

# Harley-Davidson Factory Racing Shift Skid

Harley-Davidson Factory Racing (HDFR) competes in the King of the Baggers series, a one-of-a-kind competition bringing together the best riders in the world to race 620-pound, souped-up Road Glide motorcycles.

## Challenge

In its final race of the King of the Baggers season, HDFR had an opportunity to secure first place at New Jersey Motorsports Park in Millville, N.J. The forecast called for rain, which meant a slippery track for the riders whose bikes exceed 180 mph. With a title on the line, the team could not afford a crash rendering the bike undrivable.

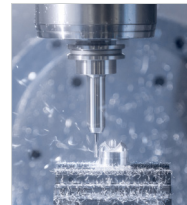
HDFR brainstormed ways they could keep the most critical components of the bike safe in case of an accident. The shift assembly—the component that allows the rider to shift between gears—is located on the bike’s left side in a susceptible position. Just days before the race, HDFR engineers began iterating a design that could keep the shift assembly safe, even if the bike went down.

## Solution

HDFR engineers designed a shift skid to protect the shift assembly. One important requirement was that it have enough thickness to take on the forces of a bike going down during a high-speed turn.

A second element required the part to be compact, preventing it from scraping the ground as riders lean to attack the track’s 12 challenging turns. To create a shift skid that could sit tightly against the primary case and out of the lean angle plane, HDFR engineers needed the tight tolerances CNC machining provides.

HDFR uploaded the final CAD file to Protolabs on the Monday before the race, and the part was delivered two days later. Quick-turn CNC machining allowed the team to install the new part before Friday’s qualifying events.



### Process

**3+2 axis CNC machining** for faster manufacturing time and tighter tolerances.



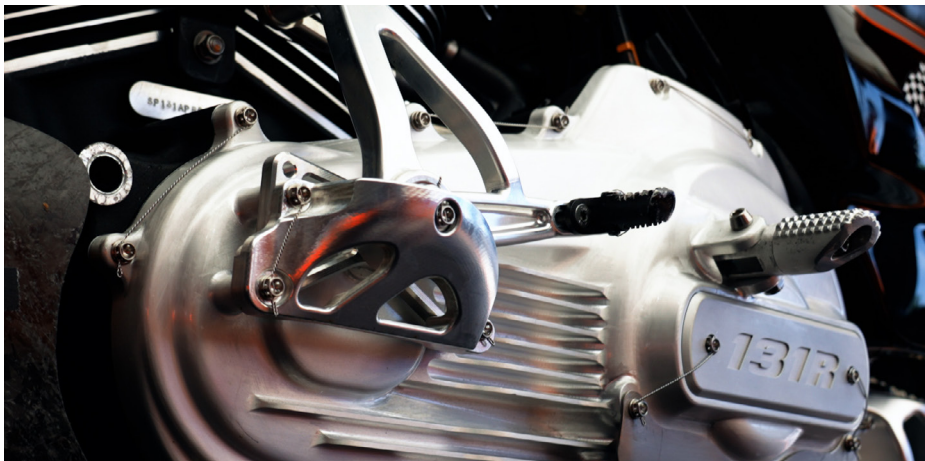
### Material

The team chose aluminum **7075-T651/T6** because it offers high strength/durability and can achieve tight tolerances.



### Application

The machined shift skid absorbs the forces of a crash, preserving the functionality of the shift assembly.



## Outcome

During the first race of the weekend, adverse weather conditions resulted in Kyle Wyman tipping over and sliding on the left side of the motorcycle.

Fortunately, the shift skid successfully protected the shift assembly, allowing Wyman to pick the bike up and continue in pursuit of vital championship points. Wyman ultimately won race two in similarly treacherous conditions.