Very-Rigorous Original Design

The construction of the Harley Davidson V-Rod required a long, complex design process that took six years. The first step, was to come up with the idea of designing a new motorcycle. They wanted to keep the conventional style of a Harley Davidson, and combine it with the speed and durability of racing motorcycles. After thorough research, they decided to use the VR-1000 liquid cooled dual overhead cam two cylinder racing engine. Fitting this inside the old Harley Davidson frame would prove to be much more difficult than they thought when doing the modeling process.

The main problem, was that Willie G and the styling team often disagreed on the style vs. the practicality of the bike. For example, the styling team wanted a specific frame that was impossible for the engineers due to the numerous welds that would make the bike unstable. The stylists wanted the front tire to be further forward, to create the look of a racing bike.

Unfortunately, this led to instability. The initial radiator was too bulky for the styling team’s likings, but it needed to be large enough to cool the engine. The VR-1000 was not efficient or reliable enough for road use. The exhaust needed to be large enough to meet sound regulations, yet satisfy the styling team. There was not enough room for a large metal gas tank, so initially, the bike could only go a short distance before running out of fuel.
Not only was there the overall process of designing the bike, but also many smaller processes for each problem they came across. After several attempts to rectify the difficult construction frame, the engineers implemented a process called hydroforming that significantly reduced the number of welds necessary to obtain the desired frame. The team needed to change the geometry of the handlebars to maintain stability and keep the one of a kind racing look. After several redesigns, the engineering team implemented turbulence generators to increase airflow into the radiator without sacrificing style. In order to perfect the engine, the team paired up with the engine experts, Porsche. To fix the many problems they faced while creating the exhaust system, they added a single chamber between the double chambers to maximize internal volume. Finally, the team decided to use a molded plastic gas tank to form to the space under the seat and maximize its capacity.

A lot of research, modeling, designs, and testing went into each element of perfecting the V-Rod making it a spiral process. To test the all parts of the bike, they put it through a structures lab to ensure durability. To test the effectiveness of the radiator at speeds, the team put the bike in a wind tunnel to test how much airflow passed through the radiator coils. After testing the bike’s performance in gruesome heat, the engineering team decided to install two small fans to keep the engine cool while in idle position. They tested the engine running at full throttle with high load for an extended period of time to test the overall durability of the engine. Some other tests include putting the bike through all types of radiation, the hot wash, and a terrain course. Once all these tests were deemed successful, they marketed the bike and communicated the results to the world.
After six long years of planning, designing, and building the V-Rod, over and over, they finally completed the newest Harley Davidson. It was a big commercial success, everyone was happy, and it could not have been done without the basic engineering process.