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Engineering Process (from Harley movie)

The stages of engineering design are a universal tool that engineers use to develop new technologies or improve on existing ones. Even though the stages are not set in stone, engineers can go back to previous steps to change what happens in following steps. In the video about Harley-Davidson we see the engineers follow these eight steps to create a new motorcycle.

The first step of the engineering process is recognizing the need to create or improve a product. This would take into account the market pull and the technology push. In the video this step would be where Harley-Davidson recognized that they were losing customers to other companies who make performance motorcycles. The second step is defining the problem. Part of the challenge was to keep the style of a Harley-Davidson while matching the demands for speed. This was a problem because Harley's old frames weren't built to house a 150hp race bike engine. The third step is gathering information. Harley-Davidson had to take inspiration from dragster bikes and other performance bikes in the market. They also spent a lot of time collaborating with Porsche. The fourth step is to generate some conceptual ideas. Harley had to come up with a way to make it look completely different but still have Harley-Davidson-esque qualities. They had to balance what the engineers needed with what the stylists wanted. Harley turned design over to Willy G. Davidson. The fifth step is to combine, compare, and select the ideas that had been brainstormed. A problem with this step is that sometimes what the stylists had designed just wasn't feasible from the engineering standpoint. For example, the shape of the frame and the size of the radiator were all contested due to what was needed for the bike to run and what would

look good. The sixth step is to analyze and design. They to find what design of frame would work with the required engine. They had to learn how far they could bend the tubes for the frame without becoming too weak. The stylists would use modeling clay to create a full size visual that you can change aspects of very quickly. The seventh step is fabricating and testing prototypes. Porsche collaboration helped them create a bunch of engine prototypes and they would test each one individually. They tried different materials like plastic and aluminum. Each aspect of the bike had different ideas that they could try, allowing for the creation of many different bikes. The eight step is to communicate the design. They would create 3D models on the computer and also have full size prototypes that people could see and test.