The first stage of the engineering process is to recognize the need for a product. In order for a product to be profitable, one needs to recognize the market pull or the want of a better product. In the V-Rod documentary, the market pull could be identified as the younger generation desiring a faster motorcycle thereby shifting the focus of the motorcycle industry in that direction. In the video, the Harley Davidson Company recognized the demand for a faster motorcycle and therefore began designing a faster tradition style Harley Davidson. In order to keep up with the newer technology, Harley Davidson had to find a way to reach high speeds without overheating the tradition air-cooled Harley engine.

There were numerous problems that arose while conceptualizing this new faster engine for the new model Harley. Being too weak to sustainably hold the power of the engine, the designers and engineers had to design a new frame. Another obstacle was increasing noise regulations as well as new design for the radiator.

Before manufacturing a new bike, designers and engineers researched the capabilities of racing engines and their liquid cooling systems. In order to meet noise regulations, the Harley team researched the appropriate noise limitations around the world for all customers. The team realized they needed to collaborate with Porsche to make the racing engine small enough to fit the bike.

To redesign the frame, the engineers proposed a double-bar frame that accounted for the power of this new engine, giving the bike structure and stability. In an attempt to keep the engine from overheating, the engineers conceptualized different prototypes of a wider vortex radiator. The idea of the gas tank was to use plastic instead of the traditional metal gas tank in order to mold into unorthodox shape while holding the most amount of gas.

The body of the bike seemed too impractical using the welding process because of the amount of welds making the frame weaker. Thanks to the research team, the engineers found a way to bend the frame with less welds using hydro-bending. Aluminum was utilized in the final frame-work because it was cheaper and lighter than steel. The design team also altered the radiator fins to maximize the amount of air reaching the engine in order to cool it. In the end, the ingenious wind fins created a vortex effect which gathered more air in the radiator.

In order to facilitate the goal of meeting noise restrictions, the design of the muffler needed to be aesthetically pleasing as well as functional. They accomplished this goal by shaping a chamber in which the exhaust can be quieted before leaving the twin exhaust pipes. The design
of the liquid engine system became a problem when it disrupted the view of the engine. Therefore the team relocated the hose for the liquid cooling system vertically to emphasize the symmetry of the engine.

The Harley Davidson Company built prototypes to test the bike’s capabilities. One of these tests consisted of spraying the bike with power hoses for an extended time to check for shortages and other possible water damage. In the extreme heat of the Arizona desert, the bikes rotated between idling and cruising to simulate parade conditions. The radio wave chamber blasted the bike with a series of electro-magnetic waves to simulate interactions with the rogue signals. The bike was also tested with a series of road tests to examine the wear and tear of the motorcycle parts.

To effectively communicate the design the engineers and the designers collaborated with one another using pictures, clay models, and verbal communication. The process of naming the bike was done through the use of flash cards and plenty of time. The ending result was the name V-ROD. The team also held a convention to present the new V-ROD bike to the general public.