

SEND LETTERS TO THE EDITORS OF MCN

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RE: AWW Wheel Failure

I am a former motorcycle dealer, well read in motorcycle engineering (just finished Tony Foale's new book, thank you), have worked as a motorcycle mechanic and built hundreds of wire wheels. Regarding the letter from John Fredrikson on the failure of the AWW aftermarket wheel: When I read it, I wondered if this was finally a wake-up call for a style of wheel that I keep seeing on Harleys, and that is designed so *wrong* it makes my skin crawl! I contacted John, he e-mailed me before and after photos, and it *is* the design I had worried about! In the interest of public safety, we need you to expose this to the next level.

In a properly designed spoke wheel, all spokes are under tension only! To illustrate: Visualize a wheel with spokes made of cable: Cable will hold tension, but not compression or bending forces, and that is how a proper spoke wheel is designed. In a proper spoke wheel, the spoke angles from the rim to a point partly wrapped around the

hub with each spoke crossing the others. There are several patterns, such as "cross three," "cross four," etc., and the higher the "cross" number, the more a sharp load pulls at a tangent to the hub for greater strength. In all of these designs, there are spokes going in four directions, clockwise angled right, clockwise angled left, counter-clockwise angled right and counter-clockwise angled left. When the bike is at rest, a minimum of four spokes are at or near straight up and are suspending the bike through *tension!* When power is applied, all of the spokes that go clockwise (viewed from the right from hub to rim) are under tension, and at no time is a compression or bending load applied to a spoke. That spoke angularity is crucial for coping with acceleration and braking forces.

The design that failed on John's H-D had 40 spokes in a "cross zero" design, aka radial (as if that was a good thing!). In such designs the spokes are under tension at rest, but under a bending load under power or

braking loads. They use huge spokes so the spoke can cope with the application of torque, but, as happened here, the ends ripped through the spoke holes.

That style of wheel should be limited to the auto shows only, but are being sold for street use. John is a mature police officer with a show-grade H-D, so I doubt he was abusing it, but a street-ridden machine should withstand anything you can do to it, including most crashes. Anyway, it ripped the spokes out of the rim after only 300 miles of touring-type use.

Engineers have worked for decades to bring the motorcycle to where it is today, and someone who does not understand the design principles can endanger their customers' lives by ignoring sound engineering principles and developing a product that is based on a "look"!

Dave Hopkins
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**American Super Spoke Wire Wheel—
 40 3/8" spokes in a radial pattern.**

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