacturing a motorcycle to accommodate the public’s interest seemed impossible. The first step to creating this unprecedented bike was to turn it over to Willie G Davidson. He gathered ideas from racing bikes and dragsters to make the overall design of what would eventually be known as the V-rod. After finalizing a design, it was up to the engineering department to make the idea a reality. In doing so, the engineers discovered flaws, especially related to the frame. The original single-rod frame could not support the power of the new engine. The chief engineer developed a double-rod system that utilized the new technology of hydroforming.

Because of the compact frame the engineers had trouble fitting key features into the frame such as the engine, gas tank, and radiator. Harley looked to their racing team’s bike for a powerful engine and to Porsche for the longevity and durability. After months of testing, identifying the issues, and fixing them they finally came up with an engine that lasted 500 hours of rigorous tests. While they were working on the engine, back in Milwaukee the engineering and design team was working on an inconspicuous radiator. The team brainstormed to come up with a design that remained functionable while still keeping the sleek style of the classic Harley Davidson model. Finally, after months of trial and error, the team stumbled upon the idea of
using fins to increase airflow to the radiator. The limited space made it impossible for a decent sized gas tank. The fix to this was a plastic mold capable of fitting into a tight space and holding a substantial amount of fuel.

Nearing the end of the project, the last major hurdle was the exhaust system. As the engineer was looking at the clay model that design made, it was determined that the exhaust system was not functionable. The engineering team came up with a solution to conceal a single barrel as a double barrel, which would sustain the look while functioning properly. Once the prototype was finished, the team at Harley Davidson began a series of grueling testing that included riding the bike for hours on end, beating up individual parts, subjecting it to harsh environmental conditions, and putting it into an anechoic room to identify unwanted sounds. After six years, the V-Rod was finally ready to be revealed at the Harley Davidson Expo. The revolutionary bike was an immediate success and the Harley name was once again on top.

In conclusion, although the V-Rod encountered many problems, by sticking with the Engineering Design process the bike was successful. The motorcycle team solved the enigma of creating a new type of Harley bike that would meet the consumer’s needs while also retaining the Harley style by identifying the problems of such a motorcycle and ultimately turning those problems into solutions. Thus, leading to what is now known as the V-Rod.