



Behind the Wheels Podcast Transcription Season 2, Episode 4: Wheels of Shame Part 2

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You're listening to Behind the Wheels with Doug Mason, Dave Walters, and Mike Yagley. This is a show where we talk about heavy truck and medium duty axle ends. Doug, Dave, and Mike bring close to 100 years of experience and expertise in the transportation business.

Join us once a month to learn new things about axle ends. Sponsored by Alcoa® Wheels, the global leader in aluminum wheel innovation.

MIKE YAGLEY

Welcome to another episode of Behind the Wheels, I'm Mike Yagley.

DOUG MASON

I'm Doug Mason.

DAVE WALTERS

And I'm Dave Walters.

MIKE YAGLEY

So we always have a little fun with this. This is another Wheels of Shame, which is an episode we do occasionally, I think we did one before, and these are just wheels that we get in through our warranty center that have been just badly abused. And we actually hold on to them as educational examples that we show the engineers, we show the salespeople, and now we're going to be sharing them with you. We're going to be trying to describe what we're looking at. It's helpful, very helpful, to visually see what we're talking about here. We're going to do our best to describe it clearly, but always some of the pictures are worth a thousand words, and so we're going to be having these pictures in the show notes. If you want to see what we're talking about, go onto the website, take a look, and you'll see these wheels, which are just, I'll tell you, they're surprising how badly they'd been abused. Dave, I'm going to let you try and explain this first one. What are we looking at here? Try and describe it I guess; we'll start out with that.



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DAVE WALTERS

Okay. Basically, on a wheel, this is a big flat spot. And what happened to this wheel, it's a wide base, and it had a tire blow up. You blow out a tire, the first thing you start to think about is hitting the brakes. Well, when you hit the brakes and you don't leave up on the brakes, you're dragging that tire along the pavement as you're trying to get the truck to stop. And basically, it got really hot and he took away a bunch of metals, so there's a humongous flat spot. And when the guy called us, his comment was, "yeah, I blew out a tire and yeah, I hit the brakes, but it's got to be soft metal." That's our favorite comment, always tell you, "it's got to be soft metal."

DAVE WALTERS

And being in the aluminum wheel business for the past 32 years and then when you explain to them the heat treat process and all the bells and whistles that we put into making these, it is not soft metal. So it's a very interesting one to see how hot the wheel can get in a very short time when you're hitting the brakes and running across pavement.

DOUG MASON

What it reminds me of, Dave, is, if you want to visualize this, you get a huge chunk of sand paper and a circular piece of wood, and you start sanding that and just how you can remove the material so fast. Basically, I would imagine this is probably on an asphalt road where they did this and it looks like it was just sanded right off. When you get a chance to look at the pictures, if you guys go on to the notes, you'll see that this is about a nine-inch section of the wheel that's removed. The flange is just gone. So yeah, it's very impressive to see, and obviously if it was a soft wheel previously, it would have deformed and not have been removed like this here.

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MIKE YAGLEY

When folks are saying that they're dealing with a soft wheel, what they're talking about, and they may not even know they're talking about this, but what happens is like Dave was saying, our heat treat process, we call it the T6. That T6 is the recipe for heat treating. And what that does is that's what hardens the wheel. That's what really gives the wheel its strength. And when somebody says that they've got a soft wheel, what they're trying to say is that, "Hey, you guys didn't heat treat this wheel properly. The metal is soft. It's not strong like it's supposed to be." If there is a soft wheel out in the marketplace, which thank God that doesn't happen, the heat is what does that. We've had some shows on small wheels, and really small wheels are soft wheels.

MIKE YAGLEY

What happens is you heat up the metal and then the metal gets soft, it loses that T6 heat treat. What can happen is that the wheel will start shrinking on the open end, and it's the wheel is soft. It just starts shrinking a little bit on the open end and won't be able to hold the tire properly. If you drag a wheel with a load on it over asphalt, and it looks like this, that is not a soft wheel. That is a wheel that's been ground down to nothing, and that's exactly what this looks like. And I guess before somebody goes and starts talking soft wheel, you really need to understand what a soft wheel is. Soft wheel comes about because of heat and this is mechanical damage that we're looking at here.

DOUG MASON

Just to say, yeah, you're just going to get deformation if it's a soft wheel, if you've overheated the wheel in some way, like you said, it's just going to deform. It's not going to be removed like you see in this picture.

MIKE YAGLEY

Hey Dave, how should he have handled this? I mean, he's going down the road, he has a blow out, the tire blew out so there's no reason that the wheel should have been destroyed. He slams on the brake. What's the right thing for a driver to do?

DAVE WALTERS

Well, unfortunately With wide base, this is a wide base wheel, if you have a blowout, and this is one of the things that a lot of companies don't like about wide base, when you have a blowout with a wide base, that wheel's going to hit the ground and you're going to ruin the wheel. A lot of these guys used to tell me, road calls are extremely expensive, but you're not only buying a tire, which a wide based tire could be \$12 to \$1,500. You're buying a wheel, you're doing a road call. I mean, it's very expensive with a wide base. Now the benefit of course, the wide base is hauling more payload, but on a wide base that happens. Now, a lot of times what you see, this driver was on the brakes hot and heavy. A lot of them will hit the brake and then let up a little bit and hit it again.

DAVE WALTERS

It's just really their training. So, you might see two flat spots on a wheel and you're saying, "well, he hit his brakes once and then he hit him again." But on a wide base, unfortunately, you're going to do that. Now on a set of duals, because you have two tires and you have a blowout say on the outer dual, the chances of hitting the asphalt is slim to none because you still have the other one and vice versa. So, duels, you don't hit asphalts. Wide base you definitely hit asphalt.

MIKE YAGLEY

Okay. Let's move on to the next one. Doug, why don't you take a shot at this one?



DOUG MASON

Well, this one really is interesting from the standpoint of how much deformation we're seeing here. If you can think of one of our dual wheels and you have the open-end, you typically would see a nice round surface. Well, think about going around that outer rim and all of a sudden you have a tremendous dip in towards the hub and then continue on around the wheel. And this is really some real heavy impact situation where the flange has been bent dramatically, and we presume that they would have had air loss on this situation as well. And so, this is just the amount of force and what they would have run over or hit, not exactly sure. It looks like it only hit the flange, the open-end flange. It doesn't look like it hit the inboard flange from the picture. So that would be what you would describe this as, is just a large deformation that caused an unseating of the bead of the tire and created a flat.

MIKE YAGLEY

So the only reason we have these wheels is because these customers sent them to us thinking that, well maybe they would get a warranty return, that we would accept them as a warranty return, that it's somehow our fault that the wheel is damaged. Dave, do you have any background on this particular wheel? Do you recall this particular?

DAVE WALTERS

Yes. And the reason I've kept this one, because either I talked to the customer personally when we rejected, or one of my people do, but this one was probably the funniest conversation I had. I called the guy and I said, "we're not going to warranty this because it was an impact hit," and he says, "well, I hit a moose." And I'm like, "You hit a moose!" He says, "yeah, but I missed it with my front, I only hit it with my duals, and I don't think a moose could bend that wheel like that." And I'm like, "a moose is like hitting something bigger than a horse. We definitely don't warranty against mooses."

DAVE WALTERS

You know what I mean? That's not warrantable and he's like, "Well, I guess if you don't warranty hitting mooses, I guess I can't have an argument," but I still think that's what he hit was a moose. And he was so adamant he hit it with his front, but he got it with his duals, you know what I mean? And he's like, "it wasn't that big a moose." And I'm like, "well, any moose is probably [inaudible 00:09:55] so sorry, mooses don't count. Horses, cows, certain animals you hit, no." So that's what he hit, was a moose.

DOUG MASON

Wow, that tells you how tough a moose is, that's for sure.

MIKE YAGLEY

So that's what moose damage looks like.

DAVE WALTERS

That's a big moose.



DOUG MASON

That's funny. Let's move on then. And I guess this one is also very interesting because it's a picture of an aluminum wheel and a steel wheel duel with the steel wheel not looking so good. And Dave, I know that you really gave me some good insight when we first looked at this, so I'm going to turn this over to you again as to what happened here.

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DAVE WALTERS

I don't like the steel inner and aluminum outer. I know a lot of people run steel inners and aluminum outers, and this is what I'll tell in my story when I would go out and do training programs. Steel wheel flex rate, compared to aluminums are totally different. Steel wheel flexes are a lot more, they're thinner. They're not as strong as a forged aluminum wheel. So, what you have is you got two different flex weights. So even at the same air pressure, you got different flex weight. Then you put a steel wheel on the inside where it's harder to get to the valve STEM, especially when you're running an aluminum wheel to get to the valve STEM and say, you don't have the right air pressure. One of those wheels is flexing a lot and the other one isn't. So, when the steel wheel breaks out, it breaks out.

DAVE WALTERS

I mean, completely this one's got chunks missing of it and it breaks apart. And not only are you ruining your wheel on the inside, you're probably going to ruin your wheel on the outside. And a lot of times you can even ruin a tire or brake drums. So steel wheels and aluminum outers is not an application if you're, and I'll put an asterisk between this here, but if you're hauling very light loads and I mean, light loads like fiber glass or something like that, you're not hauling, your max load is maybe 15,000 pounds, you might be able to get away with it. But boy, if you're all in 80,000 pounds of steel inner and aluminum outer, it's going to cause you problems down the road. So anyways, that's what this picture is.

MIKE YAGLEY

So basically what's happened here is you have the ongoing flex, and you have just a hell of a lot of flex of that inner steel dual, and it just looks like it's broken into pieces. There's nothing left of the mounting flange that I can see. It looks like it's completely all gone.

DOUG MASON

It looks like there might be a little bit holding the aluminum wheel in position from the inner of the bolts circle or along the bolts circles, kind of what I see. And so they're fortunate actually, that that is still there or the outer would be wobbling all over the place.

DAVE WALTERS

Most of the time, the whole center breaks out of steel wheel and then it starts flopping around and that's always the aluminum outer and it can even get the tire and can even get the break drop. People always say, steel inner and aluminum outer, the flex rates are so greatly different. I mean, aluminum wheel, the thicknesses we make on aluminum wheel, forged aluminum wheel, there is no flex, where steel wheels are endlessly flexing as they go down the road.

MIKE YAGLEY

Right. That makes a lot of sense. That's just for our listeners knowledge. And aluminum wheel and the mounting flange will be typically about twice as thick, maybe a little bit more, maybe a little bit less, but in the hand hole area and the disc face there, it gets real thick compared to a steel wheel. And in this picture, you can see the wheel thicknesses, you can easily see the wheel thickness of the steel wheel and compare that to the aluminum wheel. And you'll see, it looks like two or three times the thickness, at least from the same angle. The aluminum wheel is like two to three times the thickness of that steel wheel. And although steel is strong, the mechanical properties of steel are certainly strong, there's some times that that thicknesses, especially when you're talking about stiffness, nothing helps like just having thickness there, having that mass, or I would say the dimensional thickness is what really stiffens things up.

MIKE YAGLEY

And like Dave has said, you will see a big difference between the two. And this is the first time I've seen this picture, Dave, and I guess this is sort of unusual. Usually we just see wheels. We usually don't see... This is a picture, it has, you can see the aluminum outer and the steel enter, and you can also see the brake drum and it's all on the hub. I mean, it's still part of an assembly. This looks like if you guys went out to the shop and actually took this picture. My guess is they didn't send this into us all as an assembly like this.

DAVE WALTERS

No, we actually, this is one that I went out to a shop and the guy's showing me what happened. So, I got a picture of it. And my comment, when I would go out to training classes after that, I would share this photo saying, "Hey, steel inners and aluminum outers, this is what can happen because of the flex rates." And so, it was a good tool just to have that picture. And I used to kind of kid everybody, I'm like, well, I'll be honest, my son actually said it. He's like, "you've been to every state, you've been to every continent except Antarctica to look at wheels, and it's amazing that they would send you all around." And I'm like, "yeah, I've been a lot of places." So, a lot of times when these photo ops come up, I love to take a picture and say, "wow, this could be handy sometime in the training session." It's a good one.



MIKE YAGLEY

Okay. I'll try and explain this one. This is a, basically this is a stylized wheel. And when we say stylized wheels, typically our wheels have just round hand holes. And this one has hand holes that have some shape to them, it's elongated hand holes, that's how it's designed. So, the wheel has these longer hand holes. And then what looks like has happened is the wheel broke from hand hold to hand hole. So, there's a crack that went from one hand hole to the next hand hole. And I guess from an engineering standpoint, I find it interesting the way it cracked. It cracks down toward the hub and then goes back up toward the next hand hole and then down towards the hub, sort of making a zigzag shape as it works its way around the wheel. It looks like the photo only shows like four or five handholds here, but it looks like the entire mounting section of the wheel is removable now, that it's been broken 360 degrees all the way around. So, Dave, any stories behind this one?

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DAVE WALTERS

Oh, absolutely. Like I said, I only ever kept wheels that I really found a great story. This is actually from a coal hauler. And this coal hauler, I really don't want to mention the state, but in this state, they were very brazen about overload. And the one time I was down there and he had this wheel and I'm like, "wow, the loads that you're carrying," and he's like, "no, I'm really doing a good job. I'm cutting my guys back." And I say, "well, what do you mean you're cutting your guys back?" He says, "cutting them back to 90 tons." I said, "90 tons? [inaudible 00:17:45] Anything over 90 I'm not paying them for no more."

DAVE WALTERS

And I'm thinking of the whole tractor trailer, he's talking about just the load. The legal payload is 23 tons. "You can't make no damn money at 23 tons" is what he said to me. So, I'm like, "Oh boy, here we go." And I'm like, "I think you need severe service wheels and there still won't be in warranty." Needless to say, the DLTs in the state now don't allow that kind of stuff to happen anymore, but this is off a coal truck. And if you look at the wheel on the photo, it's as dirty as you've ever seen and smashed. And we always say poor inspection protocol. You know what I mean?

DOUG MASON

To allow it to get that far, but it brings up a very good point about just overload in the design of the wheels themselves. I mean, these are designed very, very carefully and there's a lot of technology that goes into them. A lot of testing accelerated testing at high loads to ensure there's a margin of safety. And so like you said, Dave, you go out and you take a look at these things and you know that the wheel is designed to handle the load the vehicle is rated to, the axles are rated to, the tires, everything, the whole system together. And I'm presuming that if they're having issues like this with the wheel, they're probably having issues with other portions of the whole suspension as well. That's a tremendous overload.

DAVE WALTERS

Their tire life is next to nothing. They go through brake drums and brake shoes because they're trying to stop these, but all they're trying to do, and I really appreciate American ingenuity, it's about how much coal could you run across the scale. And if they legally ran that, like the one guy said, it's like four to one, I'm getting four loads for one. So, you add up the math and see what happened. I'm not going to argue that with you, I'm just saying from my standpoint, you ain't going to get no more warranty. The best we got severe service, and you still won't get no warranty, but you got to understand, like Doug said, load is critical and you can't overload a vehicle like that and expect durability out of any of your products.

MIKE YAGLEY

You know what it reminds me of, Dave, you and I spent some time in China together. Some of those high load guys that we met there were just unbelievable. And basically, what they did there was they just had thrown away vehicles. They would buy a vehicle, they'd have it for a year, overload, just amazing overloads. They just would calculate, I can carry 10 metric ton per wheel, and so if this vehicle has 10 wheels, well then, I get to carry 100 metric ton. And don't forget a metric ton is 10% bigger than a US ton. So, they're looking at like, "Oh, I can carry 110 tons." Or if they had, let's say 15, 20 wheels on the vehicle, "I can carry 200 tons, 200 metric tons, 220 American tons."

MIKE YAGLEY

And I'd ask them, "what kind of... What do you do with these vehicles?" They'd say, "Oh, they last for six months and I throw them away." It's a completely different world when you get into these high overload businesses. Like you said, those coal guys, they do the math, they know what the damage is to the vehicles and they sort of run with it. But that's amazing. I guess I didn't realize we saw that to that level here in the US also. 90 ton is just an amazing number.

DAVE WALTERS

Now, again, I'll say this is going back because that state now has basically told them, hauling coal is allowed to run a hundred thousand pounds vehicle coal, everything. From 180,000 pounds payload, plus another 25, 30,000 vehicle, two tens, two twenties. So now they're down to a hundred, so we're going in the right direction. But we do make severe service wheels and I always stress that.

MIKE YAGLEY

So let's go to the next one. Dave, what's going on here?



DAVE WALTERS

Okay. This particular one, as you can see, the wheel actually cracked the whole bolt circle, and this is another designer wheel. We don't know what the inner dual did, but we can tell you that this wheel was moving. We believe the inner dual could have been a steel wheel and basically gouged out or smoothed up the other part of this wheel. But this is one I really didn't talk to, but whenever we got it in, it was unique because the mounting flange is still intact and the other part of it is not. And to me, this looks like they run a steel wheel inner wheel and it broke and when it did, it just carved up everything that it could except the mounting flange, but it also cracked our wheels. So, when we say poor inspection protocol, this is kind of the poster child.

DOUG MASON

Yeah, it's very... If you can get on the show and look at this, it's very unique. The inner mounting circle basically stayed stationary. So that would in my mind mean that the inner wheel steel or otherwise had to break off just outside of the bolt circle and as you said, tore up the other wheel and ended up creating this crack that went around, but it stayed in place. This thing had good torque on the nuts.

MIKE YAGLEY

Yeah.

DOUG MASON

It stayed.

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MIKE YAGLEY

So to try and explain this a little bit more, it's got, like the other guys have said, we call it the bolt circle. And the bolt circle is if you take a line, make a circle that goes from bolt hole to bolt hold to bolt hold to bolt hole, that is called the bolt circle, and that's part of the design geometry. It's how we know that our wheels are going to fit nicely onto the hub. So, we pay a lot of attention to the bolt circle. And what you've got here is, all the metal on the inside of the bolt circle from the bolt circle into the hub is perfectly in great shape. There's nothing wrong with it. But going out from the bolt circle out toward the rim, it's just tore up. There's a crack that goes 360 degrees around the wheel at the bolt circle, going from old hole to bolt hole.

MIKE YAGLEY

And then on the mounting face there, the part that's been beat up, it looks like it's been dragged along something. That's another one that has that same sandpaper look to it. So, there was certainly movement on the inner dual, something was moving around there and just eaten up that wheel on that surface. And it is a steel wheel that didn't make it. It's the best conjecture, best explanation I can think of. I agree with what Dave said, and that makes the most sense. It's still, it's amazing the kind of the kind of damage that we're seeing on this thing.

DOUG MASON

And the fact that the wheel stayed on the vehicle.

MIKE YAGLEY

Yeah. They were at 500-foot pounds. We've had a lot of discussions on the benefits of keeping within spec, at least they did that right.

MIKE YAGLEY

Well, that does it for today's episode of Behind the Wheels. Really glad you joined us, had a lot of fun with this one. If you want to get in touch with us, you can go to the website at alcoawheels.com, click through, there'll be a selection there to go to the podcast and you can write us any questions or comments. We'd love to hear from you. I think that does it. Thanks a lot. We'll see you next time.

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